OSHA Compliance Manual

Application of Key OSHA Topics

J. J. Keller
& Associates, Inc.®
Since 1953

34-M (1066)

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Introduction

The Occupational Safety and Health Act of 1970 states that, at a minimum, a worker can expect a safe and healthful work environment. The importance of an effective workplace safety and health program cannot be overemphasized. OSHA has focused its efforts toward achieving that goal for nearly forty years, passing workplace standards, setting acceptable limits, developing voluntary guidelines, forming partnerships, and making recommendations.

Achieving compliance is often more complicated than simply reading the regulations. Most of OSHA regulations are "performance-oriented," which means the desired results are stated, but how employers are to achieve these results is not clarified.

The first assumption of this manual is that you have a copy of the OSHA regulations. The second assumption is that you are looking for something to take you beyond *what* the regulations are, to *how do I comply* with them.

The third assumption is that you do not want to spend hours researching a single topic, such as employee training or labeling. This manual pulls together all the instances of required employee training so you can set up one program to meet the varied requirements.

Used in conjunction with the OSHA regulations, this manual serves as an effective guide to implementing safety and health requirements in your workplace.

Revision bars, like the one at the left of this paragraph, are used in this publication to show where significant changes were made on update pages. The revision bar next to text on a page indicates that the text was revised. The date at the bottom of the page tells you when the revised page was issued.

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OSHA

This manual provides information to help employers maintain a safe and healthful workplace for all employees and, at the same time, meet the safety and health requirements of federal OSHA. In order to understand the Occupational Safety and Health Administration's regulations, it is important to have a basic understanding of the agency, how it functions, and its effect on employers around the nation.

What is OSHA?

An brief summary of why the Occupational Safety and Health Administration (OSHA) was established, who it covers, the programs it offers, employer and employee rights and responsibilities, and the General Duty Clause.

Inspections

What every employer needs to know about how OSHA conducts workplace inspections. This section provides details about how to prepare for an inspection, the inspection process, how to contest a citation, follow-up inspections, violation statistics, and OSHA's Top 25 General Industry violations for the current year.

OSHA COMPLIANCE MANUAL

WHAT IS OSHA?

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Introduction

OSHA is the federal agency charged with setting and enforcing standards to ensure safe and healthful working conditions in the United States. The Agency was created by Congress through the Occupational Safety and Health Act of 1970. OSHA is part of the United States Department of Labor. The administrator for OSHA, known as the Assistant Secretary of Labor for Occupational Safety and Health, answers to the Secretary of Labor, who is a member of the cabinet of the President of the United States.

OSHA carries out its mission to ensure worker safety through the following methods:

- Setting workplace safety and health standards;
- Enforcing those standards;
- Providing training, outreach, education and assistance.

Most employees in the nation come under OSHA's jurisdiction. OSHA covers private sector employers and employees in all 50 states, the District of Columbia, and other U.S. jurisdictions either directly through federal OSHA or through an OSHA-approved state program. State run health and safety programs must be at least as effective as the federal OSHA program, but can also be more stringent.

The following table provides an at-a-glance look at federal OSHA jurisdiction versus state OSHA jurisdiction.

OSHA jurisdiction at-a-glance		
State	**Federal OSHA jurisdiction**	**State OSHA jurisdiction**
Alabama	Private sector	
Alaska		Public and private sector
Arizona		Public and private sector
Arkansas	Private sector	
California		Public and private sector
Colorado	Private sector	
Connecticut	Private sector	Public sector
Delaware	Private sector	
District of Columbia	Private sector	
Florida	Private sector	
Georgia	Private sector	
Guam	Private sector	
Hawaii	Temporary concurrent enforcement with state	Temporary concurrent enforcement with Federal
Idaho	Private sector	
Illinois	Private sector	Public sector
Indiana		Public and private sector
Iowa		Public and private sector
Kansas	Private sector	
Kentucky		Public and private sector
Louisiana	Private sector	
Maine	Private sector	
Maryland		Public and private sector
Massachusetts	Private sector	
Michigan		Public and private sector
Minnesota		Public and private sector
Mississippi	Private sector	
Missouri	Private sector	
Montana	Private sector	
Nebraska	Private sector	

OSHA jurisdiction at-a-glance		
State	**Federal OSHA jurisdiction**	**State OSHA jurisdiction**
Nevada		Public and private sector
New Hampshire	Private sector	
New Jersey	Private sector	Public sector
New Mexico		Public and private sector
New York	Private sector	Public sector
North Carolina		Public and private sector
North Dakota	Private sector	
Ohio	Private sector	
Oklahoma	Private sector	
Oregon		Public and private sector
Pennsylvania	Private sector	
Puerto Rico		Public and private sector
Rhode Island	Private sector	
South Carolina		Public and private sector
South Dakota	Private sector	
Tennessee		Public and private sector
Texas	Private sector	
Utah		Public and private sector
Vermont		Public and private sector
Virgin Islands	Private sector	Public sector
Virginia		Public and private sector
Washington		Public and private sector
West Virginia	Private sector	
Wisconsin	Private sector	
Wyoming		Public and private sector

Who is not covered by the OSH Act?

The OSH Act does not cover:

- Self employed;
- Immediate family members of farm employers that do not employ outside employees; and
- Workers who are protected by another federal agency (for example the Mine Safety and Health Administration, FAA, Coast Guard).

State and local government workers

Employees who work for state and local governments are not covered by federal OSHA, but have OSH Act protections if they work in a state that has an OSHA-approved state program. In addition, states may elect to establish OSHA plans that only cover public sector employees; in these cases, private sector workers in those states would fall under federal OSHA jurisdiction.

Federal government workers

Federal agencies must have a safety and health program that meets the same standards as private employers. Although OSHA does not fine federal agencies, it does monitor federal agencies and respond to workers' complaints. There is one exception to this: the United States Postal Service (USPS) is covered by OSHA in the same way that private employers are.

OSHA regulations

In carrying out its duties, OSHA is responsible for developing and issuing legally enforceable standards and regulations.

It is every employer's responsibility to understand the standards and regulations that apply to his or her operations. Likewise, employees are responsible to comply with all rules that apply to their own actions and conduct.

OSHA standards are rules that describe the methods that employers must use to protect their employees from hazards. There are OSHA standards for construction work, maritime operations, and general industry, which is the set that applies to most worksites. These standards limit the amount of hazardous chemicals workers can be exposed to, require the use of certain safe practices and equipment, and require employers to monitor hazards and keep records of workplace injuries and illnesses. Examples of OSHA standards include requirements to:

- Provide fall protection,
- Prevent trenching cave ins,
- Prevent infectious diseases,
- Assure that workers safely enter confined spaces,
- Prevent exposure to harmful substances like asbestos,
- Put guards on machines,
- Provide respirators or other safety equipment, and
- Provide training for certain dangerous jobs.

The General Duty Clause

In situations where OSHA has not developed specific standards, employers are responsible for complying with the OSH Act's General Duty Clause (Section 5.a.1). The General Duty Clause states that each employer:

> "shall furnish ... a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."

Where OSHA inspectors find workplace hazards that are not addressed in the regulations, they may cite the employer under the General Duty Clause.

The following elements are necessary for OSHA to cite a General Duty Clause violation:

- Employees are exposed to a hazard;
- The hazard is recognized;
- The hazard is likely to cause death or serious physical harm; and
- There is a feasible and useful method to correct the hazard.

How OSHA develops standards

OSHA publishes its intention to propose, amend, or revoke a standard in the *Federal Register*, either as:

- A Request for Information or an Advance Notice of Proposed Rulemaking or announcement of a meeting to solicit information to be used in drafting a proposal; or
- A Notice of Proposed Rulemaking, which sets out the proposed new rule's requirements and provides a specific time for the public to respond.

These actions are posted online at www.regulations.gov. Interested parties may submit written information, comments, and evidence. In addition, OSHA may also schedule a public hearing to consider various points of view. After reviewing public comments, evidence, and testimony, OSHA publishes:

- The full text of any standard amended or adopted and the date it becomes effective, along with an explanation of the standard — known as a preamble — and the reasons for implementing it; or
- A determination that no standard or amendment is necessary.

OSHA's semi-annual regulatory agenda

Twice a year, the federal government publishes a summary of current regulatory activity occurring in the departments and agencies under its jurisdiction. The following is an overview of OSHA's major projects as outlined in the Fall 2011 agenda:

Final rule stage

Electric Power Transmission and Distribution; Electrical Protective Equipment

OSHA has developed a revision to the Electric Power Transmission and Distribution requirements for both construction and general industry, so that the requirements are similar for work in both industries. In addition, OSHA will be revising a few miscellaneous general industry requirements primarily affecting electric transmission and distribution work, including provisions on electrical protective equipment and foot protection. This rulemaking also addresses fall protection in aerial lifts for work on power generation, transmission, and distribution installations.

Status: OSHA plans to publish the Final Rule in 2012.

Hazard Communication Standard - Global Harmonization System of Classification and Labeling of Chemicals

OSHA and other U.S. agencies have been involved in a long-term project to negotiate a globally harmonized approach to informing workers about chemical hazards. The result is the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). OSHA is revising its Hazard Communication Standard to make it consistent with the GHS. The new standard will include more specific requirements for hazard classification, as well as standardized label components which will provide consistent information and definitions for hazardous chemicals and a standard approach to conveying information on material safety data sheets.

Status: The Final Rule was published in March 2012, with an effective date of May 26, 2012. There is a phase-in period for compliance.

Effective Completion Date	Requirement(s)	Who
Dec. 1, 2013	Train employees on the new label elements and safety data sheet (SDS) format.	Employers
June 1, 2015* December 1, 2015	Compliance with all modified provisions of this final rule, except: The Distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label	Chemical manufacturers, importers, distributors and employers
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.	Employers
Transition period to above dates	May comply with either 29 CFR 1910.1200 (the final standard), or the current standard, or both	Chemical manufacturers, importers, distributors, and employers

Walking/Working Surfaces - Subparts D & I

This proposed standard will update OSHA's rules covering slip, trip and fall hazards and establish requirements for personal fall protection systems. The rule affects almost every non-construction worker in the United States. This is an important rulemaking because it addresses hazards that result in numerous deaths and thousands of injuries every year. The proposal is expected to prevent 20 workplace fatalities per year and over 3,500 injuries serious enough to result in days away from work.

Status: The Agency issued the Proposed Rule in May 2010 and held public meetings in January 2011. The Final Rule is expected in October 2012.

Cooperative Agreements

OSHA is proposing to revise its regulations for the federally funded On-site Consultation Program to: a) Clarify the ability of OSHA to define sites which would receive inspections regardless of Safety and Health Achievement Recognition Program (SHARP) exemption status; b) allow Compliance Safety and Health Officers to proceed with enforcement visits resulting from referrals at sites undergoing Consultation visits and at sites that have been awarded SHARP status; and c) limit the deletion period from OSHA's programmed inspection schedule for those employers participating in the SHARP program. Note: SHARP is a recognition program that OSHA administers to provide incentives and support for small employers to develop, implement, and continuously improve effective safety and health programs at their worksites.

Status: OSHA published the Proposed Rule in September 2010. OSHA plans to take final action in 2012.

Proposed Rule stage

Injury and Illness Recordkeeping and Reporting - NAICS and Reporting revisions

This proposal involves changes to two aspects of the OSHA recordkeeping and reporting requirements. First, OSHA is proposing to update appendix A to subpart B of part 1904. This appendix contains a list of industries that are partially exempt from the requirements to maintain a log of occupational injuries and illnesses, generally due to their relatively low rates of occupational injury and illness. The current list of industries is based on the Standard Industrial Classification (SIC) system. In 1997, a newer system, the North American Industry Classification System (NAICS), was introduced to classify establishments by industry. The proposed rule would update appendix A by replacing it with a list of industries based on the NAICS and based on more recent occupational injury and illness rates. Second, OSHA is proposing to revise the reporting requirements regarding the obligations of employers to report to OSHA the occurrence of fatalities and certain injuries. The existing regulations require employers to report to OSHA within 8 hours any work-related incident resulting in the death of an employee or the in-patient hospitalization of three or more employees. The Proposed Rule would require employers to report to OSHA all fatalities and all hospitalizations, as well as amputations.

Status: OSHA published the Proposed Rule in June 2011 and expects to analyze comments in 2012.

Injury and Illness Recordkeeping and Reporting - Improved Tracking of Workplace Injuries and Illnesses

OSHA is proposing changes to its reporting system for occupational injuries and illnesses. An updated and modernized reporting system would enable a more efficient and timely collection of data and would improve the accuracy and availability of the relevant records and statistics. This proposal involves modification to 29 CFR part 1904.41 to expand OSHA's legal authority to collect and make available injury and illness information required under part 1904.

Status: OSHA held stakeholder meetings in 2010 and plans to publish a Proposed Rule in 2012.

Crystalline Silica

Inhalation of respirable silica dust can cause lung disease, silicosis and lung cancer. Exposure to airborne silica dust occurs in operations involving cutting, sawing, drilling and crushing of concrete, brick, block and

other stone products, and in operations using sand products (e.g., in glass manufacturing and sand blasting). One study estimated that there may be as many as 7,000 new cases of chronic silicosis each year. This rulemaking will update existing permissible exposure limits and establish additional provisions to protect workers from exposures to respirable crystalline silica dust.

Status: OSHA planned to publish a Proposed Rule in early 2012. However, the proposal has been delayed in the OMB review process, due to opposition from industry groups.

Updating OSHA Standards based on National Consensus Standards

This rule would revise the references to ANSI standards regarding head protection in OSHA's personal protective equipment standard. The rule will reference the 2009 edition of ANSI Z89.1.

Status: OSHA plans to publish a Direct Final Rule and companion Proposed Rule in early 2012.

Pre-rule stage

Injury and Illness Prevention Rule (I2P2)

OSHA is looking at developing a rule that would require employers to implement an Injury and Illness Prevention Program. It involves planning, implementing, evaluating, and improving processes and activities that protect employee safety and health. OSHA has substantial data on reductions in injuries and illnesses from employers who have implemented similar effective processes. The Agency currently has voluntary Safety and Health Program Management Guidelines, published in 1989. An injury and illness prevention rule would build on these guidelines as well as lessons learned from successful approaches and best practices under OSHA's Voluntary Protection Program, Safety and Health Achievement Recognition Program, and similar industry and international initiatives such as American National Standards Institute/American Industrial Hygiene Association Z10 and OHSAS 18001. Twelve States have similar rules.

Status: As a first step, the Agency held stakeholder meetings beginning in June 2010 to obtain input for an injury and illness prevention rulemaking. The Agency announced it will convene a Small Business Regulatory Fairness Act review in 2012.

Review/Lookback of Chemical Standards

As part of the Department's Regulatory Review and Lookback Efforts, OSHA is developing a Request for Information (RFI) seeking input from the public to help the Agency identify effective ways to address occupational exposure to chemicals. The majority of OSHA's Permissible Exposure Limits (PELs) were adopted in 1971, under section 6(a) of the OSH Act and only a few have been successfully updated since that time. There is widespread agreement among industry, labor, and professional occupational safety and health organizations that OSHA's PELs are outdated and need revising in order to take into account newer scientific data that indicates that significant occupational health risks exist at levels below OSHA's current PELs. In 1989, OSHA issued a final standard that lowered PELS for over 200 chemicals and added PELS for 164. However, the final rule was challenged and ultimately vacated by the 11th Circuit Court of Appeals in 1991 citing deficiencies in OSHA's analyses. Since that time OSHA has made attempts to examine its outdated PELs in light of the court's 1991 decision. Most recently, OSHA sought input through a stakeholder meeting and web forum to discuss various approaches that might be used to address its outdated PELs.

Status: OSHA plans to publish a request for information in August 2012.

Bloodborne Pathogens

OSHA is undertaking a review of the Bloodborne Pathogen Standard (29 CFR 1910.1030) in accordance with the requirements of the Regulatory Flexibility Act and section 5 of Executive Order 12866. The review will consider the continued need for the rule; whether the rule overlaps, duplicates, or conflicts with other Federal, State or local regulations; and the degree to which technology, economic conditions, or other factors may have changed since the rule was evaluated.

Status: The review began in October 2009; OSHA plans to end the review and issue findings in 2012.

Infectious Diseases

Employees in health care and other high-risk environments face long-standing infectious diseases hazards such as tuberculosis (TB), varicella disease (chickenpox, shingles), and measles (rubeola), as well as new and emerging infectious disease threats, such as Severe Acute Respiratory Syndrome (SARS) and pandemic influenza. Health care workers and workers in related occupations or who are exposed in other high-risk environments are at increased risk of contracting TB, SARS, MRSA, and other infectious diseases that can be transmitted through a variety of exposure routes. OSHA is concerned about the ability of employees to continue to provide health care and other critical services without unreasonably jeopardizing their health. OSHA is considering the need for a standard to ensure that employers establish a comprehensive infection control program and control measures to protect employees from infectious disease exposures to pathogens that can cause significant disease. Workplaces where such control measures might be necessary include: health care, emergency response, correctional facilities, homeless shelters, drug treatment programs, and other occupational settings where employees can be at increased risk of exposure to potentially infectious people. A standard could also apply to laboratories which handle materials that may be a source of pathogens, and to pathologists, coroners' offices, medical examiners, and mortuaries.

Status: OSHA plans to initiate a small business review panel in 2012.

Long-term rulemaking stage

Combustible Dust

OSHA has commenced rulemaking to develop a combustible dust standard for general industry. Combustible dust can cause catastrophic explosions like the 2008 disaster at a sugar refinery that killed 14 workers and seriously injured dozens more. Deadly combustible dust fires and explosions can be caused by a wide array of materials and processes in a large number of industries. Materials that may form combustible dust include wood, coal, plastics, spice, starch, flour, feed, grain, fertilizer, tobacco, paper, soap, rubber, drugs, dyes, certain textiles, and metals. While a number of OSHA standards address aspects of this hazard, the Agency does not have a comprehensive standard that addresses combustible dust.

Status: OSHA published an Advance Notice of Proposed Rulemaking in October 2009 and held stakeholder meetings in December 2009. The next action is currently undetermined.

Injury and Illness Recording and Reporting Requirements (Musculoskeletal Disorders)

OSHA is proposing to revise its regulation on Recording and Reporting Occupational Injuries and Illnesses (Recordkeeping) to add a column on the OSHA 300 Injury and Illness Log that employers will check when recording work-related musculoskeletal disorders (MSDs). The MSD data from the column will help about 750,000 employers and 40 million workers track injuries at individual workplaces, and improve the Nation's occupational injury and illness information data published by the Bureau of Labor Statistics.

Status: The Proposed Rule was published in January 2010. However, OSHA temporarily withdrew the rulemaking from the mandated government regulatory review, while more outreach was conducted with small businesses. Additionally, OSHA's budget for FY12 contained language prohibiting the Agency from working on the rule during that time period. The next action for the rulemaking is undetermined.

Beryllium

Beryllium is a lightweight metal that has a wide variety of applications, including aerospace, telecommunications and defense applications. Chronic beryllium disease occurs when people inhale beryllium dust or fumes and can take anywhere from a few months to 30 years to develop. The disease is caused by an immune system reaction to beryllium metal, and causes symptoms such as persistent coughing, difficulty breathing

upon physical exertion, fatigue, chest and joint pain, weight loss, and fevers. OSHA is developing a rule that would update the permissible exposure limit and establish additional provisions to protect exposed workers.

Status: The next action is currently undetermined.

Diacetyl

Employee exposure to diacetyl causes obstructive airway disease, including the disabling and sometimes fatal lung disease called bronchiolitis obliterans or "popcorn lung." This rulemaking will establish a permissible exposure limit as well as additional provisions to protect workers from exposure to diacetyl. The Agency is also looking at the health impact of diacetyl substitutes. NIOSH has found that some current substitutes in use may be structurally similar to diacetyl and pose similar hazards.

Status: The next action is currently undetermined.

Variances from rules

Generally, a variance is an alternative procedure of compliance with some part of a safety and health standard granted by OSHA to an employer. For example, sometimes employers may not be able to comply fully and on time with a new safety or health standard because of a shortage of personnel, materials, or equipment. Or, employers may prefer to use methods, equipment, or facilities that they believe protect workers as well as or better than OSHA standards.

In situations like these, employers may apply to OSHA for a variance. (Written application must be sent either to Federal OSHA or the appropriate State OSHA.) There are four types of variances: temporary, permanent, experimental, and national defense. The two variances that are most common are temporary and permanent variances.

Temporary variance

A temporary variance allows employers a short-term (limited time) relief from a standard when they cannot comply with newly published OSHA requirements by the prescribed effective date because the necessary construction or alteration of the facility cannot be completed in time or when technical personnel, materials, or equipment are temporarily unavailable. To be eligible for a temporary variance, an employer must implement an effective compliance program as quickly as possible. In the meantime, the employer must demonstrate to OSHA that all available steps are being taken to safeguard workers.

Inability to afford compliance costs is not a valid reason for requesting a temporary variance.

Permanent variance

A permanent variance grants an alternative means of compliance with the requirements of a standard to employers who can prove that their methods, conditions, practices, operations, or processes provide workplaces that are as safe and healthful as those that follow the OSHA standards. When applying for a permanent variance, employers must let workers know they have filed the application and that the workers have the right to request a hearing. To decide whether to grant a permanent variance, OSHA reviews the employer's evidence and, if appropriate, visits the workplace to confirm the facts provided in the application. If the request has merit, OSHA may grant a permanent variance. Final variance orders detail the employer's specific responsibilities and requirements and explain exactly how the employer's method varies from the OSHA requirement.

OSHA Consultation Services

OSHA's On-Site Consultation Program offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites. On-site Consultation services are separate from enforcement and do not result in penalties or citations. Consultants from state agencies or universities work with employers to identify workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing safety and health management systems.

Consultation program participants:

- Receive professional advice and assistance to correct workplace hazards;
- Benefit from on-site training and assistance;
- May be deferred from OSHA inspections during the course of the consultation; and
- Make safety and health activities routine rather than crisis-oriented responses.

Getting started with Consultation Services

Because consultation is a voluntary activity, employers must request it. The employer's telephone call or letter sets the consulting machinery in motion. The consultant will discuss the employer's specific needs and set up a visit date based on the priority assigned to the request, the employer's work schedule, and the time needed for the consultant to adequately prepare. OSHA encourages a complete review of employers' safety and health situation; however, employers may limit the visit to one or more specific problems.

The employer's only obligation is to commit to correcting serious job safety and health hazards – a commitment which is expected to be made prior to the actual visit and carried out in a timely manner.

Opening conference

When the consultant arrives at a worksite for the scheduled visit, he or she will first meet with the employer in an opening conference to briefly review the consultant's role and the obligation the employer incurs.

Walk-through

Together, the employer and the consultant will examine conditions in the workplace. OSHA strongly encourages maximum employee participation in the walk-through. Better informed and more alert employees can more easily work with the employer to identify and correct potential injury and illness hazards in your workplace. Talking with employees during the walk-through helps the consultant identify and judge the nature and extent of specific hazards.

The consultant will study the entire workplace or the specific operations the employer designates and discuss the applicable OSHA standards. Consultants also will point out other safety or health risks that might not be cited under OSHA standards, but nevertheless may pose safety or health risks to employees. They may suggest and even provide other measures such as self-inspection and safety and health training to prevent future hazardous situations.

A comprehensive consultation also includes (1) appraisal of all mechanical and environmental hazards and physical work practices, (2) appraisal of the present job safety and health program or establishment of one, (3) a conference with management on findings, (4) a written report of recommendations and agreements, and (5) training and assistance with implementing recommendations.

Closing conference

The consultant will then review detailed findings with the employer in a closing conference. The employer will learn not only what is needed to improve, but also what it is doing right. At that time, the employer can discuss problems, possible solutions, and abatement periods to eliminate or control any serious hazards identified during the walk-through. In rare instances, the consultant may find an "imminent danger" situation during the walk-through. If so, the employer must take immediate action to protect all employees. In certain other

situations that would be judged a "Serious violation" under OSHA criteria, the employer and the consultant are required to develop and agree to a reasonable plan and schedule to eliminate or control that hazard. The consultants will offer general approaches and options to the employer. They may also suggest other sources for technical help.

Abatement and follow-through

The consultant will send to the company a detailed written report about 20 days after the closing conference that explains the findings and confirms agreed upon correction periods. A list of hazards is included in the report and must be posted electronically or in an easily observable area by employees for three days or until the listed hazards are corrected. Consultants may also contact the business from time to time to check progress, and employers may always contact them for assistance. Employers using the consultation serviceare deferred from OSHA's scheduled inspections while the consultation remains "in progress." This period encompasses the time between the onset of the consultation and the final correction dates, including any extensions.

Ultimately, OSHA does require hazard correction so that each consultation visit achieves its objective — effective employee protection. If there is a failure to eliminate or control identified serious hazards (or an imminent danger) according to the plan and within the limits agreed upon, the situation is referred from consultation to an OSHA enforcement office for appropriate action.

Role of Consultation personnel

The consultants will:

- Help employers recognize hazards;
- Suggest general approaches or options for solving a safety or health problem;
- Identify kinds of help available if further assistance is needed;
- Provide employers with a written report summarizing findings;
- Assist employers with developing or maintaining an effective safety and health program;
- Provide training and education;
- Recommend the employer for a one-year exclusion from OSHA programmed inspections, once program criteria are met.

The consultants will not:

- Issue citations or propose penalties for violations of OSHA standards;
- Report possible violations to OSHA enforcement staff; or
- Guarantee that the workplace will "pass" an OSHA inspection.

Safety and Health Achievement Recognition Program (SHARP)

Employers may participate in OSHA's Safety and Health Achievement Recognition Program (SHARP) or a similar state program. This program is designed to provide incentives and support to employers to develop, implement and continuously improve effective safety and health programs at their worksite(s). SHARP provides for recognition of employers who have demonstrated exemplary achievements in workplace safety and health by receiving a comprehensive safety and health consultation visit, correcting all workplace safety and health hazards, adopting and implementing effective safety and health management systems, and agreeing to request further consultative visits if major changes in working conditions or processes occur which may introduce new hazards. Employers who meet these specific SHARP requirements may be exempted from OSHA programmed inspections for a period not less than one year.

To participate in SHARP, an employer must:

- Request a comprehensive consultation visit from the On-site Consultation office that involves a complete hazard identification survey;
- Involve employees in the consultation process;
- Correct all hazards identified by the consultant; Implement and maintain a safety and health management system that, at a minimum, addresses OSHA's 1989 Safety and Health Program Management Guidelines;
- Maintain the company's Days Away, Restricted, or Transferred (DART) rate and Total Recordable Case (TRC) rate below the national average for your industry; and
- Agree to notify the employer's state's On-site Consultation office prior to making any changes in the working conditions or introducing new hazards into the workplace.

To schedule an On-site Consultation visit and determine eligibility for SHARP, contact your state's On-site Consultation office.

Voluntary Protection Programs (VPP)

Voluntary Protection Programs (VPP) promote effective worksite-based safety and health. The goal of VPP participants is to take worker protection beyond the minimum requirements of OSHA standards. In the VPP, management, labor, and OSHA establish cooperative relationships at work-places that have implemented comprehensive safety and health management systems.

Top-notch safety and health programs

The VPP recognizes employers and workers in the private industry and federal agencies who have implemented effective safety and health management systems and maintain injury and illness rates below national Bureau of Labor Statistics averages for their respective industries. In VPP, management, labor, and OSHA work cooperatively and proactively to prevent fatalities, injuries, and illnesses through a system focused on: hazard prevention and control; worksite analysis; training; and management commitment and worker involvement. To participate, employers must submit an application to OSHA and undergo a rigorous onsite evaluation by a team of safety and health professionals. Union support is required for applicants represented by a bargaining unit. VPP participants are re-evaluated every three to five years to remain in the programs. VPP participants are exempt from OSHA programmed inspections while they maintain their VPP status.

There are three levels of VPP:

- Star, which is the most rigorous;
- Merit, which is a stepping-stone to Star status; and
- Demonstration, which is used for programs that use alternative safety and health management systems.

For more information on becoming a VPP member, contact OSHA's Office of Partnerships and Recognition at (202) 693-2213 or the VPP Manager at your OSHA Regional Office.

Whistleblower protections

The OSH Act is designed to regulate employment conditions relating to occupational safety and health and to achieve safer and more healthful workplaces throughout the nation. The Act provides for a wide range of substantive and procedural rights for employees and representatives of employees. The Act also recognizes that effective implementation and achievement of its goals depend in large measure upon the active and orderly participation of employees, individually and through their representatives, at every level of safety and health activity.

To help ensure that employees are, in fact, free to participate in safety and health activities, Section 11(c) of the Act prohibits any person from discharging or in any manner retaliating against any employee because the employee has exercised rights under the Act. These rights include complaining to OSHA and seeking an OSHA inspection, participating in an OSHA inspection, and participating or testifying in any proceeding related to an OSHA inspection.

OSHA also administers the whistleblowing provisions of eighteen other statutes, protecting employees who report violations of various airline, commercial motor carrier, consumer product, environmental, financial reform, health care reform, nuclear energy, pipeline, public transportation agency, railroad and securities laws.

A person filing a complaint of discrimination or retaliation will be required to show that he or she engaged in protected activity, the employer knew about that activity, the employer subjected him or her to an adverse action, and the protected activity contributed to the adverse action.

Adverse action is generally defined as any action that would dissuade a reasonable employee from engaging in protected activity. Depending upon the circumstances of the case, “adverse action” can include:

- Firing or laying off
- Blacklisting
- Demoting
- Denying overtime or promotion
- Disciplining
- Denial of benefits
- Failure to hire or rehire
- Intimidation
- Making threats
- Reassignment affecting prospects for promotion
- Reducing pay or hours

The 18 statutes enforced by OSHA are listed below:

- Section 11(c) of the Occupational Safety and Health Act
- Surface Transportation Assistance Act (STAA)
- Asbestos Hazard Emergency Response Act (AHERA)
- International Safe Container Act (ISCA)
- Safe Drinking Water Act (SDWA)
- Federal Water Pollution Control Act (FWPCA)
- Toxic Substances Control Act (TSCA)

- Solid Waste Disposal Act (SWDA)
- Clean Air Act (CAA)
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- Energy Reorganization Act (ERA)
- Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (AIR21)
- Corporate and Criminal Fraud Accountability Act, Title VIII of the Sarbanes Oxley Act (SOX)
- Pipeline Safety Improvement Act (PSIA)
- Federal Railroad Safety Act (FRSA)
- National Transit Systems Security Act (NTSSA)
- Consumer Product Safety Improvement Act (CPSIA)
- Section 1558 of the Affordable Care Act (ACA), P.L. 111-148

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Inspections

Introduction

Under the OSH Act, OSHA is authorized to conduct workplace inspections to determine whether employers are complying with safety and health standards. Workplace inspections are performed by federal and state OSHA compliance officers who are knowledgeable and experienced in the occupational safety and health field and who are trained in the OSHA standards and in the recognition of safety and health hazards.

OSHA and its state partners have approximately 2,000 inspectors.

Inspection priorities

Many employers have the vision of OSHA randomly picking workplaces to inspect. The fact is OSHA relies primarily on "programmed" inspections for the vast majority of enforcement work. Typically, nearly 60 percent of all OSHA inspections are programmed.

Programmed inspections are those "planned" inspections designed to target the areas or issues where OSHA believes enforcement is most needed. Current programmed inspection plans include the following:

- 12 National Emphasis Programs (NEPs) — Focusing on amputations, lead, crystalline silica, shipbreaking, trenching/excavations, primary metals industries, process safety management covered chemical facilities, hexavalent chromium, diacetyl, combustible dust, and federal agency targeting inspection.
- 150 Regional and Local Emphasis Programs — Focusing on a variety of issues, including forklifts, residential construction, and falls. (See the end of this section for a listing of current regional/local emphasis programs.)
- Site-Specific Targeting Program (SST) — Focusing on non-construction workplaces that have 20 or more workers and have high injury and illness rates.
- Severe Violator Enforcement Program (SVEP) — Focuses on employers who show indifference to their OSH Act obligations.

OSHA also conducts "unprogrammed" inspections in response to complaints, referrals from other agencies, and reports of fatalities or catastrophes. While these types of inspections do not occur as frequently as programmed inspections, they can take priority over a programmed inspection, if for example there is an imminent danger. (Imminent danger situations, where a hazard exists that will likely cause death or serious physical harm immediately, are given top priority for OSHA inspection.)

In addition, under very limited circumstances, OSHA may conduct phone/fax investigations. This process is used when OSHA receives a complaint regarding a low-priority hazard. With the permission of the complainant, OSHA may telephone the employer to describe safety and health concerns, following up with a fax providing details on alleged safety and health hazards. The employer must respond in writing within five working days, identifying any problems found and noting corrective actions taken or planned. If the response is adequate and the complainant satisfied with the response, OSHA generally will not conduct an on-site inspection.

Inspections: By the numbers

Federal OSHA conducts approximately 40,000 inspections per year. (State OSHA plans conduct an additional 60,000 inspections per year on average.)

Federal OSHA Inspections		
Reason for inspection	**Description**	**Frequency**
National, regional, local emphasis programs	Hazard-based (e.g. combustible dust) Equipment-based (e.g., forklifts, presses) Industry-based (e.g., logging, residential construction)	60% of *all* inspections — approximately 24,000 per year.
Site-Specific-Targeting Program	Based on injury rates (usually 4-5 times the national average) Heavy focus on manufacturing	
Complaints	Most commonly from employee complaints	50% of *unprogrammed* inspections — 7,000 per year.
Referrals from other agencies	Referrals from local building inspectors, EPA inspectors, etc.	5,000 per year
Follow-up from prior inspection	OSHA often conducts follow-up inspections of employers who have previously been cited	3,000 per year
Plain-view	More common in the construction industry, where OSHA inspectors drive by a jobsite and notice a potentially unsafe situation	
Fatality/catastrophe reports	When employers report a fatality or multiple hospitalization or OSHA learns of these through media reports or other sources	900 per year

The inspection process

Once OSHA has decided to initiate an inspection, the OSHA compliance officer, before visiting the establishment or site, will become familiar with as many relevant facts as possible about the workplace, such as the:

- Inspection history of the establishment
- Nature of the business
- Standards that might apply

This preparation provides the compliance officer with a knowledge of the potential hazards and industrial processes that may be encountered. It also helps in the selection of appropriate personal protective equipment for protection against these hazards during the inspection.

No advance warning

Inspections are usually conducted without advance notice. In fact, alerting an employer without proper authorization in advance of an OSHA inspection can bring a fine of up to $1,000 and/or a six-month jail term. This is true for OSHA compliance officers as well as state inspectors.

OSHA's arrival

When the OSHA compliance officer arrives at an establishment, he or she displays official credentials and asks to meet an appropriate employer representative. An OSHA compliance officer carries U.S. Department of Labor credentials bearing his or her photograph and a serial number that can be verified by calling the nearest OSHA office. You should always ask to see the officer's credentials.

Refusing the inspection

The OSH Act gives compliance officers the right to enter without delay to inspect. However, employers do have a right to refuse entry without a warrant, under the fourth amendment to the U.S. Constitution. However, employers must recognize that it is relatively quick and easy for OSHA compliance officers to obtain a warrant.

Opening conference

The first component of an OSHA inspection is the opening conference. During this conference, the compliance officer will explain why OSHA selected the workplace for inspection and describe the scope of the inspection, walkaround procedures, employee representation, and employee interviews. The employer then selects a representative to accompany the compliance officer during the inspection. An authorized representative of the employees, if any, also has the right to go along. In any case, the compliance officer will consult privately with a reasonable number of employees during the inspection.

Walkaround inspection

After the opening conference, the compliance officer and accompanying representatives will begin the walkaround inspection looking for safety or health hazards. The route and duration of the inspection are determined by the compliance officer.

The compliance officer may stop and question workers, in private, about safety and health conditions and practices in their workplaces.

During the walkaround, compliance officers may point out some apparent violations that can be corrected immediately. While the law requires that these hazards must still be cited, prompt correction is a sign of good faith on the part of the employer.

Quick-Fix penalty reduction

If an employer corrects a violation on the spot while the inspector is there, it can lead to a 15% penalty reduction. This “Quick-Fix” penalty adjustment does not, however, apply to:

- Violations classified as “high gravity Serious,” “Willful,” “Repeat,” or “Failure-To-Abate”;
- Violations related either to a fatal injury or illness, or to any incidents resulting in serious injuries to employees; or
- Blatant violations that are easily corrected (e.g., turning on a ventilation system to reduce employee exposure to a hazardous atmosphere, or putting on hard hats that are readily available at the workplace).

Records inspection

OSHA places special importance on posting and recordkeeping. The compliance officer will inspect records of deaths, injuries, and illnesses which you are required to keep. The officer will check to see that a copy of the OSHA 300A Summary had been posted as required and that the OSHA 3165 “It’s the Law” workplace poster is prominently displayed.

Where records of employee exposure to toxic substances and harmful physical agents have been required, they are also examined for compliance with the recordkeeping requirements. The officer may also ask to look at required inspection and training records and written programs, as well as the PPE hazard assessment.

Closing conference

After the walkaround, the compliance officer holds a closing conference with the employer and the employee representatives to discuss the findings. The compliance officer discusses possible courses of action an employer may take following an inspection, which could include an informal conference with OSHA or contesting citations and proposed penalties. The compliance officer also discusses consultation and employee rights.

Violations, citations, and penalties

During the inspection, the compliance officer will have looked for violations of OSHA standards (or of the employer's General Duty obligation under the OSH Act). After the inspection, the compliance officer makes recommendations to the OSHA Area Office director regarding any alleged violations.

The OSHA Area Director is the person who actually determines if citations will be issued. OSHA must issue a citation and proposed penalty within six months of the violation's occurrence.

Citations

Citations describe OSHA requirements allegedly violated, list any proposed penalties, and give a deadline for correcting the alleged hazards.

OSHA sends citations of proposed penalties by certified mail. Employers are required to post a copy of each citation at or near the place a violation occurred, for three days or until the violation is abated, whichever is longer.

Penalties

Before determining the amount of a penalty, OSHA has to categorize the violation. Violations are classified as:

- Serious — a violation where there is a substantial probability that death or serious physical harm could result, and the employer knew or should have known of the hazard; carries proposed penalty of $3,000 to $7,000.
- Other-Than-Serious — a violation having a direct relationship to safety and health, but the most serious injury or illness that could reasonably be expected to result from an employee's exposure would not be severe; no penalties are usually proposed, but can be as high as $7,000.
- Willful — a violation that the employer intentionally and knowingly commits; carries a maximum penalty of $70,000 but not less than $5,000.
- Repeat — a violation that is similar to a previously cited violation at the same company location, or at other locations of the same company, within the previous five years; carries a maximum $70,000 penalty.
- Failure-To-Abate — A violation cited previously but not corrected within the prescribed abatement period; carries $7,000 per day penalty.

Penalty factors

OSHA assesses penalties with consideration to four factors:

- The gravity of the violation;
- Size of the employer's business;
- The good faith of the employer; and
- The employer's history of previous violations.

Gravity of violation

The gravity of the violation is the primary consideration in determining penalty amounts. It is the basis for calculating the basic penalty for Serious and Other-Than-Serious violations. (Repeat and Willful violations can be based on the initial Serious or Other-Than-Serious gravity-based penalty but are multiplied by five to 10 times).

To determine the gravity of a violation, OSHA makes the following two assessments

- The severity of the injury or illness which could result from the alleged violation.
- The probability that an injury or illness could occur as a result of the alleged violation.

In terms of the severity assessment, OSHA uses the following criteria:

Severity classification	
High severity	Death from injury or illness; injuries involving permanent disability; or chronic, irreversible illnesses
Medium severity	Injuries or temporary, reversible illnesses resulting in hospitalization or a variable but limited period of disability
Low severity	Injuries or temporary, reversible illnesses not resulting in hospitalization and requiring only minor supportive treatment

For Other-Than-Serious violation, there is only a minimal severity impact — meaning, the most serious injury or illness that could reasonably be expected to result from an employee's exposure would not be low, medium, or high severity and would not cause death or serious physical harm.

Once OSHA determines the severity of a violative condition, then the Agency determines the probability that an injury or illness will result from the hazard. For penalty assessment purposes, probability is categorized either as a "greater" or as a "lesser":

- Greater probability — Results when the likelihood that an injury or illness will occur is judged to be relatively high.
- Lesser probability — Results when the likelihood that an injury or illness will occur is judged to be relatively low.

To assign a probability classification, OSHA uses a variety of factors, for example:

- Number of employees exposed;
- Frequency of exposure or duration of employee overexposure to contaminants;
- Employee proximity to the hazardous conditions;
- Use of appropriate personal protective equipment;
- Medical surveillance program;
- Youth and inexperience of employees, especially those under 18-years-old; and
- Other pertinent working conditions.

After OSHA has determined the gravity and probability of a violation, a Gravity Based Penalty (GBP) is assessed.

OSHA Gravity Based Penalty system — Serious violations		
Severity/Probability	**Gravity**	**GBP**
High/Greater	High	$7,000
Medium/Greater	Moderate	$6,000
Low/Greater	Moderate	$5,000
High/Lesser	Moderate	$5,000
Medium/Lesser	Moderate	$4,000
Low/Lesser	Low	$3,000

For other-than-serious safety and health violations, there is only minimal severity.

OSHA Gravity Based Penalty system — Other-Than-Serious violations		
Severity	**Probability**	**GBP**
Minimal	Greater	$1,000 - $7,000
Minimal	Lesser	$0

Size adjustment factor

Once a base penalty has been calculated using the Gravity-Based Penalty system, OSHA may then assign a reduction based on certain factors, including size of the employer. The size adjustment factor allows for the following maximum penalty reductions:

- 40 percent for employers with one to 25 workers
- 30 percent for employers with 26 to 100 workers
- 10 percent for employers with 101 to 250 workers

Employers with more than 250 workers will not receive a penalty reduction for size.

Good faith adjustment

There may be up to an additional 25 percent reduction for evidence that the employer is making a good faith effort to provide a safe and healthy workplace.

- 25 percent for having a written and implemented safety and health program.
- 15 percent for having a documented and effective safety and health program, but with more than only incidental deficiencies.

No good faith reduction is given to employers with no safety and health program or where a Willful violation is found.

History adjustment

A 10 percent reduction in proposed penalties may be given if employers have not been cited by OSHA for any Serious, Willful, Repeat, or Failure-To-Abate violations in the past five years.

On the other hand, OSHA may assess up to a 10% **increase** in penalties (up to the statutory maximum) if employers have been cited for any high-gravity Serious, Willful, Repeat, or Failure-To-Abate violation in the past five years.

If you receive a citation

An employer who receives an OSHA citation may take either of the following courses of action:

- If the employer agrees to the Citation and Notification of Penalty, the employer must correct the condition by the date set in the citation and pay the penalty, if one is proposed;
- If the employer does not agree with the Citation and Notification of Penalty, the employer has 15 working days from the date of receiving the citation to contest in writing any or all of the following: citation, proposed penalty, and/or abatement date.

Informal conference and settlement

Before deciding whether to file a Notice of Intent to Contest, the employer may request an informal conference with the OSHA Area Director to discuss the Citation and Notification of Penalty. You may use this opportunity to do any of the following:

- Obtain a better explanation of the violations cited;

- Obtain a more complete understanding of the specific standards that apply;
- Negotiate and enter into an informal settlement agreement;
- Discuss ways to correct violations;
- Discuss problems concerning the abatement dates;
- Discuss problems concerning employee safety practices;
- Resolve disputed citations and penalties, (thereby eliminating the need for the more formal procedures associated with litigation before the Review Commission); and
- Obtain answers to any other questions you may have.

OSHA encourages employers to take advantage of the opportunity to have an informal conference if they foresee any difficulties in complying with any part of the citation. Employee representative(s) have the right to participate in any informal conference or negotiations between the OSHA Regional Administrator or Area Director and the employer.

If you don't contest

For violations the employer does not contest:

1. Promptly notify the OSHA Area Director by letter signed by a member of management that you have taken the appropriate corrective action within the time set forth in the citation, and
2. Pay any penalties itemized. The penalties itemized on the Citation and Notification of Penalty are payable within 15 working days of receipt of the penalty notice.

The notification the employer sends the Area Director is referred to as abatement certification. For Other-Than-Serious violations, this may be a signed letter identifying the inspection number and the citation item number and noting that you corrected the violation by the date specified on the citation. For more severe violations (such as Serious, Willful, Repeat, or Failure-to-Abate), abatement certification requires more detailed proof.

When the citation permits an extended time for abatement, you must ensure that employees are adequately protected during this time. For example, the citation may require the immediate use of personal protective equipment by employees while engineering controls are being installed. When this is the case and is indicated on the citation, you must also provide OSHA with an abatement plan (steps you will take to protect employees and correct the hazards) and periodic progress reports on your actions.

If you do contest

If you wish to contest any portion of your citation, you must submit to OSHA a Notice of Intent to Contest in writing within 15 working days after receipt of the Citation and Notification of Penalty. This applies even if you have stated your disagreement with a citation, penalty, or abatement date during a telephone conversation or an informal conference. The Notice of Intent to Contest must clearly state what is being contested—the citation, the penalty, the abatement date, or any combination of these factors. In addition, the notice must state whether all the violations on the citation, or just specific violations, are being contested. (For example, "I wish to contest the citation and penalty proposed for items 3 and 4 of the citation issued November 1, 2010.")

A proper contest of any item suspends your legal obligation to abate and pay until the item contested has been resolved. The OSHA Area Director will forward your case to the Occupational Safety and Health Review Commission. The Commission assigns the case to an administrative law judge who usually will schedule a hearing in a public place close to your workplace. Both employers and employees have the right to participate in this hearing, which contains all the elements of a trial, including examination and cross-examination of witnesses. You may choose to represent yourself or have an attorney represent you. The administrative law judge may affirm, modify, or eliminate any contested items of the citation or penalty. As with any other legal procedure, there is an appeals process. Once the administrative law judge has ruled, any party to the case may request a further review by the full Review Commission. In addition, any of the three commissioners may,

on his or her own motion, bring the case before the entire Commission for review. The Commission's ruling, in turn, may be appealed to the circuit in which the case arose or for the circuit where the employer has his or her principal office.

If you can't meet the abatement date

OSHA assigns abatement dates on the basis of the best information available when issuing the citation. If you are unable to meet an abatement date because of uncontrollable events or other circumstances, and the 15-working-day contest period has expired, you may file a Petition for Modification of Abatement (PMA) with the OSHA Area Director. The petition must be in writing and must be submitted as soon as possible, but no later than one working day after the abatement date. To show clearly that you have made a good-faith effort to comply, the PMA must include all of the following information before OSHA considers it:

- Steps you have taken to achieve compliance, and dates they were taken;
- Additional time you need to comply;
- Why you need additional time;
- Interim steps you are taking to safeguard your employees against the cited hazard(s) until the abatement;
- A certification that the petition has been posted, the date of posting and, when appropriate, a statement that the petition has been furnished to an authorized representative of the affected employees. The petition must remain posted for 10 working days, during which employees may file an objection.

The OSHA Area Director may grant or oppose a PMA. If it is opposed, it automatically becomes a contested case before the Review Commission. If a PMA is granted, OSHA may conduct a monitoring inspection to ensure that conditions are as they have been described and that adequate progress has been made toward abatement. The OSHA Area Office may provide additional information on PMAs.

Violations, citations, and penalties

During the inspection, the compliance officer will have looked for violations of OSHA standards (or of the employer's General Duty obligation under the OSH Act). After the inspection, the compliance officer makes recommendations to the OSHA Area Office director regarding any alleged violations.

The OSHA Area Director is the person who actually determines if citations will be issued. OSHA must issue a citation and proposed penalty within six months of the violation's occurrence.

OSHA's Top 25 violations

Every year, OSHA compiles statistics on violations to its standards. During 2011, there were 165,037 violations to Federal OSHA standards ranging across all industry segments, with adjusted penalties of over $84 million.

The following table lists the top 25 most frequently violated Federal OSHA regulations for Part 1910, General Industry.

Top 25 General Industry violations

Jan. 1, 2011 through Dec. 31, 2011

	Subject	Standard	# Violations	$ Adjusted Penalty
1	Hazard communication-Written program	1910.1200(e)(1)	4,277	1,289,251
2	Machine guarding-Types of guarding	1910.212(a)(1)	2,458	2,757,106
3	Hazard communication-Employer must provide hazard information and training	1910.1200(h)(1)	2,277	372,541
4	Personal protective equipment-Must certify hazard assessment	1910.132(d)(2)	1,415	158,963
5	First aid-Eye wash/emergency shower facilities not provided for immediate emergency use	1910.151(c)	1,387	893,038
6	Walking/working surfaces-Protection of open-sided floors, platforms, and runways	1910.23(c)(1)	1,325	1,036,998
7	Hazard communication-Employer must have MSDS for each hazardous chemical	1910.1200(g)(1)	1,318	112,486
8	Abrasive wheel machinery-Exposure adjustment/ safety guards	1910.215(b)(9)	1,286	316,181
9	Electrical-Equipment must be installed according to any instructions included in the listing or labeling	1910.303(b)(2)	1,210	538,490
10	Electrical-Unused openings in cabinets, boxes, and fittings must be effectively closed	1910.305(b)(1)(ii)	1,206	491,951
11	Lockout/tagout-Written energy control procedures	1910.147(c)(4)(i)	1,163	920,587
12	Respiratory protection-Establish a written program	1910.134(c)(1)	1,098	437,654
13	Electrical-Wiring methods, components, and equipment for general use-Flexible cords and cables strain relief	1910.305(g)(2)(iii)	1,094	398,161
14	Respiratory protection-Provide medical evaluation prior to fit test and respirator use	1910.134(e)(1)	1,050	262,130
15	Abrasive wheel machinery-Work rests	1910.215(a)(4)	1,020	424,126
16	Hazard communication-Labeling-Chemical identity	1910.1200(f)(5)(i)	1,020	202,034
17	Portable fire extinguisher-General-Mount, locate, use	1910.157(c)(1)	998	170,215
18	Personal protective equipment-Must conduct a hazard assessment	1910.132(d)(1)	974	435,567
19	Machine guarding-General-Point of operation	1910.212(a)(3)(ii)	954	1,011,838
20	Hazard communication-MSDSs must be readily accessible to employees	1910.1200(g)(8)	941	103,997
21	Lockout/tagout-Annual procedure inspection	1910.147(c)(6)(i)	932	477,091
22	Lockout/tagout-Establish an energy control program	1910.147(c)(1)	922	673,616
23	Electrical-Fixture canopy or pan-Noncombustible material	1910.305(b)(2)(i)	913	254,699
24	Walking/working surfaces-Housekeeping	1910.22(a)(1)	895	444,790
25	Powered Industrial Trucks-Training	1910.178(l)(1)(i)	878	712,725

In addition to the Part 1910 citations, OSHA also cited the General Duty Clause (Section 5(a)(1) of the OSH Act) with great frequency: 1,374 violations, with adjusted penalties of $1,803,525. OSHA also cited Part 1904.29(b)(1) a total of 1,216 times for inadequate injury and illness recordkeeping forms; total adjusted penalties were $349,094.

LOCAL EMPHASIS PROGRAMS

Local Emphasis Programs (LEPs) are OSHA enforcement strategies designed and implemented at the Regional Office and/or Area Office levels. These programs are intended to address hazards or industries that pose a particular risk to workers in the Office's jurisdiction. The emphasis programs may be implemented by a single Area Office, or at the Regional level (Regional Emphasis Programs) and applied to all of the Area Offices within the Region. Often times, these LEPs will be accompanied by outreach intended to make employers in the area aware of the program as well as the hazards that the programs are designed to reduce or eliminate. This outreach may be in the form of informational mailings, training at local tradeshows, or speeches at meetings of industry groups or labor organizations.

The following is a list of Local (Area Office) and Regional Emphasis Programs, separated by Region. This list is current as of November 1, 2012, but may change without notice.

Region I (CT, MA, ME, NH, RI, VT)

- CPL 2-1.26 Fish Processing Industry
- CPL 2-1.27 Ship Building and Repairing and Boat Building and Repairing
- CPL 02-00-021 Health High Hazard - Top 100
- CPL 04-00-002B Fall Hazards
- CPL 04-00-014B Stone Slabs and Stone Products
- CPL 04-00-016.1 Crane Operation in Construction
- CPL 04-00.018 Residential Construction
- CPL 04-00-020B Mast Climbing Work Platforms
- CPL 04-00-021A Silica Exposure in Construction
- CPL 04-00-022 Scrap, Waste and Refuse Industries
- CPL 04-00-023 Powered Industrial Trucks
- CPL 04-00-024A Underground Construction and Tunneling Operations

Region II (NJ, NY, PR, VI)

- 2012-01 (CPL 2) Fall Hazards in Construction
- 2012-02 (CPL 2) Heavy Highway and Bridge Construction and Maintenance
- 2012-03 (CPL 2) Logging Operations
- 2012-04 (CPL 2) Marinas 2012-05 (CPL 2) Gut Rehabilitation and Demolition
- 2012-06 (CPL 2) Local Implementation of NEP on Amputations
- 2012-07 (CPL 2) Warehousing and Refuse Handlers and Haulers
- 2012-08 (CPL 2) Construction Worksites - Local Targeting
- 2012-09 (CPL 2) Landscape and Horticultural Service Worksites
- 2012-10 (CPL 2) Hotels
- 2012-11 (CPL 2) Health High Hazard - Top 50

- 2012-12 (CPL 2) Isocyanate
- 2012-13 (CPL 2) Virgin Islands General Industry
- 2012-14 (CPL 2) Natural Gas Drilling Operations
- 2012-15 (CPL 2) Federal Agencies
- 2012-16 (CPL 2) Metal Recycling Industry
- 2012-17 (CPL 03-00-009) Local Implementation of Lead NEP
- 2012-18 (CPL 2) Scheduling of Never Before Inspected High Hazard Manufacturing Establishments
- 2012-19 (CPL 03-00-007) Local Implementation of NEP - Crystalline Silica
- 2012-20 (CPL 2) Car Wash Facilities

Region III (DC, DE, MD, PA, VA, WV)

- 2012-01 (CPL 04) Oil and Gas Service Industry
- 2012-02 (CPL 04) Exposure to Hexavalent Chromium
- 2012-03 (CPL 04) Falls in Construction
- 2012-04 (CPL 04) Department Store Industry
- 2012-05 (CPL 04) Healthcare Industry
- 2012-06 (CPL 04) Concrete Block and Brick, Concrete Products and Ready Mix Cement
- 2012-07 (CPL 04) Fabrication of Structural Metal Products
- 2012-09 (CPL 04) Health Hazards in the Fabrication of Structural Metal Products
- 2012-17 (CPL 04) Scrap Metal
- 2012-20 (CPL 04) Ship/Boat Building and Repair - Norfolk
- 2012-21 (CPL 04) Water Transportation Services
- 2012-26 (CPL 04) Health Care Industry
- 2012-28 (CPL 04) Ship/Boat Building and Repair - Baltimore
- 2012-29 (CPL 04) Department Store Industry
- 2012-30 (CPL 04) Health High Hazard Work Places Without an OSHA Inspection Since 1998
- 2012-31 (CPL 04) Safety High Hazard Work Places Without an OSHA Inspection Since 1998

Region IV (AL, FL, GA, KY, MS, NC, SC, TN)

- 09-01 (CPL 02-03) Implement a Pilot Program for 11C Appeals at the Regional Level
- CPL 02-01-001b Inspection of Stimulus Funded Construction Activities
- CPL 2 Lead
- CPL 03-00-007 Silica
- CPL 09-02a (CPL 02-03) Health Hazards in Scrap and Waste Materials Recycling Operations
- CPL 10-01 (CPL 02-03) Falls in Construction

- CPL 10-02 (CPL 02-03) Sanitation and Cleanup Operations in Meat Packing, Poultry and Fish Processing Industries
- CPL 10-03 (CPL 02-03) Landscaping and Horticultural Services
- CPL 10-04 (CPL 02-03) Electrical Hazards
- CPL 10-05 (CPL 02-03) Noise Health Hazards
- CPL 10-06 (CPL 02-03) Ship/Boat Building and Repair
- CPL 10-07 (CPL 02-03) High Noise Industries
- CPL 10-09 (CPL 02-03) Reducing Formaldehyde Exposure in the Funeral Service and Crematories Industry
- CPL 11-02 (CPL 02-03) Noise Hazards
- CPL 11-03 (CPL 02-03) Reducing the Number of Sharps Injuries in Urgent Care Centers, Medical Clinics and Ambulatory Surgical Centers
- CPL 11-04 (CPL 02-03) Powered Industrial Trucks
- CPL 11-05 (CPL 02-03) Methylene Chloride
- CPL 12-01 (CPL 02-03) Expedited Informal Settlement Agreements

Region V (IL, IN, MI, MN, OH, WI)

- CPL 04-00 (LEP 001) Building Renovation/Rehabilitation
- CPL 04-00 (LEP 002) Powered Industrial Vehicles
- CPL 04-00 (LEP 007) Fall Hazards in Construction
- CPL 04-00 (LEP 009) Dairy Farm Operations
- CPL 04-00 (LEP 017) Grain Handling Facilities
- CPL 04-00 (LEP 11) High Rise Building Construction Inspections in Chicago, Illinois
- CPL 04-00 (LEP 11-04) Primary Metal Industry

Region VI (AR, LA, NM, OK, TX)

- CPL 2 02-00-013 Oil and Gas Well Industries
- CPL 2 02-00-014 Construction
- CPL 2 02-00-015 Marine Operations
- CPL 2 02-00-017 Demolition Activities
- CPL 2 02-00-019 Logging
- CPL 2 02-00-020 Work Zone Safety and Health
- CPL 2 02-00-021 Cranes Used in Construction
- CPL 2 02-00-022 Safety and Health Hazards in the Manufacture of Fabricated Metal Products
- CPL 2 02-00-023 High Noise Industries
- CPL 2 02-00-024 Fall Hazards in General Industry
- CPL 2 02-00-027 Heat Illnesses

- CPL 2 02-00-028 Grain Handling Facilities
- CPL 2 06-00-048 Methylene Bisphenyl Isocyanate (MDI) Inspections of Spray-on Bed Lining Operations

Region VII (IA, KS, MO, NE)

- CPL 2-06-11C Auto Body Shops
- CPL 2-06-15E Residential Construction in Jefferson County, MO
- CPL 2-07-01C Logging and Sawmill Industries
- CPL 2-07-02E Residential Construction in St. Charles County, MO
- CPL 2-07-03A Demolition Activities That Occur During the Destruction, Restoration, and Renovation of Buildings and Structures
- CPL 2-07-04E Powered Industrial Trucks in Construction and in General Industry
- CPL 2-07-06E Powered Industrial Trucks and Other Material or Personnel Handling Motorized Equipment in Construction and General Industry
- CPL 2-07-11E Powered Industrial Trucks in Construction and General Industry
- CPL 2-07-13E Oil and Gas Operations
- CPL 2-07-14A Amputations
- CPL 2-07-14A Amputations (Amendment)
- CPL 2-07-21D Grain Handling Industry
- CPL 2-08-02B Electrical Hazards in General Industry Establishments
- CPL 2-08-05C Commercial and Residential Construction
- CPL 2-08-07C Grain Handling Industry
- CPL 2-09-01C Covering Maritime Employers
- CPL 02-11-01A Work Places With Noise and Respiratory Hazards
- CPL 02-11-02A Recycling and Scrap Hazards in General Industry Establishments
- CPL 02-11-03A Grain Handling Facilities
- CPL 02-11-04A Recycle and Scrap Material Hazards in General Industry Establishments (ARRA)
- CPL 02-11-06A Workers Compensation
- CPL 02-11-07 Crystalline Silica
- CPL 02-12-01 Commercial and Residential Construction - Omaha
- CPL 2-12-02 High Hazard Work Places Safety Inspections - St. Louis
- CPL 2-12-09 High Hazard Work Places Safety Inspections - Omaha
- CPL 2-12-10 High Hazard Work Places Safety Inspections - Kansas City
- CPL 98-02M Region-wide Problem Solving Initiative on Falls, Scaffolds, and Electrocutions from Overhead Power Lines in Construction

Region VIII (CO, MT, ND, SD, UT, WY)

- 12-01 (CPL 04-01) Fall Hazards in Construction
- 12-03 (CPL 04-01) Grain Handling Facilities
- 12-04 (CPL 04-01) Roadway Work Zone Activities
- 12-05 (CPL 04-01) Oil and Gas Industry
- 12-05 (CPL 04-01) Silica in Cut Stone and Slab Handling
- 12-06 (CPL 04-05) Noise and Respiratory Hazards in General Industry - Englewood
- 12-07 (CPL 04-02) Noise and Respiratory Hazards in General Industry - Billings
- 12-08 (CPL 04-04) Logging Operations in Bark Beetle Incident Areas
- 12-09 (CPL 04-03) High Hazard Workplaces Without an OSHA Inspection since 2000 - Bismarck
- 12-10 (CPL 04-02) High Hazard Workplaces Without and OSHA Inspection Since 2000 - Billings
- 12-11 (CPL 04-05) Asbestos Abatement Industry
- 12-12 (CPL 04-03) Automotive Lifts - Bismarck
- 12-13 (CPL 04-02) Automotive Lifts - Billings

Region IX (AZ, CA, HI, NV, and American Samoa, Guam and Northern Mariana Islands)

- 09-2009-01 Amputations
- 09-2009-02 Programmed Construction Inspections
- 09-2009-03 Warehousing, Storage and Distribution Yards in Targeted Standard Industrial Codes; and Powered Industrial Trucks in Other Warehousing, Storage and Distribution Yard Operations Not in a Targeted SIC
- 09-2009-05 Labor Barracks
- 09-2009-06 Programmed Maritime Inspections
- 09-2009-07 Smelters in Federal Jurisdiction
- 09-2011-07 Federal Agency Programs
- CPL 04-00-08 Combustible Dust
- CPL 04-00-09 Silica and Portland Cement Exposures
- CPL 04-00-10 Programmed Construction Inspections at Military Installations
- CPL 04-00-11 Hotels, Casinos and/or Casino Hotels
- CPL 04-00-13 Longshoring Activity

Region X (AK, ID, OR, WA)

- CPL 04-00-001 Residential Construction
- CPL 04-00-003 Floating Seafood Processors
- CPL 04-00-004 Construction Fall Hazards in Idaho
- CPL 04-00-005 Off-Shore Oil and Gas Drilling Platforms
- CPL 04-00-006 Logging in Idaho
- CPL 04-00-007 Shipyard Employment Operations
- CPL 04-00-008 Logging Operations Under Federal Jurisdiction in Oregon and Washington
- CPL 04-00-009 Federal Agencies
- CPL 04-00-010 Construction
- CPL 04-00-011 Native Health Care Facilities
- CPL 04-00-012 Facility Support Management Service Contractors at Military Bases and National Parks
- CPL 04-00-013 Silviculture Contractors
- CPL 04-00-014 Silica Exposure and Slab Handling in Cut Stone and Stone Product Manufacturing
- CPL 04-00-016 Employers with Nationally Targeted Hazards at Military Bases, National Parks and National Cemeteries
- CPL 04-00-017 Casinos and or Casino Hotels at Native American Reservations or American Trust Lands
- CPL 04-00-018 Lead
- CPL 04-00-020 Grain Handling Industry

Q&As - OSHA Inspections

Q: Does the OSHA inspector have to give any advance notice of an inspection?

A: No, in fact it is just the opposite—OSHA personnel are **not allowed** to give advance notice of an inspection, under penalty of law, except if extreme circumstances warrant it.

Q: Can we refuse to let the OSHA inspector into our facility?

A: Yes, employers do have a right to refuse entry without a warrant, under the fourth amendment to the U.S. Constitution. However, employers must recognize that it is relatively quick and easy for OSHA Compliance Safety and Health Officers (CSHO) to obtain a warrant. And, in cases where OSHA expects an employer will refuse entry, the Agency may request a warrant prior to showing up at the employer's worksite for the inspection.

Q: What is the average fine for a "serious" violation? What are some examples of "serious" violations?

A: A Serious violation occurs when there is substantial probability that death or serious physical harm could result from a hazard about which the employer knew or should have known. Examples cited as Serious include failure to enclose electrical boxes, using a damaged ladder, and failing to train forklift operators. It is up to the OSHA CSHO (working within the guidelines spelled out in the Field Operations Manual (FOM)) to classify the violation given all the pertinent facts. OSHA does not have a defined list of violations that would be considered Serious or Other-Than-Serious. A slight variation in time, exposure, knowledge of the hazard by the employer, location, etc., could make the difference. And, to some degree it is subjective.

Additionally, it's really hard to describe an average fine for a Serious violation, as there are a lot of factors that go into the determination of final penalties (including size of company, good faith, and history). Beyond that, OSHA actually uses a gravity-based system to assess the initial penalty; this factors in probability and severity of the specific situation (e.g., number of employees exposed). (The maximum fine for a Serious violation is $7,000 for each violation.)

Q: Can we refuse to allow OSHA to take photographs in our facility, to protect our trade secrets?

A: The OSHA inspectors have been given authority by 29 CFR 1903.7(b) "to take or obtain photographs related to the purpose of the investigation." Taking photographs during the course of an inspection is a normal investigative tool used by OSHA in order to support apparent violations of standards.

An employer could certainly **ask** that inspectors not take photographs, but if they persist and you refuse, then they have the option of attempting to obtain a warrant (discussed further below). If you do allow the photographs, it is usually a good idea to take similar photographs so you have a record of the situation.

However, the rights of the employer concerning trade secrets are protected by 29 CFR 1903.9. At the commencement of an inspection the employer has the right to identify areas in his establishment which contain or which might reveal a trade secret. All information obtained in these areas will be labeled "confidential-trade secret" and will not be disclosed except in accordance with the provisions of Section 15 of the Act.

Also, per 1903.4, employers have a right to refuse to allow an inspection to occur. However, OSHA can attempt to obtain a warrant and return to conduct the inspection. OSHA's Field Operations Manual (FOM) says that "Where entry has been allowed but the employer interferes with or limits any important aspect of the inspection, the CSHO shall determine whether or not to consider this action as a refusal. Examples of interference are refusals to permit the walkaround, the examination of records essential to the inspection, **the taking of essential photographs and/or videotapes**, the inspection of a particular part of the premises, private employee interviews, or the refusal to allow attachment of sampling devices."

So, if an employer refused to allow photographs during an inspection, OSHA would have the option of attempting to obtain a warrant as it would if an employer refused to allow the inspection to begin. For additional information on the OSHA inspection process, see the FOM (in particular pages 3-20 through 3-23).

And, as there are many variables, it is recommended to discuss the potential ramifications of refusing photographs with a legal professional.

Q: Is a company required to let OSHA privately interview an employee?

A: Yes. Section 8(a)(2) of the Federal OSH Act authorizes OSHA compliance officers to question privately "any employer, owner, operator, agent or employee." So, the mandate to interview employees in private is OSHA's right. For more detailed information on the interview process, see the Federal OSHA Field Operations Manual (page 3-23 - 3-27). (The FOM states among other things that OSHA inspectors will inform employers that interviews of non-managerial employees will be conducted in private. Inspectors are entitled to question such employees in private regardless of employer preference, the FOM states. If an employer interferes with an inspector's ability to do so, the inspector should, according to the FOM, request that the OSHA Area Director consult with OSHA legal personnel to determine appropriate legal action. Interference with an inspector's ability to conduct private interviews with non-managerial employees includes, but is not limited to, attempts by management officials or representatives to be present during interviews, the FOM states.

Q: Can we have members of management present during employee interviews?

A: No, OSHA actually prefers to question employees privately. And, in fact they have the right to do that under the OSH Act. So, employers need o make sure not to interfere with the interview process in any way. The point to the interviews is so OSHA can get a free exchange of information with employees about their views of the safety program; employers should not give any impression of trying to pressure workers to say something or not to say something. (It is recognized that some eployees may be nervous to talk

with OSHA, but that is between OSHA and the employee on how to handle it. The employer needs to allow the interview process to play out.)

Q: Can you fix a violation that was written up before the inspectors leave?

A: Yes—in fact, if an employer corrects a violation on the spot while the inspector is there, it can lead to a 15% penalty reduction. However, there are some limitations on it. It does not apply to:

- Violations classified as "high gravity serious," "willful," "repeated," or "failure-to-abate."
- Violations related either to a fatal injury or illness, or to any incidents resulting in serious injuries to employees.
- Blatant violations that are easily corrected (e.g., turning on a ventilation system to reduce employee exposure to a hazardous atmosphere, or putting on hard hats that are readily available at the workplace).

Q: What will OSHA do if we don't pay the fine?

A: If an employer doesn't pay a fine, then, like most government agencies, there are policies in place in terms of debt collection. This works like many other debts, in that interest will be assessed, you'll get notifications, and then other measures can be taken, such as referring it to a collections agency, credit reporting bureaus and so on.

Keep in mind, though, that in some cases OSHA will work with you initially to set up a payment plan, depending on the specifics. So, if a company anticipates not being able to pay the full amount, this is one of those things to discuss during the informal conference or the contest process.

Q: OSHA sometimes sends out letters to employers saying that they have a high injury rate. If we get one of these letters does that mean we'll automatically get inspected?

A: Not necessarily. The letters don't correlate directly to those sites that will be inspected. However, it does mean that you are at an increased risk for an OSHA inspection. The same triggers that OSHA uses to send the letters—in other words, high injury rates—are also used by OSHA in various inspection targeting programs, for example the Site-Specific Targeting program. So, it doesn't mean you'll be inspected, but it means you stand a much greater chance. OSHA typically targets around 4,500 of the 15,000 or so workplaces that receive the letters.

Q: Where does the money go when an employer pays an OSHA citation?

A: The money that OSHA receives from inspections goes into the Federal Government's general fund. So it doesn't stay within OSHA.

Q: Could you tell us how long we have to contest a citation once we receive it?

A: You have fifteen working days to contest the citation or proposed assessment of penalty and this must be in writing.

Q: Can OSHA cite us for a Repeat violation based on a citation at one of our other facilities in another state?

A: It depends—If both states are under Federal OSHA Jurisdiction, for example Wisconsin and Illinois, then yes, OSHA can issue a repeat violation based on a similar violation at the other location. But, if one of the states is in a state plan OSHA state, for example Minnesota or California, then, no.

Q: How long does OSHA have to issue a citation once the inspection is completed?

A: OSHA must issue any citations no later than 6 months following the occurrence of the violation. Often, citations will be mailed much sooner than that, but technically OSHA does have 6 months—the average is usually around 50 days from the opening conference.

Q: Do you have a checklist of items we should be aware of during an OSHA inspection?

A: There are quire a few variables, but following is a general checklist of do's and don'ts:

- ❑ Ask for credentials
- ❑ Let the inspector in unless there is a good reason not to! (Employers do have a right to request a warrant, but it's fairly easy for OSHA to get a warrant)
- ❑ Get senior management and legal involved—particularly in fatality/catastrophe investigations
- ❑ Ask for time before the inspection begins to get needed company/legal personnel—up to 1 hour
- ❑ Be polite, but formal
- ❑ If it is a catastrophe/fatality investigation, be very cautious
- ❑ Ask what the inspector will focus on
- ❑ Ask how long to expect
- ❑ Produce required records (it is recommended to keep a log of documents you give to OSHA)
- ❑ Don't volunteer records (unless you think it will benefit you)
- ❑ Don't let the inspector wander unsupervised
- ❑ Don't interfere with employee interviews (But, do ask for time to get a replacement worker if production demands necessitate it.)
- ❑ Take your own photos—-from multiple angles
- ❑ Don't admit to violations
- ❑ Do correct hazardous conditions where possible
- ❑ Listen carefully during the closing conference—you'll get a feel for violations
- ❑ Instruct on where and to whom citations should be sent (they will be mailed to the company via certified letter)
- ❑ If you contest, do so with a registered letter
- ❑ If you plan to contest, know that you only have 15 working days to do so
- ❑ Request an informal conference with the OSHA local area office director—you can often get penalties reduced

RECORDKEEPING

Documenting safety and health information is essential. In many cases, OSHA requires it; but, in general, it is a good way to keep track of company operations. Beyond injury, illness, first aid, and medical records, inspection and maintenance records provide insight into how the well-oiled company machine runs.

Injury and illness recordkeeping

Detailed directions for recording work-related injuries and illnesses, highlights from OSHA recordkeeping interpretative letters, and sample recordkeeping forms.

Access to medical and exposure records

What you need to know about managing medical and exposure records, including who can access them and how long OSHA requires that they be retained.

Recordkeeping requirements at-a-glance

The "who, when, and what" of OSHA's recordkeeping requirements. Lists all of 1903, 1904, and 1910 recordkeeping requirements in a quick, easy-to-read format.

Bureau of Labor Statistics (BLS) reports

The Bureau of Labor Statistics (BLS) is an independent national statistical agency that collects, processes, analyzes, and disseminates essential employment data. The BLS serves as a statistical resource to the Department of Labor by using employer-provided injury and illness data as the basis for survey reports.

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Recording and reporting occupational injuries and illnesses

Introduction

On January 1, 2002, OSHA's new recordkeeping rule became effective. The completely revised rule is designed to improve the system that employers use to track and record workplace injuries and illnesses. It simplifies the recordkeeping system by combining previous regulatory requirements, guidelines, and interpretations into one document.

If your company is covered by this rule, you will need to start documenting workplace injuries and illnesses according to the revised Part 1904 requirements. And, you will begin using a new set of recordkeeping forms, the OSHA 300 series.

This chapter is your compliance guide through the regulatory maze of injury and illness recordkeeping. Use it to determine if your company is covered; and if so, how to document and maintain accurate records of employees' work-related injuries and illnesses. Also, at the end of the chapter, you will find copies of the new forms you are required to use.

Determine if the rule applies to your company

All employers covered by the Occupational Safety and Health Act are covered by the recordkeeping regulations. However, there are two categories of employers that are exempted from routinely recording injuries and illnesses - those with 10 or fewer employees and business establishments in certain industry classifications are partially exempt.

Employers with 10 or fewer employees

If your company had 10 or fewer employees at all times during the last calendar year, you do not need to keep OSHA's occupational injury and illness records unless OSHA or the Bureau of Labor Statistics (BLS) informs you in writing that you must keep the records for the upcoming year. This partial exemption for size is based on the number of employees in your entire company, not just at a single location.

You are, however, still required to report to OSHA any workplace incident that results in a fatality or the hospitalization of three or more employees.

Employers in low hazard industries

If your business is classified in one of the low hazard retail, service, finance, insurance, or real estate industries listed on page 4, you do not need to keep injury and illness records unless the government asks you to do so. In cases where one or more of a company's establishments are classified in a non-exempt industry, records must be kept for those establishments (unless they are exempted for size).

The partial industry classification exemption applies to individual business establishments. If your company has several establishments engaged in different classes of business activities, you may need to keep records on some of them, while others are exempt.

Even though a low hazard business is exempted, it still is required to report any workplace incident that results in a fatality or the hospitalization of three or more employees.

NOTE: Businesses classified in agriculture; mining; construction; manufacturing; transportation; communication, electric, gas and sanitary services; or wholesale trade do not qualify for this exemption.

Establishments in the following Standard Industrial Classification (SIC) codes are not required to keep OSHA injury and illness records unless they are asked to do so by OSHA or the Bureau of Labor Statistics.

Partially exempt low hazard industries

SIC code	Industry description	SIC code	Industry description
525	Hardware stores	725	Shoe repair and shoeshine parlors
542	Meat and fish markets	726	Funeral service and crematories
544	Candy, nut, and confectionery stores	729	Miscellaneous personal services
545	Dairy products stores	731	Advertising services
546	Retail bakeries	732	Credit reporting and collection services
549	Miscellaneous food stores	733	Mailing, reproduction, and stenographic services
551	New and used car dealers	737	Computer and data processing services
552	Used car dealers	738	Miscellaneous business services
554	Gasoline service stations	764	Reupholstery and furniture repair
557	Motorcycle dealers	78	Motion picture
56	Apparel and accessory stores	791	Dance studios, schools, and halls
573	Radio, television, and computer stores	792	Producers, orchestras, entertainers
58	Eating and drinking places	793	Bowling centers
591	Drug stores and proprietary stores	801	Offices and clinics of medical doctors
592	Liquor stores	802	Offices and clinics of dentists
594	Miscellaneous shopping goods stores	803	Offices of osteopathic
599	Retail stores, nec (not elsewhere classified)	804	Offices of other health practitioners
60	Depository institutions (banks and savings institutions)	807	Medical and dental laboratories
61	Nondepository	809	Health and allied services, nec
62	Security and commodity brokers	81	Legal services
63	Insurance carriers	82	Educational services (schools, colleges, universities and libraries)
64	Insurance agents, brokers and services	832	Individual and family services
653	Real estate agents and managers	835	Child day care services
654	Title abstract offices	839	Social services, nec
67	Holding and other investment offices	841	Museums and art galleries
722	Photographic studios, portrait	86	Membership organizations.
723	Beauty shops	87	Engineering, accounting, research, management, and related services
724	Barber shops	899	Services, nec

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Covered SICs (formerly exempt industries)		
SIC 55	553	Auto and home supply stores
	555	Boat dealers
	556	Recreational vehicle dealers
SIC 57	571	Home furniture and furnishing stores
	572	Household appliance stores
SIC 59	593	Used merchandise stores
	596	Nonstore retailers
	598	Fuel dealers
SIC 65	651	Real estate operators and lessors
	655	Subdividers and developers
SIC 72	721	Laundry, cleaning, and garment service
SIC 73	734	Services to buildings
	735	Miscellaneous equipment rental/leasing
	736	Personnel
SIC 83	833	Job training and related services
	836	Residential care
SIC 84	842	Botanical and zoological gardens

Exempt SICs (formerly covered industries)		
SIC 52	525	Hardware stores
SIC 54	542	Meat and fish markets
	544	Candy, nut, and confectionery stores
	545	Dairy product stores
	546	Retail bakeries
	549	Miscellaneous food stores
SIC 76	764	Reupholstery and furniture repair
SIC 79	791	Dance studios, schools, and halls
	792	Producers, orchestras, and entertainers
	793	Bowling centers
SIC 80	801	Offices and clinics of medical doctors
	802	Offices and clinics of dentists
	803	Offices of osteopathic physicians
	804	Offices of other health practitioners
	807	Medical and dental laboratories
	809	Health and allied services, nec

SICs routinely required to keep injury/illness records

SIC code	Industry description	SIC code	Industry description
01-02 .	Agricultural production	59[e] ...	Miscellaneous retail stores
07-09 .	Agricultural services, forestry, fishing	65[f] ...	Real estate
13	Oil and gas extraction	70	Hotels and other lodging places
15-17 .	Construction	72[g] ...	Personal services
20-39 .	Manufacturing	73[h] ...	Business services
41-49 .	Transportation, postal, utilities	75	Automotive repair, services, parking
50-51 .	Wholesale trade	76[i]	Miscellaneous repair services
52[a] ...	Building materials/garden supplies	79[j]	Amusement and recreation services
53	General merchandise stores	80[k] ...	Health services
54[b] ...	Food stores	83[m] ...	Social services
55[c] ...	Automotive dealers	84[n] ...	Museums
57[d] ...	Furniture stores	.....	State and local government employers in state-plan states

[a] Consists of Lumber & Other Building Materials (SIC 521); Paint, Glass, & Wallpaper Stores (SIC 523); Retail Nurseries & Garden Stores (SIC 526); and Mobile Home Dealers (SIC 527).
[b] Consists of Grocery Stores (SIC 541) and Fruit and Vegetable Markets (SIC 543).
[c] Consists of Auto and Home Supply Stores (SIC 553); Boat Dealers (SIC 555); and Recreational Vehicle Dealers (SIC 556).
[d] Consists of Furniture & Homefurnishings Stores (SIC 571) and Household Appliance Stores (SIC 572).
[e] Consists of Used Merchandise Stores (SIC 593); Nonstore Retailers (SIC 596); and Fuel Dealers (SIC 598).
[f] Consists of Real Estate Operators and Lessors (SIC 651) and Subdividers and Developers (SIC 655).
[g] Consists of Laundry, Cleaning, and Garment Services (SIC 721).
[h] Consists of Services to Buildings (SIC 734); Miscellaneous Equipment Rental and Leasing (SIC 735); and Personnel Supply Services (SIC 736).
[i] Consists of Electrical Repair Shops (SIC 762); Watch, Clock and Jewelry Repair (SIC 763); and Miscellaneous Repair Shops (SIC 769).
[j] Consists of Commercial Sports (SIC 794) and Miscellaneous Amusement & Recreation Services (SIC 799).
[k] Consists of Nursing and Personal Care Facilities (SIC 805); Hospitals (SIC 806); and Home Health Care Services (SIC 808).
[m] Consists of Job Training and Related Services (SIC 833) and Residential Care (SIC 836).
[n] Consists of Botanical and Zoological Gardens (SIC 842).

Sources: U.S. Census Bureau compilation of 1996 establishment and employment data by parent firm, performed for the Small Business Administration; Bureau of Labor Statistics 1998 Survey of Occupational Injuries and Illnesses.

Decide which employees to record

On your 300 Log, enter the recordable injuries and illnesses of all employees on your payroll, whether they are labor, executive, hourly, salary, part-time, seasonal, or migrant workers. Also enter the recordable injuries and illnesses that occur to employees who are not on your payroll, such as temporary and leased workers, if you supervise them on a day-to-day basis.

If your business is organized as a sole proprietorship or partnership, the owner or partners are not considered employees for recordkeeping purposes. Likewise, self-employed individuals are not covered by the recordkeeping regulation and you do not need to record it if they become ill or are injured while doing work in your establishment.

Temporary and contractor's employees

When injuries or illnesses occur to employees from a temporary help service, employee leasing service, or personnel supply service, record them on your 300 Log if you supervise them on a day-to-day basis.

If a contractor's employee is under the daily supervision of the contractor, the contractor is responsible for recording the injury or illness. But, if you supervise the contractor employee's work on a day-to-day basis, record the injury or illness on your 300 Log.

Each injury or illness must be recorded only once. You and the temporary help service, employee leasing service, personnel supply service, or contractor need to coordinate the recordkeeping to make sure that each injury and illness is recorded only once, either on your 300 Log (if you provide daily supervision) or on the other employer's 300 Log (if that company provides daily supervision).

Employee training and involvement

OSHA requires that your employees and their representatives be involved in the recordkeeping system in the following ways:

- Inform each employee of how he or she is to report an injury or illness. Set up a way for them to report work-related injuries and illnesses promptly, and explain the reporting method to them.
- Provide limited access to your injury and illness records for your employees, former employees, and their representatives (authorized collective bargaining agent, a person designated in writing by the employee, or the legal representative of a deceased or legally incapacitated employee or former employee). You can't charge for these copies the first time they are provided. However, if one of the designated persons asks for additional copies, you may assess a reasonable charge for retrieving and copying the records.

The Occupational Safety and Health Act prohibits you from discriminating against an employee for reporting a work-related fatality, injury, or illness. The Act also protects employees who file a safety and health complaint, ask for access to the injury and illness records, or otherwise exercise their rights under the OSH Act.

New recordkeeping forms

OSHA 300 Log of Work-Related Injuries and Illnesses

The OSHA 300 *Log of Work-Related Injuries and Illnesses* replaces the OSHA 200 Log. Use the 300 Log to document recordable injuries and illnesses, either electronically or on paper. You may use forms that are different from the OSHA 300 Log, provided that the electronic record or paper forms are equivalent to the 300 Log. Record the injury or illness within seven calendar days of receiving information that it occurred.

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OSHA 301 Injury and Illness Incident Report

The OSHA 301 *Injury and Illness Incident Report* replaces the OSHA Form 101. For each recordable injury or illness on the 300 Log, complete an OSHA 301 Incident Report form, or an equivalent. The 301 is designed to accommodate lengthier, detailed information about the incident. Many employers use a workers' compensation or an insurance form instead of the 301 Incident Report, or supplement a workers' comp/insurance form by adding any additional information required by OSHA. Record the injury or illness within seven calendar days of receiving information that it occurred.

OSHA 300A Summary of Work-Related Injuries and Illnesses

The OSHA 300A *Summary of Work-Related Injuries and Illnesses* is a new form for posting the annual summary of injuries and illnesses. At the end of each calendar year:

- **Review** your 300 Log to verify that the entries are complete and accurate, and correct any deficiencies identified.
- **Create** an annual summary by totaling the columns on the 300 Log. If you had no recordable cases, enter zeros for each column total. Using the OSHA 300A (or an equivalent), enter the calendar year covered, the company's name, establishment name, establishment address, annual average number of employees covered by the 300 Log, and the total hours worked by all employees covered by the Log. If you are using an equivalent form, also include the employee access and employer penalty statements found on the OSHA 300A Summary.
- **Certify** that the information is accurate. A company executive must certify that he or she has examined the 300 Log and believes that the summary is correct and complete. The company executive may be the owner (only if the company is a sole proprietorship or partnership), an officer in the corporation, the highest ranking official (or immediate supervisor) working at the establishment.
- **Post** a copy of the annual summary in each establishment in a conspicuous place or places where notices to employees are customarily posted. Post it no later than February 1 of the year following the year covered by the records and keep the Summary in place until April 30. Ensure that it is always available for viewing by employees.

Equivalent forms

You can keep your records on computer equipment only if the computer system can produce paper copies of equivalent forms when access to them is required by OSHA, an employee or former employee, or employee representative. Many employers use a workers' compensation or insurance form instead of the 301 Incident Report or supplement a workers' comp/insurance form by adding any additional information required by OSHA. Also, the records may be emailed, if requested. A record is considered "equivalent" when it:

- Has the same information,
- Is as readable and understandable, and
- Is completed using the same instructions as the OSHA form it replaces.

Seven calendar days to record

In most instances, you will know immediately or within a short time that a recordable case has occurred. Sometimes, however, it may be several days before you are informed that an employee's injury or illness meets recordable criteria. OSHA requires that each recordable injury or illness be recorded on the 300 Log and 301 Incident Report within seven calendar days of receiving information that a recordable injury or illness has occurred.

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Location and retrieval of records

You can keep the records for an establishment at your headquarters or other central location if you can transmit information about the injuries and illnesses from the establishment to the central location within seven calendar days of receiving information that a recordable injury or illness occurred. You must also be able to produce and send the records from the central location to the establishment within the required time frames when the records are requested.

- **OSHA inspector or other government representative:** When an OSHA inspector or other government representative asks for the records you keep under Part 1904, provide them copies within four business hours. If you maintain the records at a location in a different time zone, use the business hours of the establishment at which the records are located when calculating the deadline.
- **Employee, former employee, or representative:** When an employee, former employee, personal representative, or authorized employee representative asks for copies of your current or stored 300 Log(s) for an establishment the employee or former employee has worked in, you must give the requester a copy of the relevant page(s) by the end of the next business day.

  You cannot remove the names of the employees or any other information from the OSHA 300 Log before you give copies to the requester. However, to protect the privacy of injured and ill employees, do not record the employee's name on the 300 Log for certain privacy concern cases.
- **Employee, former employee, or representative:** When an employee, former employee, or personal representative asks for a copy of the OSHA 301 Incident Report describing an injury or illness to that employee or former employee, give it to the requester by the end of the next business day.
- **Union representative:** When an authorized employee representative asks for a copy of the 301 Incident Report for an establishment where the agent represents employees under a collective bargaining agreement, give copies of those forms to the authorized employee representative within seven calendar days. You are only required to provide information from the section titled "About the case." Remove all other information from the copy of the 301 Incident Report (or the equivalent substitute form) that you give to the authorized employee representative.

Multiple business establishments

When you have multiple business establishments, keep a separate OSHA 300 Log for each one that is expected to be in operation for a year or longer. Do not, however, keep a separate log for each establishment that will exist for less than a year.

You can keep one 300 Log that covers all of your short-term establishments and include the short-term establishments' recordable injuries and illnesses on an 300 Log that covers short-term establishments for individual company divisions or geographic regions.

Recording employees at different locations

For recording purposes, those employees who work at several different locations or do not work in a specific location at all, will need to be linked to one of your business locations.

When an employee from one of your locations is injured or becomes ill while visiting or working at another of your locations, record the injury or illness on the 300 Log of the location at which the injury or illness occurred. If one of your employees is injured or becomes ill while working away from any of your business locations, record the case on the 300 Log at the location where the employee normally works.

Retaining recordkeeping forms

Retain your OSHA 300 Log, the privacy case list (if one exists), the 300A Summary, and the OSHA 301 Incident Report forms for five years following the end of the calendar year that these records cover.

If, during the five-year storage period, newly discovered recordable injuries or illnesses occur, update the stored 300 Logs to include them. If the description or outcome of a case changes, remove or line out the original entry and enter the new information. You do not have to update the 300A Annual Summary or 301 Incident Report, but you may, if you choose.

Save your copies of the OSHA 200 and 101 forms for five years following the year to which they relate and continue to provide access to the data as though these forms were the OSHA 300 and 301 forms. You are not required to update your old 200 and 101 forms.

Change in business ownership

If your business changes ownership, you are responsible for recording and reporting work-related injuries and illnesses only for that period of the year during which you owned the establishment. When you transfer the injury and illness records to the new owner, he or she must save all records of the establishment kept by the prior owner, but need not update or correct them.

Definitions

Days Away, Restricted, or Transferred (DART) Rate

This includes cases involving days away from work, restricted work activity, and transfers to another job and is calculated based on (N/EH) x (200,000) where N is the number of cases involving days away and/or job transfer or restriction, EH is the total number of hours worked by all employees during the calendar year, and 200,000 is the base for 100 full-time equivalent employees.

> *Example:* Employees of an establishment (XYZ Company), including temporary and leased workers, worked 645,089 hours at XYZ company. There were 22 injury and illness cases involving days away and/or restricted work activity and/or job transfer from the OSHA 300 Log (total of column H plus column I). The DART rate would be (22/645,089) x (200,000) = 6.8.

Note: The DART rate replaces the Lost Workday Injury and Illness (LWDII) rate.

Establishment

An establishment is a single physical location where business is conducted or where services or industrial operations are performed. For activities where employees do not work at a single physical location, such as construction; transportation; communications, electric, gas and sanitary services; and similar operations, the establishment is represented by main or branch offices, terminals, stations, etc. that either supervise such activities or are the base from which personnel carry out these activities.

Normally, one business location has only one establishment. Under limited conditions, the employer may consider two or more separate businesses that share a single location to be separate establishments. An employer may divide one location into two or more establishments only when:

- Each of the establishments represents a distinctly separate business;
- Each business is engaged in a different economic activity;
- No one industry description in the Standard Industrial Classification Manual (1987) applies to the joint activities of the establishments; and
- Separate reports are routinely prepared for each establishment on the number of employees, their wages and salaries, sales or receipts, and other business information. For example, if an employer operates a construction company at the same location as a lumber yard, the employer may consider each business to be a separate establishment.

An establishment can include more than one physical location, but only under certain conditions. An employer may combine two or more physical locations into a single establishment only when:

- The employer operates the locations as a single business operation under common management;

- The locations are all located in close proximity to each other; and
- The employer keeps one set of business records for the locations, such as records on the number of employees, their wages and salaries, sales or receipts, and other kinds of business information. For example, one manufacturing establishment might include the main plant, a warehouse a few blocks away, and an administrative services building across the street.

For employees who telecommute from home, the employee's home is not a business establishment and a separate OSHA 300 Log is not required. Employees who telecommute must be linked to one of your establishments.

First aid

In general, first aid treatment can be distinguished from medical treatment because:

- First aid is usually administered after the injury or illness occurs and at the location (workplace) where it occurred.
- First aid usually consists of one-time or short-term treatment.
- First aid treatments are usually simple and require little or no technology.
- First aid can be administered by people with little training (beyond first aid training) and even by the injured or ill person.
- First aid is usually administered to keep the condition from worsening, while the injured or ill person is awaiting medical treatment.

For the recordkeeping standard, first aid treatment means the following:

- Using a non-prescription medication at non-prescription strength (for medications available in both prescription and non-prescription form, a recommendation by a physician or HCP to use a non-prescription medication at prescription strength is considered medical treatment);
- Administering tetanus immunizations (other immunizations, such as hepatitis B vaccine or rabies vaccine, are considered medical treatment);
- Cleaning, flushing, or soaking wounds on the surface of the skin;
- Using wound coverings such as bandages, Band-Aids™, gauze pads, etc.; or using butterfly bandages or Steri-Strips™ (other wound closing devices such as sutures or staples are considered medical treatment);
- Using hot or cold therapy;
- Using any non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc. (devices with rigid stays or other systems designed to immobilize parts of the body are considered medical treatment);
- Using temporary immobilization devices while transporting an accident victim (splints, slings, neck collars, back boards, etc.);
- Drilling of a fingernail or toenail to relieve pressure, or draining fluid from a blister;
- Using eye patches;
- Removing foreign bodies from the eye using only irrigation or a cotton swab;
- Removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means;
- Using finger guards;
- Using massages (physical therapy or chiropractic treatment are considered medical treatment for recordkeeping purposes); or
- Drinking fluids for relief of heat stress.

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Injury or illness

An injury or illness is an abnormal condition or disorder. Injuries include cases such as, but not limited to, a cut, fracture, sprain, or amputation. Illnesses include both acute and chronic illnesses, such as, but not limited to, a skin disease, respiratory disorder, or poisoning. (Note: Injuries and illnesses are recordable only if they are new, work-related cases that meet one or more of the Part 1904 recording criteria.)

Medical treatment

Medical treatment means the management and care of a patient to combat disease or disorder. Under OSHA's recordkeeping standard, medical treatment does *not* include:

- Visits to a physician or other licensed healthcare professional solely for observation or counseling;
- The conduct of diagnostic procedures, such as X-rays and blood tests, including the administration of prescription medications used solely for diagnostic purposes (eye drops to dilate pupils); or
- Procedures that constitute the standard's definition of first aid.

Physician or other licensed healthcare professional

A physician or other licensed healthcare professional is an individual whose legally permitted scope of practice *(i.e*., license, registration, or certification) allows him or her to independently perform, or be delegated the responsibility to perform, the activities described by this regulation.

Work environment

OSHA defines the work environment as the establishment and other locations where one or more employees are working or are present as a condition of their employment. The work environment includes not only physical locations, but also the equipment or materials used by an employee to perform work.

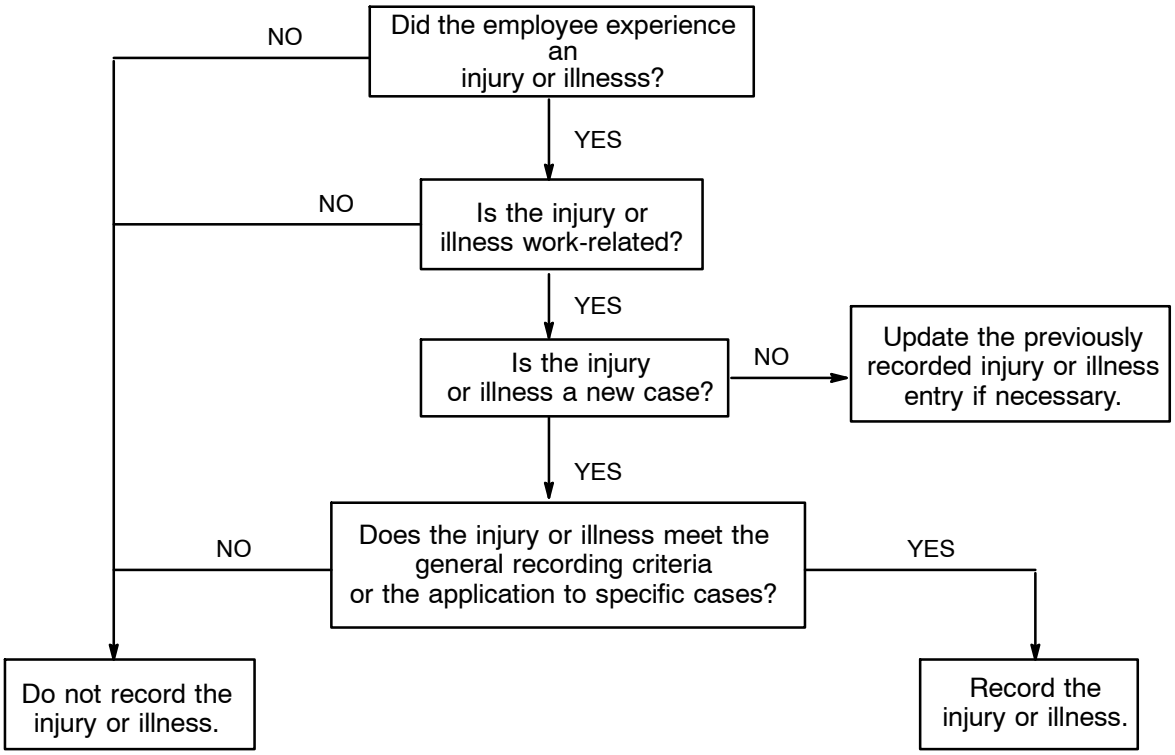
OSHA COMPLIANCE MANUAL

Determine if the injury or illness is work-related

When an employee reports an illness or injury, you will have to decide if it should be recorded on the OSHA 300 Log. The following flow chart shows the steps you should use when making that decision.

Each fatality, injury, or illness is recordable if it:

- Is work-related;
- Is a new case; and
- Meets one or more of the general recording criteria.



What is "significant aggravation"

An injury or illness is work-related if an event or exposure in the workplace (the work environment) either caused or contributed to the resulting condition, or if it *significantly* aggravated a preexisting injury or illness. When the work-relatedness is not clear, evaluate the employee's work duties and environment to decide whether or not one or more events or exposures at work either caused or contributed to the resulting condition or significantly aggravated a preexisting condition.

The preexisting injury or illness must be one caused entirely by non-occupational factors. An injury or illness is a "preexisting condition" if it results solely from a non-work-related event or exposure that occurred outside the work environment. Preexisting conditions also include any injury or illness that the employee experienced while working for another employer.

In order to be recordable, work must have clearly worsened the injury or illness. OSHA considers that a preexisting injury or illness has been significantly aggravated when an event or exposure in the workplace results in any of the following:

- Death, provided that the preexisting injury or illness would likely not have resulted in death but for the occupational event or exposure.
- Loss of consciousness, provided that the preexisting injury or illness would likely not have resulted in loss of consciousness but for the occupational event or exposure.
- One or more days away from work, or days of restricted work, or days of job transfer that otherwise would not have occurred but for the occupational event or exposure.
- Medical treatment in a case where no medical treatment was needed for the injury or illness before the workplace event or exposure, or a change in medical treatment was necessitated by the workplace event or exposure.

When employees are working or conducting other tasks in the interest of their employer but at a location away from the employer's establishment, the work-relatedness of an injury or illness that arises is subject to the same decision making process that would occur if the case had occurred at the establishment itself. This applies when a delivery driver experiences an injury to his or her back while loading boxes and transporting them into a building, or when an employee is injured in a car accident while running errands for the company or traveling to make a speech on behalf of the company.

Exceptions: Non-recordable situations

Work-relatedness is presumed for injuries and illnesses resulting from events or exposures occurring in the work environment, except under the following conditions, which are not recordable.

1. At the time of the injury or illness, the employee was present in the work environment as a member of the general public rather than as an employee. In these situations, the injury or illness has nothing to do with the employee's work or status as an employee.

   Non-recordable — An employee of a retail store patronizing that store as a customer on a non-work day and was injured in a fall.

2. The injury or illness involves signs or symptoms that surface at work but result solely from a non-work-related event or exposure that occurs outside the work environment. For this exception to apply, the work environment cannot have caused, contributed to, or significantly aggravated the injury or illness.

   Non-recordable — A diabetic incident that occurs while an employee is working. No event or exposure at work contributed in any way to the incident.

3. The injury or illness results solely from voluntary participation in a wellness program or in a medical, fitness, or recreational activity such as blood donation, physical examination, flu shot, exercise class, racquetball, or baseball. This allows you to exclude cases that are related to personal matters of exercise, recreation, medical examinations, or participation in blood donation programs when they are voluntary and are not being undertaken as a condition of work.

   Non-recordable — A worker is injured while performing aerobics in the company gymnasium during his or her lunch hour.

   Non-recordable — An employee suffers a severe reaction to a flu shot that was administered as part of a voluntary inoculation program.

4. The injury or illness is solely the result of an employee eating, drinking, or preparing food or drink for personal consumption, whether bought on your premises or brought in.

   Non-recordable — An employee is injured by choking on a sandwich brought from home while in your establishment. Likewise, if the employee contracts food poisoning from a sandwich brought from home or purchased in the company cafeteria and must take time off to recover, the case is not considered work-related.

   NOTE: If the employee is made ill by eating food contaminated by workplace contaminants (such as lead), or gets food poisoning from food supplied by your company for a business meeting or company function, the case would be considered work-related.

5. The injury or illness is solely the result of an employee doing personal tasks unrelated to their employment, at the establishment outside of the employee's assigned working hours (off-shift time).

   Non-recordable — An employee using a meeting room in your company, outside of his or her assigned work hours, to hold a meeting for a civic group and slipped and fell in the hallway.

6. The injury or illness is solely the result of personal grooming, self medication for a non-work-related condition, or is intentionally self-inflicted, such as attempted suicide.

   Non-recordable — A burn injury from a hair dryer used at work to dry the employee's hair.

   Non-recordable — A negative reaction to a medication brought from home to treat a non-work related condition.

7. The injury or illness is caused by a motor vehicle accident and occurs on a company parking lot or company access road while the employee is commuting to or from work or on a personal errand.

   Non-recordable — An employee is injured in a car accident while arriving at work, or while leaving the company's property at the end of the day, or while driving on his or her lunch hour to run an errand.

   NOTE: If an employee is injured in a car accident while leaving the property to purchase supplies for work, the case is considered work-related. Likewise, if an employee is injured by slipping on ice permitted to accumulate in the parking lot, the case is work-related.

8. The illness is the common cold or flu. These can be excluded, even if contracted while the employee was at work.

   NOTE: You must evaluate cases of contagious diseases such as tuberculosis, brucellosis, or hepatitis C to determine if they are work-related.

9. The illness is a mental illness. Mental illness will not be considered work-related unless the employee voluntarily provides you with an opinion from a physician or other licensed healthcare professional with appropriate training and experience, such as a psychiatrist, psychologist, or psychiatric nurse practitioner, stating that the employee has a mental illness that is work-related.

   NOTE: If you do not believe the reported mental illness is work-related, you may refer the case to a physician or other licensed healthcare professional for a second opinion.

Recording injuries/illnesses related to travel and telecommuting

Employees on travel status

Injuries and illnesses that occur while an employee is on travel status are work-related if, at the time of the injury or illness, the employee was engaged in work activities on behalf of your company. Some of these activities include travel to and from customer contacts, conducting job tasks, and entertaining or being entertained to transact, discuss, or promote business.

Work-related entertainment includes only entertainment activities being engaged in at your company's direction. When an employee joins a private club or organization, perhaps to "network" or make business contacts, an injury that occurs there is not considered work-related.

Injuries or illnesses that occur when the employee is on travel status do not have to be recorded when:

- A traveling employee checks into a hotel, motel, or into another temporary residence for one or more days, he or she establishes a "home away from home." You must evaluate the employee's activities after he or she checks into the hotel, motel, or other temporary residence for their work-relatedness in the same manner as you evaluate the activities of a non-traveling employee.
- The employee checks into the temporary residence, he or she is considered to have left the work environment. When the employee begins work each day, he or she re-enters the work environment. If the employee has established a "home away from home" and is reporting to a fixed worksite each day, you also do not consider injuries or illnesses work-related if they occur while the employee is commuting between the temporary residence and the job location.

- An employee takes a side trip for personal reasons. Injuries or illnesses are not considered work-related if they occur while the employee is on a personal detour from a reasonably direct route of travel.

Employees working at home (telecommuting)

Injuries and illnesses that occur while an employee is working at home, including work in a home office, will be considered work-related if the injury or illness:

- Occurs while the employee is performing work for pay or compensation in the home, and
- Is directly related to the performance of work, rather than to the general home environment or setting.

For example, if an employee drops a box of work documents and injures his or her foot, the case is considered work-related. If an employee's fingernail is punctured by a needle from a sewing machine used to perform garment work at home, becomes infected and requires medical treatment, the injury is considered work-related.

However, if an employee is injured because he or she trips on the family dog while rushing to answer a work phone call, the case is not considered work-related. If an employee working at home is electrocuted because of faulty home wiring, it is not considered work-related.

Determine if it is a new or continuing case

You may occasionally have difficulty determining whether new signs or symptoms are due to a new workplace event or exposure or whether they are the continuation of an existing work-related injury or illness that has already been recorded. This is an important distinction, because a new injury or illness requires you to make a new entry on the OSHA 300 Log, while the continuation of an old recorded case requires, at most, an updating of the original entry.

Consider an injury or illness to be a "new case" if the employee:

- Has not previously experienced a recorded injury or illness of the same type that affects the same part of the body, or
- Previously experienced a recorded injury or illness of the same type that affected the same part of the body but had recovered completely (all signs and symptoms had disappeared) from the previous injury or illness and an event or exposure in the work environment caused the signs or symptoms to reappear.

Recording chronic illnesses

The key to recording chronic illnesses is determining whether the conditions will progress even in the absence of workplace exposure or whether those conditions are triggered by events in the workplace.

In occupational illnesses where the signs or symptoms may recur or continue in the absence of an exposure in the workplace, the case must be recorded only once. Examples include occupational cancers, asbestosis, tuberculosis, byssinosis, and silicosis. These conditions are chronic — once the disease is contracted, it may never be cured or completely resolved.

However, when an employee experiences the signs or symptoms of an injury or illness that are the result of an event or exposure in the workplace, such as an episode of occupational asthma or contact dermatitis, you must treat the incident as a new case. It is typical, but not always the case, for individuals with these conditions to be symptom-free if exposure does not occur.

To help you determine if the case is new or recurring, you may, but are not required to, seek the advice of a physician or other licensed healthcare professional (HCP). However, if you do, you must follow the physician or HCP's recommendation about whether the case is a new case or a recurrence. If you receive recommendations from two or more physicians or HCPs, you must decide which recommendation is the best documented, best reasoned, and most authoritative and record the case based on that recommendation.

Recording privacy cases

If you have a privacy concern case, you cannot enter the employee's name on the 300 Log. Instead, enter "privacy case" in the space normally used for the employee's name. This will protect the privacy of the injured or ill employee when an authorized person requests access to the Log. Keep a separate, confidential list of the case numbers and employee names for your privacy concern cases so you can update the cases and provide the information to the government if asked to do so. The following privacy concern cases are the only types of occupational injuries and illnesses that fall under this category:

- An injury or illness to an intimate body part or the reproductive system;
- An injury or illness resulting from a sexual assault;
- Mental illnesses;
- HIV infection, hepatitis, or tuberculosis;
- Needlestick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material; and
- Other illnesses, if the employee independently and voluntarily requests that his or her name not be entered on the Log.

Identifiable information

In certain injury or illness cases, coworkers who are allowed to access the Log may be able to deduce the identity of the injured or ill worker and obtain inappropriate knowledge of a privacy-sensitive injury or illness. For instance, knowing the department in which the employee works could inadvertently divulge the person's identity.

If you have a reasonable basis to believe that information describing the privacy concern case may be personally identifiable even though the employee's name has been omitted, use discretion in describing the injury or illness on both the OSHA 300 and 301 forms. Enter enough information to identify the cause of the incident and the general severity of the injury or illness, but do not include details of an intimate or private nature. For example, a sexual assault case could be described as "injury from assault," or an injury to a reproductive organ could be described as "lower abdominal injury."

If you decide to voluntarily disclose the recordkeeping forms to persons other than government representatives, employees, former employees or authorized representatives, remove or hide the employees' names and other personally identifying information, except for the following cases. You may disclose the forms with personally identifying information only to:

- An auditor or consultant hired by the employer to evaluate the safety and health program;
- The extent necessary for processing a claim for workers' compensation or other insurance benefits; or
- A public health authority or law enforcement agency for uses and disclosures for which consent, an authorization, or opportunity to agree or object is not required.

General recording criteria

An injury or illness is recordable when it meets any of the following criteria:

- Death,
- Days away from work,
- Restricted work or transfer to another job,
- Medical treatment beyond first aid,

- Loss of consciousness, or
- A significant injury or illness diagnosed by a physician or HCP.

Although most cases are recorded because they meet one of these criteria, some cases may meet more than one as the case continues. For example, an injured worker may initially be sent home to recuperate (making the case recordable as a "days away" case) and then subsequently return to work on a restricted "light duty" basis.

Death

Record an injury or illness that results in an employee's death by entering a check mark on the OSHA 300 Log in the space for cases resulting in death. Additionally, you have to verbally report a work-related fatality to OSHA within eight hours.

Days away from work

When an injury or illness involves one or more days away from work, record the injury or illness on the OSHA 300 Log with a check mark in the space for cases involving days away and an entry of the number of calendar days away from work. If the employee is out for an extended period of time, enter an estimate of the days that the employee will be away, and update the day count when the actual number of days is known.

NOTE: Begin counting days away on the day *after* the injury occurred or the illness began.

When a physician or HCP recommends that the worker stay at home but the employee comes to work anyway, record these injuries and illnesses on the OSHA 300 Log using the check box for cases with days away from work and enter the number of calendar days away recommended by the physician/HCP. Days away must be recorded whether or not the injured or ill employee follows the physician/HCP's recommendation.

If the physician/HCP recommends that the employee return to work but he or she stays at home anyway, end the count of days away from work on the date the physician/HCP recommends that the employee return to work.

In cases where you receive recommendations from two or more physicians or HCPs, make a decision as to which recommendation is the most authoritative and record the case based on that recommendation. The employer is the ultimate recordkeeping decision-maker and must resolve the differences in opinion. You may turn to a third HCP for this purpose, or make the recordability decision yourself.

Weekends, holidays, and vacations

Count the number of calendar days the employee was unable to work as a result of the injury or illness, *regardless* of whether or not the employee was scheduled to work on those day(s). Weekend days, holidays, vacation days, or other days off are included in the total number of days recorded if the employee would not have been able to work on those days because of a work-related injury or illness.

If an employee is injured or becomes ill on a Friday and reports to work on a Monday, and was not scheduled to work on the weekend, you do not need to record the case unless you have received information from a physician or HCP indicating that the employee should not have worked, or should have performed only restricted work during the weekend. If so, record the injury or illness as a case with days away from work or restricted work and enter the day counts, as appropriate.

If an employee is injured or becomes ill on the day before scheduled time off such as a holiday, a planned vacation, or a temporary plant closing, the case should be recorded only if you receive information from a physician or HCP indicating that the employee should not have worked, or should have performed only restricted work, during the scheduled time off. If that is the case, record the injury or illness as a case with days away from work or restricted work, and enter the day counts, as appropriate.

Capping the count

You are not required to keep track of the number of calendar days away from work if the injury or illness resulted in more than 180 calendar days away from work and/or days of job transfer or restriction. In such a case, "cap" the total days away by entering 180 (or 180+) in the total days away column of the OSHA 300 Log.

Retiring or leaving the company

If an employee leaves your company for some reason unrelated to the injury or illness, such as retirement, a plant closing, or to take another job, you can stop counting days away from work or days of restriction/job transfer.

However, when an employee leaves your company because of the injury or illness, estimate the total number of days away or days of restriction/job transfer the employee would have experienced if he or she had remained on your payroll and enter the day count on the OSHA 300 Log.

Cases carried into the next year

If a case occurs in one year but results in days away during the next calendar year, record the injury or illness only once. Enter the number of calendar days away for the injury or illness on the OSHA 300 Log for the year in which the injury or illness occurred. If the employee is still away from work because of the injury or illness when you prepare the annual summary, estimate the total number of calendar days you expect the employee to be away from work, use this number to calculate the total for the annual summary, and then update the initial log entry later when the day count is known or reaches the 180-day cap.

Restricted work or job transfer

According to the Bureau of Labor Statistics, the incidence of restricted work cases grew nearly 70 percent between 1994 through 2000, largely in an effort to encourage injured or ill employees to return to work as soon as possible.

The return-to-work programs increasingly being relied on by employers (often at the recommendation of their workers' compensation insurers) are designed to:

- Prevent aggravating the injury or illness,
- Allow recuperation,
- Rehabilitate employees more effectively,
- Reintegrate them back into the workplace more rapidly,
- Limit workers' compensation costs, and
- Retain productive workers.

Additionally, many employees want restricted work when it is available, and would rather return to work on a restricted basis over recuperating at home.

Decide if the injury or illness is considered "restricted work"

Restricted work occurs when, as the result of a work-related injury or illness:

- You keep the employee from performing one or more of the routine functions of his or her job (work activities regularly performed at least once per week), or from working the full workday that he or she would otherwise have been scheduled to work; or
- A physician or HCP recommends that the employee not perform one or more of the routine functions of his or her job, or not work the full workday that he or she would otherwise have been scheduled to work.

When an employee's injury or illness involves restricted work or job transfer but does not involve days away from work, record it on the OSHA 300 Log by checking the space for job transfer or restriction and enter the number of restricted or transferred days in the "restricted workdays" column. However, you do not have to record restricted work or job transfers if the restriction or transfer occurs only for the day on which the injury occurred or the illness began.

Recording restricted work cases

When a physician or HCP recommends restricted work, record it only if it affects one or more of the employee's routine job functions. To determine whether this is the case, evaluate the restriction in light of the routine functions of the injured or ill employee's job. If the restriction from you or the physician/HCP keeps the employee from performing one or more of his or her routine job functions, or from working the full workday the employee would otherwise have worked, the employee's work has been restricted and you must record the case.

If an employee works only for a partial work shift because of a work-related injury or illness, record it as a day of job transfer or restriction, except for the day on which the injury occurred or the illness began.

If a physician/HCP recommends vague restrictions, such as that the employee engage only in "light duty" or "take it easy for a week," you should ask that person whether the employee can do all of his or her routine job functions and work all of his or her normally assigned work shift. If the answer to both of these questions is yes, then the case does not involve a work restriction and does not have to be recorded as such. However, if the answer to one or both of these questions is no, the case involves restricted work and must be recorded as a restricted work case. In cases where you are unable to get clarification from the physician/HCP who recommended the restriction, record the injury or illness as a case involving restricted work.

When a physician/HCP recommends a job restriction meeting OSHA's definition, but the employee does all of his or her routine job functions anyway, you still must record the injury or illness on the OSHA 300 Log as a restricted work case. If job restrictions are recommended, ensure that the employee complies with that restriction. If you receive recommendations from two or more physicians/HCPs, decide which recommendation is the most authoritative, and record the case based on that recommendation.

Recording job transfers

If you assign an injured or ill employee to a job other than his or her regular job for part of the day, the case involves transfer to another job. Both job transfer and restricted work cases are recorded in the same box on the OSHA 300 Log. Do not include the day on which the injury or illness occurred.

For example, if you assign, or a physician/HCP recommends that you assign, an injured or ill worker to his or her routine job duties for part of the day and to another job for the rest of the day, the injury or illness involves a job transfer.

You count days of job transfer or restriction in the same way you count days away from work. The only difference is that, if you permanently assign the injured or ill employee to a job that has been modified or permanently changed in a manner that eliminates the routine functions the employee was restricted from performing, you may stop the day count when the modification or change is made permanent. In these cases, count at least one day of restricted work or job transfer.

Medical treatment beyond first aid

First aid and medical treatment criteria will probably be the criteria you use the most when deciding whether a work-related injury must be recorded. OSHA's list of first aid treatments is inclusive, that is, you can look at it and without elaborate analysis, determine whether a treatment is first aid and thus not recordable. These treatments are considered first aid whether they are provided by a lay person, a physician, or HCP. Any treatment *not* on the first aid list is considered medical treatment and recordable, even when it is provided by someone other than a physician or HCP.

If a work-related injury or illness results in medical treatment beyond first aid, record it on the OSHA 300 Log. If the injury or illness does not involve death, one or more days away from work, one or more days of restricted work, or one or more days of job transfer, enter a check mark in the box for cases where the employee received medical treatment but remained at work and was not transferred or restricted.

Loss of consciousness

Every work-related injury or illness case involving a complete loss of consciousness (not merely a sense of disorientation or other diminished level of awareness) is recordable, regardless of the length of time the employee remains unconscious. Fainting episodes involving voluntary activities such as vaccination programs or blood donations are not recordable. However, fainting episodes that result from mandatory medical procedures such as blood tests or physicals required by OSHA standards are considered work-related events and, as such, are recordable if they meet one or more of the recording criteria.

What makes an injury or illness "significant"

Significant diagnosed work-related injuries or illnesses are recordable under the general criteria, even if they do not result in death, days away from work, restricted work or job transfer, medical treatment beyond first aid, or loss of consciousness. However, there are significant injuries, such as a punctured eardrum or a fractured toe or rib, for which neither medical treatment nor work restrictions may be recommended. In addition, there are some significant progressive diseases, such as byssinosis, silicosis, and some types of cancer, for which medical treatment or work restrictions may not be recommended at the time of diagnosis but are likely to be recommended as the disease progresses.

OSHA believes that cancer, chronic irreversible diseases, fractured or cracked bones, and punctured eardrums are generally considered significant injuries and illnesses and must be recorded at the initial diagnosis, even if medical treatment or work restrictions are not recommended or are postponed in a particular case. Record these "significant" cases within seven days of receiving a diagnosis from a physician or HCP.

Recording specific types of cases

Needlestick and sharps injuries

Record all work-related needlestick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material (as defined by OSHA's Bloodborne Pathogens standard at §1910.1030). Enter the case on the OSHA 300 Log as an injury; however, to protect the employee's privacy, do not enter the employee's name on the OSHA 300 Log.

If the injured employee is later diagnosed with an infectious bloodborne disease, update the classification of the case on the OSHA 300 Log if the case results in death, days away from work, restricted work, or job transfer. Also update the description to identify the infectious disease and change the classification of the case from an injury (a needlestick) to an illness (that resulted from the needlestick).

Additionally, record incidents where employees are splashed or exposed to blood or other potentially infectious material without being cut or scratched if it results in the diagnosis of a bloodborne illness, such as HIV, hepatitis B, or hepatitis C; or it meets one or more of the general recording criteria.

Note: You need to record cuts, lacerations, punctures, and scratches only if they are work-related and involve contamination with another person's blood or other potentially infectious material. If the cut, laceration, or scratch involves a clean object, or a contaminant other than blood or other potentially infectious material, record the case only if it meets one or more of the general recording criteria.

You may use the OSHA 300 and 301 forms to meet the sharps injury log requirement at §1910.1030(h)(5) in the Bloodborne Pathogens standard. To fulfill this requirement, enter the type and brand of the device causing the sharps injury on either form and maintain the records in a way that segregates sharps injuries from other types of work-related injuries and illnesses, or allows sharps injuries to be easily separated.

Medical removal

Some OSHA standards, such as lead, cadmium, methylene chloride, formaldehyde, and benzene, have medical removal requirements. If an employee is medically removed under a standard's medical surveillance requirements, record the case on the OSHA 300 Log.

Enter a medical removal case as either a case involving days away from work or a case involving restricted work activity, depending on how you decide to comply with the medical removal requirement. If the medical removal is the result of a chemical exposure, enter the case on the 300 Log by checking the "poisoning" column.

NOTE: If the case involves voluntary medical removal before the medical removal levels required by an OSHA standard, you do not need to record the case on the OSHA 300 Log.

Noise-induced hearing loss

Noise-induced hearing loss is a serious and irreversible condition. However, it is not the type of occupational injury that typically requires days away from work for recuperation. Beginning January 1, 2003, record work-related hearing losses of 10 decibel shifts that result in a total 25 decibel shift above audiometric zero.

Recordability based on audiometric zero and a standard threshold shift

A standard threshold shift (STS) is a change in hearing threshold, relative to an employee's baseline audiogram (hearing test), averaging 10 decibels (dB) or more at 2000, 3000, and 4000 hertz (Hz) in one or both ears. If an employee's audiogram reveals that a work-related STS has occurred in one or both ears, and the total hearing level is 25 decibels or more above audiometric zero in the same ears as the STS, the case is recordable.

Through December 31, 2003, document the case on the 300 Log by checking either the "injury" or "all other illnesses" column, depending on the nature of the incident that caused the hearing loss.

NOTE: OSHA has revised the 300 Log and 300A Summary to include a check box and corresponding field specifically for occupational hearing loss cases. Beginning January 1, 2004, record these cases by checking the "hearing loss" column on the OSHA 300 Log.

Hearing loss that occurs with aging

You may take into account the hearing loss that occurs as a result of the aging process and retest an employee who has an STS on an audiogram to ensure that the STS is permanent before recording it. Retesting allows you to exclude false positive results and temporary threshold shifts from the data. If you retest the employee's hearing within 30 days of the first test, and the retest does not confirm the STS, you are not required to record the hearing loss case on the OSHA 300 Log. However, if the retest confirms the STS, record the hearing loss illness within seven calendar days of the retest.

When comparing audiogram results, adjust the results for the employee's age when the audiogram was taken using Tables F-1 or F-2, as appropriate, in Appendix F of the Occupational Noise Exposure standard at §1910.95.

Hearing loss is presumed to be work-related if the employee is exposed to noise in the workplace at an 8-hour time-weighted average of 85 dBA or greater, or to a total noise dose of 50 percent, as defined in OSHA's Occupational Noise Exposure standard. Noise dose is defined as the amount of actual employee exposure to noise relative to the permissible exposure limit for noise. A dose greater than 100 percent represents exposure above the limit. For hearing loss cases where the employee is not exposed to this level of noise, refer to the rules in §1904.5 to determine if the hearing loss is work-related.

If a physician or HCP determines that the hearing loss is not work-related or has not been significantly aggravated by occupational noise exposure, you are not required to consider the case work-related or to record the case on the 300 Log. Examples include hearing loss occurring before the employee was hired or those unrelated to workplace noise, such as off the job traumatic injury to the ear or infections.

Tuberculosis (TB)

There are two general stages of TB — tuberculosis infection and active tuberculosis disease. Individuals with tuberculosis infection and no active disease are not infectious. Tuberculosis infections are asymptomatic and are only detected by a positive response to a tuberculin skin test.

If any of your employees has been occupationally exposed to anyone with a known case of active TB, and that employee subsequently develops a tuberculosis infection as evidenced by a positive skin test or diagnosis by a physician or HCP, record the case on the 300 Log by checking the "respiratory condition" column.

You do not have to record a positive TB skin test result obtained at a pre-employment physical because the employee was not occupationally exposed to a known case of active tuberculosis in your workplace. Line-out or erase the case from the Log if:

- The worker is living in a household with a person who has been diagnosed with active TB;
- The Public Health Department has identified the worker as a contact of an individual with a case of active TB unrelated to the workplace; or
- A medical investigation shows that the employee's infection was caused by exposure to TB away from work, or proves that the case was not related to the workplace TB exposure.

Soft tissue injuries (MSDs)

Work-related injuries and illnesses involving the muscles, nerves, tendons, ligaments, joints, cartilage and spinal discs (often referred to as musculoskeletal disorders or MSDs) are recordable under the same requirements applicable to any other type of injury or illness. Soft-tissue injury cases are recordable only if they are work-related, are new cases, and involve medical treatment, days away, job transfer, or restricted work. Record soft tissue injuries by checking either the "injury" or the "all other illness" column.

Requesting a variance

If you wish to keep records in a different manner from that prescribed by the Part 1904 regulations, submit a variance petition to OSHA in Washington D.C. You may obtain a variance only if you can show that your alternative recordkeeping system:

- Collects the same information as Part 1904 requires;
- Meets the purposes of the OSH Act; and
- Does not interfere with the administration of the Act.

Include the following items in your variance petition:

- Name and address;
- A list of the state(s) where the variance would be used;
- The address(es) of the business establishment(s) involved;
- A description of why you are seeking a variance;
- A description of the different recordkeeping procedures you propose to use;
- A description of how your proposed procedures will collect the same information as would be collected by Part 1904 and achieve the purpose of the Act; and
- A statement that you have informed your employees of the petition by giving them or their authorized representative a copy of the petition and by posting a statement summarizing the petition in the same way as notices are posted under §1903.2(a).

During the time OSHA is processing your variance request, record injuries and illnesses according to Part 1904. You may not use your own system until it receives final approval. OSHA will take the following steps to process your variance petition:

1. Offer your employees and their authorized representatives an opportunity to submit written data,views, and arguments about your variance petition.
2. Allow the public to comment on your variance petition by publishing the petition in the *Federal Register*.If the petition is published, the notice will establish a public comment period and may include aschedule for a public meeting on the petition.
3. After reviewing your variance petition and any comments from your employees and the public, OSHA will decide whether or not your proposed recordkeeping procedures will meet the purposes of the OSH Act, will not otherwise interfere with the Act, and will provide the same information as the Part 1904regulations. If your procedures meet these criteria, the Agency may grant the variance subject to such conditions as he or she finds appropriate.
4. If the variance is granted, OSHA will publish a notice in the *Federal Register* to announce the variance. The notice will include the practices the variance allows you to use, any conditions that apply,and the reasons for allowing the variance.

If you have already been cited by OSHA for not following the Part 1904 regulations, your variance petition will not affect the citation and penalty. However, OSHA may elect not to review your variance petition if it includes an element for which you have been cited and the citation is still under review by a court, an Administrative Law Judge (ALJ), or the OSH Review Commission.

Your variance may be revoked if there is a good cause. The procedures revoking a variance will follow the same process as OSHA uses for reviewing variance petitions, except in cases of willfulness or where necessary for public safety, you will be:

- Notified in writing of the facts or conduct that may warrant revocation of your variance; and
- Provided (including your employees and authorized employee representatives) with an opportunity to participate in the revocation procedures.

Recordkeeping requirements in state-plan states

Some states operate their own OSHA programs. States operating OSHA-approved state plans must have occupational injury and illness recording and reporting requirements that are substantially identical to the requirements of federal OSHA's Part 1904. These states must have the same requirements as federal OSHA for determining which injuries and illnesses are recordable and how they are recorded.

However, for other Part 1904 provisions, such as industry exemptions, reporting of fatalities and hospitalizations, record retention, or employee involvement, state-plan state requirements may be more stringent than the federal requirements. These states, however, have to get approval from federal OSHA to make such changes to the recordkeeping requirements.

State and local government employees

Although state and local government employees are not covered by federal OSHA, all state-plan states must provide coverage and develop injury and illness statistics for these workers. State plan recording and reporting requirements for state and local government entities may differ from those for the private sector, but must meet the general requirements as federal OSHA for determining which injuries and illnesses are recordable and how they are recorded.

A state-plan state cannot issue a variance to a private sector employer and must recognize all variances issued by federal OSHA. It can, however, grant a variance to a state or local government employer after obtaining approval from federal OSHA.

Reporting fatalities and multiple hospitalization incidents

You must verbally report the death of any employee from a work-related incident or the in-patient hospitalization of three or more employees as a result of a work-related incident. Report within eight hours following the incident by telephone or in person to your local OSHA office that is nearest to the site of the incident.

If you can't talk to a person at the area office, report the fatality or multiple hospitalization incident using the OSHA toll-free central telephone number, 1-800-321-OSHA (1-800-321-6742). Leaving a message on OSHA's answering machine, faxing the area office, or sending an email is not acceptable.

When an employee dies or hospitalization occurs long after the incident, it is not necessary to report. You must only report each fatality or multiple hospitalization incident that occurs within 30 days of the incident.

If you do not learn of a reportable incident at the time it occurs and the incident would otherwise be reportable, you are required to make the report within eight hours of the time the incident is reported to you, your agent(s), or employee(s). Note also that some states have more stringent requirements and require verbal reporting to OSHA for situations other than those referenced above.

Provide incident information

When you contact OSHA, you will need to provide the following information for each fatality or multiple hospitalization incident:

- Establishment name,
- Location of the incident,
- Time of the incident,
- Number of fatalities or hospitalized employees,
- Names of any injured employees,
- Your contact person and his or her telephone number, and
- A brief description of the incident.

Motor vehicle accidents

You do not have to report every fatality or multiple hospitalization incident resulting from a motor vehicle accident. If the motor vehicle accident occurs on a public street or highway and does not occur in a construction work zone, you do not have to report the incident to OSHA. However, these injuries must be recorded on your OSHA injury and illness records, if you are required to keep them.

Commercial or public transportation systems

OSHA does not require that you call to report a fatality or multiple hospitalization incident if it involves a commercial airplane, train, subway, or bus accident. Fatalities or multiple hospitalization incidents that occur on a commercial or public transportation system must be recorded on your OSHA injury and illness records, if you are required to keep them.

Heart attacks

If an employee has a heart attack at work and dies, you must report the fatality to OSHA. Your local OSHA area office director will decide whether to investigate the incident, depending on the circumstances of the heart attack.

OSHA COMPLIANCE MANUAL

Citations and penalties

During an inspection, OSHA compliance officers are required to review and record a company's injury and illness records for the three prior calendar years. They also must obtain any OSHA Data Initiative survey information available on the company.

Regarding the OSHA 300 and 301 forms, where no records are kept and there have been recordable injuries or illnesses, OSHA will issue a citation for failure to keep records. Where required records are kept but no entry is made for a recordable injury or illness, a citation for failure to record the case will be issued. However, if no records are kept and there have been no recordable injuries or illnesses, a citation will not be issued.

When the required records are kept but have not been completed with the necessary details, or the records contain minor inaccuracies, the records will be reviewed. If the lack of detail impairs understandability of the nature of the hazards or injuries and illnesses, an other-than-serious citation will be issued. In cases where the deficiencies do not impair understanding, no citation will be issued.

OSHA has set up the following penalty structure (unadjusted) for recordkeeping violations:

- 300 Log not properly kept: $1,000 for each year.
- 301 not filled out at all: $1,000 for each incident, up to a maximum of $7,000.
- 301 not accurately completed: $1,000 for each incident, up to a maximum of $3,000.
- 300A not posted by February 1, not posted for the required three-month time period, or not certified by the appropriate company official: $1,000.
- Failure to report a fatality or multiple hospitalization by telephone or in person to OSHA: $5,000 up to a maximum of $7,000.
- Failure to provide copies of injury and illness records to an approved requester within the required time-frame: $1,000 for each form not made available, up to a maximum of $7,000.

OSHA's annual injury and illness survey

Each year, OSHA sends injury and illness survey forms to employers in certain industry segments. In any given year, some employers will receive an OSHA survey form and others will not. You do not have to send injury and illness data to OSHA unless you receive a survey form.

If you receive OSHA's survey form, you must fill it out and send it to OSHA, as stated on the form. You will need to report the following information for the year specified on the form:

- Number of workers you employed;
- Number of hours worked by your employees; and
- Requested information from the records that you keep under Part 1904.

The completed survey must be returned to OSHA within 30 calendar days or by the date stated in the survey form, whichever is later.

Even if you are exempt from keeping injury and illness records, OSHA can request that it will be collecting injury and illness information from you in the following year. If you receive letter requesting the information, you must keep the injury and illness records and make a survey report for the year covered by the survey. This applies to employers in state-plan states as well as those covered by federal OSHA.

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Bureau of Labor Statistics request for data

Annually, the Bureau of Labor Statistics (BLS) sends injury and illness survey forms to randomly selected employers and uses the information to create the Nation's occupational injury and illness statistics. In any year, some employers will receive a BLS survey form and others will not. You do not have to send injury and illness data to the BLS unless you receive a survey form.

Even if you are exempt from keeping injury and illness records, the BLS may inform you in writing that it will be collecting injury and illness information from you in the coming year. If you receive such a letter, you must keep the injury and illness records required by OSHA's recordkeeping rule and make a survey report for the year covered by the survey. All employers who receive a survey form must respond to the survey, even those in state-plan states.

Recordkeeping calculations

Annual average number of employees

The annual average number of employees is calculated by dividing your total paid employees by the number of pay periods.

To find your company's annual average number of employees, you need to add the number of all full-time, part-time, temporary, seasonal, salaried, and hourly employees at your location throughout the year. You will need a total of all employees on the payroll for each pay period. This figure may vary from pay period to pay period due to seasonal work.

Divide this total number by the number of pay periods at your location during the year. Be sure to include all pay periods, even if you had no employees. This calculation will give you an average number of employees for each of your pay periods.

EXAMPLE

Acme Construction, which pays its employees once every two weeks (26 pay periods/year) figured its average employment this way:

For pay period:	Acme paid this number of employees:
1	10
2	0
3	15
4	30
5	40

(NOTE: Pay periods 6 through 23 are not shown in this example. Include all pay periods in your calculation.)

24	20
25	15
26	10
	830

CALCULATION

Number of employees paid = 830
Number of pay periods = 26
830 = 31.92
26
31.92 rounds to 32
32 is the annual average number of employees

Total hours worked by all employees

The total number of hours worked by all employees is the number of full-time employees multiplied by the number of work hours for a full-time employee — plus overtime hours and hours worked by temporary, part-time, and seasonal employees. Use the following guidelines for calculating the total hours worked by all employees:

- Include the hours worked by all of your salaried, hourly, part-time and seasonal workers.
- Include hours worked by other workers subject to day-to-day supervision by your company (leased workers and temporary help services workers).
- Do not include vacation, sick leave, holidays, or any other non-work time, even if employees were paid for it.

If your company keeps records of only the hours paid or if you have employees who are not paid by the hour, estimate the hours that the employees actually worked. If this number isn't available, you can use this optional worksheet to estimate it.

CALCULATION

1. **Find the number** of full-time employees in your establishment for the year.
2. **Multiply by the number** of work hours for a full-time employee in a year. This is the number of full-time hours worked.
3. **Add the number** of any overtime hours as well as the hours worked by other employees (part-time, temporary, or seasonal)
4. **Round the answer** to the next highest whole number. Write the rounded number in the blank marked "Total hours worked by all employees last year."

Incident rate calculator

What is an incidence rate?

An incidence rate is the number of recordable injuries and illnesses occurring among a given number of full-time workers (usually 100 fulltime workers) over a given period of time (usually one year). To evaluate your company's injury and illness experience over time or to compare your experience with that of your industry as a whole, you need to compute your incidence rate. Because a specific number of workers and a specific period of time are involved, these rates can help you identify problems in your workplace and/or progress you have made in preventing work-related injuries and illnesses.

To calculate your incidence rate for *all recordable injuries and illnesses*

To find the total number of recordable injuries and illnesses that occurred during the year, count the number of line entries on your OSHA Form 300, or refer to the OSHA Form 300A and sum the entries for columns (G), (H), (I), and (J).

To calculate your incidence rate for *injuries and illnesses that involved days away from work*

To find the number of injuries and illnesses that involved days away from work, count the number of line entries on your OSHA Form 300 that received a check mark in column (H), or refer to the entry for column (H) on the OSHA Form 300A.

Calculation formula

To calculate an incidence rate, you need to know the number of hours all employees actually worked during the year. Refer to OSHA Form 300A and optional worksheet to calculate this number.

All recordable cases:

Compute the incidence rate for all recordable cases of injuries and illnesses using the following formula:

> Total number of injuries and illnesses x 200,000 ÷ Number of hours worked by all employees = Total recordable case rate

(The 200,000 figure in the formula represents the number of hours 100 employees working 40 hours per week, 50 weeks per year would work, and provides the standard base for calculating incidence rates.)

Days away from work, restriction, or transfer (DART):

Compute the incidence rate for recordable cases involving days away from work, days of restricted work activity, or job transfer (DART) using the following formula:

> (Number of entries in column H + Number of entries in column I) x 200,000 ÷ Number of hours worked by all employees = DART incidence rate

NOTE: You can use the same formula to calculate incidence rates for other variables such as cases involving restricted work activity (column (I) on Form 300A), cases involving skin disorders (column (M-2) on Form 300A), etc. Just substitute the appropriate total for these cases, from Form 300A, into the formula in place of the total number of injuries and illnesses.

To calculate your severity rate

To calculate the severity rate (SR), use the same formula that you use to calculate the DART rate except that the total number of days away from work, days of restriction, and days of transfer are substituted into the numerator in place of the total number of incidents.

This calculation provides a measure of the severity of the cases and is used in conjunction with the DART rate to determine the magnitude of the case.

Frequently asked questions (FAQs)

General

<u>Question:</u> Can I compare injury and illness rates generated from my OSHA 300 Log, and the new regulation, to injury and illness rates generated from my OSHA 200 Log under the old rule (i.e., compare 2001 data with 2002 data)?

The new recordkeeping rule changes some of the criteria used to determine which injuries and illnesses will be entered into the records and how they will be entered. Therefore, employers should use reasonable caution when comparing data produced under the old 1904 regulation with data produced under the new rule.

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Question: Are the recordkeeping requirements the same in all of the States?

The States operating OSHA-approved State Plans must adopt occupational injury and illness recording and reporting requirements that are substantially identical to the requirements in Part 1904 and which should also be in effect on January 1, 2002. For more information, see "States Requirements" §1904.37.

Question: Why are employers required to keep records of work-related injuries and illnesses?

The OSH Act of 1970 requires the Secretary of Labor to produce regulations that require employers to keep records of occupational deaths, injuries, and illnesses. The records are used for several purposes.

Injury and illness statistics are used by OSHA. OSHA collects data through the OSHA Data Initiative (ODI) to help direct its programs and measure its own performance. Inspectors also use the data during inspections to help direct their efforts to the hazards that are hurting workers.

The records are also used by employers and employees to implement safety and health programs at individual workplaces. Analysis of the data is a widely recognized method for discovering workplace safety and health problems and for tracking progress in solving those problems.

The records provide the base data for the BLS Annual Survey of Occupational Injuries and Illnesses, the Nation's primary source of occupational injury and illness data.

Question: What is the effect of workers' compensation reports on the OSHA records?

The purpose section of the rule includes a note to make it clear that recording an injury or illness neither affects a person's entitlement to workers' compensation nor proves a violation of an OSHA rule. The rules for compensability under workers' compensation differ from state to state and do not have any effect on whether or not a case needs to be recorded on the OSHA 300 Log. Many cases will be OSHA recordable and compensable under workers' compensation. However, some cases will be compensable but not OSHA recordable, and some cases will be OSHA recordable but not compensable under workers' compensation.

Question: Do States with OSHA-approved State plans have the same industry exemptions as Federal OSHA?

States with OSHA-approved plans may require employers to keep records for the State, even though those employers are within an industry exempted by the Federal rule.

Question: Does an employee report of an injury or illness establish the existence of the injury or illness for recordkeeping purposes?

No. In determining whether a case is recordable, the employer must first decide whether an injury or illness, as defined by the rule, has occurred. If the employer is uncertain about whether an injury or illness has occurred, the employer may refer the employee to a physician or other healthcare professional for evaluation and may consider the healthcare professional's opinion in determining whether an injury or illness exists.

NOTE: If a physician or other licensed healthcare professional diagnoses a significant injury or illness within the meaning of §1904.7(b)(7) and the employer determines that the case is work-related, the case must be recorded.

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Work-relatedness

Question: If a maintenance employee is cleaning the parking lot or an access road and is injured as a result, is the case work-related?

Yes, the case is work-related because the employee is injured as a result of conducting company business in the work environment. If the injury meets the general recording criteria of §1904.7 (death, days away, etc.), the case must be recorded.

Question: Are cases of workplace violence considered work-related under the new recordkeeping rule?

The recordkeeping rule contains no general exception, for purposes of determining work-relationship, for cases involving acts of violence in the work environment. However, some cases involving violent acts might be included within one of the exceptions listed in §1904.5(b)(2). For example, if an employee arrives at work early to use a company conference room for a civic club meeting and is injured by some violent act, the case would not be work-related under the exception in §1904.5(b)(2)(v).

Question: What activities are considered "personal grooming" for purposes of the exception to the geographic presumption of work-relatedness in §1904.5(b)(2)(vi)?

Personal grooming activities are activities directly related to personal hygiene, such as combing and drying hair, brushing teeth, clipping fingernails and the like. Bathing or showering at the workplace when necessary because of an exposure to a substance at work is not within the personal grooming exception in §1904.5(b)(2)(vi). Thus, if an employee slips and falls while showering at work to remove a contaminant to which he has been exposed at work, and sustains an injury that meets one of the general recording criteria listed in §1904.7(b)(1), the case is recordable.

Question: What are "assigned working hours" for purposes of the exception to the geographic presumption in §1904.5(b)(2)(v)?

"Assigned working hours," for purposes of §1904.5(b)(2)(v), means those hours the employee is actually expected to work, including overtime.

Question: What are "personal tasks" for purposes of the exception to the geographic presumption in §1904.5(b)(2)(v)?

"Personal tasks" for purposes of §1904.5(b)(2)(v) are tasks that are unrelated to the employee's job. For example, if an employee uses a company break area to work on his child's science project, he is engaged in a personal task.

Question: If an employee stays at work after normal work hours to prepare for the next day's tasks and is injured, is the case work-related? For example, if an employee stays after work to prepare air-sampling pumps and is injured, is the case work-related?

A case is work-related any time an event or exposure in the work environment either causes or contributes to an injury or illness or significantly aggravates a pre-existing injury or illness, unless one of the exceptions in §1904.5(b)(2) applies. The work environment includes the establishment and other locations where one or more employees are working or are present as a condition of their employment. The case in question would be work-related if the employee was injured as a result of an event or exposure at work, regardless of whether the injury occurred after normal work hours.

Question: If an employee voluntarily takes work home and is injured while working at home, is the case recordable?

No. Injuries and illnesses occurring in the home environment are only considered work-related if the employee is being paid or compensated for working at home and the injury or illness is directly related to the performance of the work rather than to the general home environment.

Question: If an employee's pre-existing medical condition causes an incident which results in a subsequent injury, is the case work-related? For example, if an employee suffers an epileptic seizure, falls, and breaks his arm, is the case covered by the exception in §1904.5(b)(2)(ii)?

Neither the seizures nor the broken arm are recordable. Injuries and illnesses that result solely from non-work-related events or exposures are not recordable under the exception in §1904.5(b)(2)(ii). Epileptic seizures are a symptom of a disease of non-occupational origin, and the fact that they occur at work does not make them work-related. Because epileptic seizures are not work-related, injuries resulting solely from the seizures, such as the broken arm in the case in question, are not recordable.

Question: This question involves the following sequence of events: Employee A drives to work, parks her car in the company parking lot and is walking across the lot when she is struck by a car driven by employee B, who is commuting to work. Both employees are seriously injured in the accident. Is either case work-related?

Neither employee's injuries are recordable. While the employee parking lot is part of the work environment under §1904.5, injuries occurring there are not work-related if they meet the exception in §1904.5(b)(2)(vii). Section 1904.5(b)(2)(vii) excepts injuries caused by motor vehicle accidents occurring on the company parking lot while the employee is commuting to and from work. In the case in question, both employees' injuries resulted from a motor vehicle accident in the company parking lot while the employees were commuting. Accordingly, the exception applies.

New cases

Question: How is an employer to determine whether an employee has "recovered completely" from a previous injury or illness such that a later injury or illness of the same type affecting the same part of the body resulting from an event or exposure at work is a "new case" under §1904.6(a)(2)? If an employee's signs and symptoms disappear for a day and then resurface the next day, should the employer conclude that the later signs and symptoms represent a new case?

An employee has "recovered completely" from a previous injury or illness, for purposes of §1904.6(a)(2), when he or she is fully healed or cured. The employer must use his best judgment based on factors such as the passage of time since the symptoms last occurred and the physical appearance of the affected part of the body. If the signs and symptoms of a previous injury disappear for a day only to reappear the following day, that is strong evidence the injury has not properly healed. The employer may, but is not required to, consult a physician or other licensed healthcare provider (PLHCP). Where the employer does consult a PLHCP to determine whether an employee has recovered completely from a prior injury or illness, it must follow the PLHCP's recommendation. In the event the employer receives recommendations from two or more PLHCPs, the employer may decide which recommendation is the most authoritative and record the case based on that recommendation.

OSHA COMPLIANCE MANUAL

Recording criteria

Question: The old rule required the recording of all occupational illnesses, regardless of severity. For example, a work-related skin rash was recorded even if it didn't result in medical treatment. Does the rule still capture these minor illness cases?

No. Under the new rule, injuries and illnesses are recorded using the same criteria. As a result, some minor illness cases are no longer recordable. For example, a case of work-related skin rash is now recorded only if it results in days away from work, restricted work, transfer to another job, or medical treatment beyond first aid.

Question: Does the size or degree of a burn determine recordability?

No, the size or degree of a work-related burn does not determine recordability. If a work-related first, second, or third degree burn results in one or more of the outcomes in §1904.7 (days away, work restrictions, medical treatment, etc.), the case must be recorded.

Question: If an employee dies during surgery made necessary by a work-related injury or illness, is the case recordable? What if the surgery occurs weeks or months after the date of the injury or illness?

If an employee dies as a result of surgery or other complications following a work-related injury or illness, the case is recordable. If the underlying injury or illness was recorded prior to the employee's death, the employer must update the Log by lining out information on less severe outcomes, e.g., days away from work or restricted work, and checking the column indicating death.

Question: An employee hurts his or her left arm and is told by the doctor not to use the left arm for one week. The employee is able to perform all of his or her routine job functions using only the right arm (though at a slower pace and the employee is never required to use both arms to perform his or her job functions). Would this be considered restricted work?

No. If the employee is able to perform all of his or her routine job functions (activities the employee regularly performs at least once per week), the case does not involve restricted work. Loss of productivity is not considered restricted work.

Question: Are surgical glues used to treat lacerations considered "first aid?"

No, surgical glue is a wound closing device. All wound closing devices except for butterfly and steristrips are by definition "medical treatment," because they are not included on the first aid list.

Question: Item N on the first aid list is "drinking fluids for relief of heat stress." Does this include administering intravenous (IV) fluids?

No. Intravenous administration of fluids to treat work-related heat stress is medical treatment.

Question: Is the use of a rigid finger guard considered first aid?

Yes, the use of finger guards is always first aid.

Question: For medications such as Ibuprofen that are available in both prescription and non-prescription form, what is considered to be prescription strength? How is an employer to determine whether a non-prescription medication has been recommended at prescription strength for purposes of §1904.7(b)(5)(i)(C)(ii)(A)?

The prescription strength of such medications is determined by the measured quantity of the therapeutic agent to be taken at one time, i.e., a single dose. The single dosages that are considered prescription strength for four common over-the-counter drugs are:

Ibuprofen (such as Advil™) – greater than 467 mg
Diphenhydramine (such as Benadryl™) – greater than 50 mg

Naproxen Sodium (such as Aleve™) – greater than 220 mg
Ketoprofen (such as Orudus KT™) – greater than 25mg

To determine the prescription-strength dosages for other drugs that are available in prescription and non-prescription formulations, the employer should contact OSHA, the United States Food and Drug Administration, their local pharmacist or their physician.

Question: If an employee who sustains a work-related injury requiring days away from work is terminated for drug use based on the results of a post-accident drug test, how is the case recorded? May the employer stop the day count upon termination of the employee for drug use under §1904.7(b)(3)(vii)?

Under §1904.7(b)(3)(vii), the employer may stop counting days away from work if an employee who is away from work because of an injury or illness leaves the company for some reason unrelated to the injury or illness, such as retirement or a plant closing. However, when the employer conducts a drug test based on the occurrence of an accident resulting in an injury at work and subsequently terminates the injured employee, the termination is related to the injury. Therefore, the employer must estimate the number of days that the employee would have been away from work due to the injury and enter that number on the 300 Log.

Question: Once an employer has recorded a case involving days away from work, restricted work or medical treatment and the employee has returned to his regular work or has received the course of recommended medical treatment, is it permissible for the employer to delete the Log entry based on a physician's recommendation, made during a year-end review of the Log, that the days away from work, work restriction or medical treatment were not necessary?

The employer must make an initial decision about the need for days away from work, a work restriction, or medical treatment based on the information available, including any recommendation by a physician or other licensed healthcare professional. Where the employer receives contemporaneous recommendations from two or more physicians or other licensed healthcare professionals about the need for days away, a work restriction, or medical treatment, the employer may decide which recommendation is the most authoritative and record the case based on that recommendation. Once the days away from work or work restriction have occurred or medical treatment has been given, however, the employer may not delete the Log entry because of a physician's recommendation, based on a year-end review of the Log, that the days away, restriction or treatment were unnecessary.

Question: Section 1904.7(b)(5)(ii) of the rule defines first aid, in part, as "removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means." What are "other simple means" of removing splinters that are considered first aid?

"Other simple means" of removing splinters, for purposes of the first aid definition, means methods that are reasonably comparable to the listed methods. Using needles, pins or small tools to extract splinters would generally be included.

Question: How long must a modification to a job last before it can be considered a permanent modification under §1904.7(b)(4)(xi)?

Section 1904.7(b)(4)(xi) of the rule allows an employer to stop counting days of restricted work or transfer to another job if the restriction or transfer is made permanent. A permanent restriction or transfer is one that is expected to last for the remainder of the employee's career. Where the restriction or transfer is determined to be permanent at the time it is ordered, the employer must count at least one day of the restriction or transfer on the Log. If the employee whose work is restricted or who is transferred to another job is expected to return to his or her former job duties at a later date, the restriction or transfer is considered temporary rather than permanent.

Question: If an employee loses his arm in a work-related accident and can never return to his job, how is the case recorded? Is the day count capped at 180 days?

If an employee never returns to work following a work-related injury, the employer must check the "days away from work" column, and enter an estimate of the number of days the employee would have required to recuperate from the injury, up to 180 days.

Question: If an employee who routinely works ten hours a day is restricted from working more than eight hours following a work-related injury, is the case recordable?

Generally, the employer must record any case in which an employee's work is restricted because of a work-related injury. A work restriction, as defined in §1904.7(b)(4)(i)(A), occurs when the employer keeps the employee from performing one or more routine functions of the job, or from working the full workday the employee would otherwise have been scheduled to work. The case in question is recordable if the employee would have worked 10 hours had he or she not been injured.

Question: If an employee is exposed to chlorine or some other substance at work and oxygen is administered as a precautionary measure, is the case recordable?

If oxygen is administered as a purely precautionary measure to an employee who does not exhibit any symptoms of an injury or illness, the case is not recordable. If the employee exposed to a substance exhibits symptoms of an injury or illness, the administration of oxygen makes the case recordable.

Question: Is the employer subject to a citation for violating §1904.7(b)(4)(viii) if an employee fails to follow a recommended work restriction?

Section 1904.7(b)(4)(viii) deals with the recordablility of cases in which a physician or other health-care professional has recommended a work restriction. The section also states that the employer "should ensure that the employee complies with the [recommended] restriction." This language is purely advisory and does not impose an enforceable duty upon employers to ensure that employees comply with the recommended restriction.

NOTE: In the absence of conflicting opinions from two or more healthcare professionals, the employer ordinarily must record the case if a healthcare professional recommends a work restriction involving the employee's routine job functions.

Needlestick and sharps injuries

Question: Can you clarify the relationship between the OSHA recordkeeping requirements and the requirements in the Bloodborne Pathogens standard to maintain a sharps injury log?

The OSHA Bloodborne Pathogens standard states: "The requirement to establish and maintain a sharps injury log shall apply to any employer who is required to maintain a log of occupational injuries and illnesses under 29 CFR 1904." Therefore, if an employer is exempted from the OSHA recordkeeping rule, the employer does not have to maintain a sharps log. For example, dentists' offices and doctors' offices are not required to keep a sharps log after January 1, 2002.

Question: Can I use the OSHA 300 Log to meet the Bloodborne Pathogen standard's requirement for a sharps injury log?

Yes. You may use the 300 Log to meet the requirements of the sharps injury log provided you enter the type and brand of the device causing the sharps injury on the Log and you maintain your records in a way that segregates sharps injuries from other types of work-related injuries and illnesses, or allows sharps injuries to be easily separated.

Forms

Question: How do I determine whether or not a case is an occupational injury or one of the occupational illness categories in Section M of the OSHA 300 Log?

The instructions that accompany the OSHA 300 Log contain examples of occupational injuries and the various types of occupational illnesses listed on the Log. If the case you are dealing with is on one of those lists, then check that injury or illness category. If the case you are dealing with is not listed, then you may check the injury or illness category that you believe best fits the circumstances of the case.

Question: Does the employer decide if an injury or illness is a privacy concern case?

Yes. The employer must decide if a case is a privacy concern case, using §1904.29(b)(7), which lists the six types of injuries and illnesses the employer must consider privacy concern cases. If the case meets any of these criteria, the employer must consider it a privacy concern case. This is a complete list of all injury and illnesses considered privacy concern cases.

Question: Under §1904.29(b)(9), the employer may use some discretion in describing a privacy concern case on the log so the employee cannot be identified. Can the employer also leave off the job title, date, or where the event occurred?

Yes. OSHA believes that this would be an unusual circumstance and that leaving this information off the log will rarely be needed. However, if the employer has reason to believe that the employee's name can be identified through this information, these fields can be left blank.

Question: May employers attach missing information to their accident investigation or workers' compensation forms to make them an acceptable substitute form for the OSHA 301 for recordkeeping purposes?

Yes, the employer may use a workers' compensation form or other form that does not contain all the required information, provided the form is supplemented to contain the missing information and the supplemented form is as readable and understandable as the OSHA 301 form and is completed using the same instructions as the OSHA 301 form.

Question: If an employee reports an injury or illness and receives medical treatment this year, but states that the symptoms first arose at some unspecified date last year, on which year's log do I record the case?

Ordinarily, the case should be recorded on the Log for the year in which the injury or illness occurred. Where the date of injury or illness cannot be determined, the date the employee reported the symptoms or received treatment must be used. In the case in question, the injury or illness would be recorded on this year's Log because the employee cannot specify the date when the symptoms occurred.

Covered employees

Question: How is the term "supervised" in §1904.31 defined for the purpose of determining whether the host employer must record the work-related injuries and illnesses of employees obtained from a temporary help service?

The host employer must record the recordable injuries and illnesses of employees not on its payroll if it supervises them on a day-to-day basis. Day-to-day supervision occurs when "in addition to specifying the output, product or result to be accomplished by the person's work, the employer supervises the details, means, methods and processes by which the work is to be accomplished."

Question: If a temporary personnel agency sends its employees to work in an establishment that is not required to keep OSHA records, does the agency have to record the recordable injuries and illnesses of these employees?

A temporary personnel agency need not record injuries and illnesses of those employees that are supervised on a day-to-day basis by another employer. The temporary personnel agency must record the recordable injuries and illnesses of those employees it supervises on a day to day basis, even if these employees perform work for an employer who is not covered by the recordkeeping rule.

Annual summary

Question: How do I calculate the "total hours worked" on my annual summary when I have both hourly and temporary workers?

To calculate the total hours worked by all employees, include the hours worked by salaried, hourly, part-time and seasonal workers, as well as hours worked by other workers you supervise (e.g., workers supplied by a temporary help service). Do not include vacation, sick leave, holidays, or any other non-work time even if employees were paid for it. If your establishment keeps records of only the hours paid or if you have employees who are not paid by the hour, you must estimate the hours that the employees actually worked.

Employee involvement

Q: How does an employer inform each employee on how he or she is to report an injury or illness?

A: Employers are required to let employees know how and when to report work-related injuries and illnesses. This means that the employer must set up a way for the employees to report work-related injuries and illnesses and tell its employees how to use it. The recordkeeping rule does not specify how the employer must accomplish these objectives, so employers have flexibility to set up systems that are appropriate to their workplace. The size of the workforce, employee's language proficiency and literacy levels, the workplace culture, and other factors will determine what will be effective for any particular workplace.

State recordkeeping regulations

Q: Do I have to follow these rules if my State has an OSHA-approved State-Plan?

A: If your workplace is located in a State that operates an OSHA-approved State-Plan, you must follow the regulations of the State. However, these States must adopt occupational injury and illness recording and reporting requirements that are substantially identical to the requirements in Part 1904. State-Plan States must have the same requirements as federal OSHA for determining which injuries and illnesses are recordable and how they are recorded.

Q: How may state regulations differ from the federal requirements?

A: For Part 1904 provisions other than recording and reporting, State requirements may be more stringent than or supplemental to the federal requirements. For example, a State-Plan could require employers to keep records for the State, even though those employers have 10 or fewer employees (1904.1) or are within an industry exempted by the federal rule. A State-Plan could also require employers to keep additional supplementary injury and illness information, require employers to report fatality and multiple hospitalization incidents within a shorter time frame than federal OSHA does (1904.39), require other types of incidents to be reported as they occur, require hearing loss to be recorded at a lower threshold level during CY 2002 (1904.10(c)), or impose other requirements.

Q: Are State and local government employers covered by this rule?

A: No, but they are covered under the equivalent State rule in States that operate OSHA-approved State-Plans. State rules must cover these workplaces and require the recording and reporting of work-related injuries and illnesses.

Q: How can I find out if my State has an OSHA-approved plan?

A: The following States have OSHA-approved plans: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, and Wyoming. Connecticut, New Jersey, New York, Illinois, and the Virgin Islands have plans that cover State and local government employees only.

Reporting fatalities and multiple hospitalization incidents to OSHA

Q: When a work-related heart attack occurs in the workplace and the employee dies one or more days later, how should the case be reported to OSHA?

A: The employer must orally report a work-related fatality by telephone or in person to the OSHA Area Office nearest to the site of the incident. The employer must report the fatality within eight hours of the employee's death in cases where the death occurs within 30 days of the incident. The employer need not report a death occurring more than 30 days after a work-related incident.

Q: What is considered a "construction work zone" for purposes of §1904.39(b)(3)?

A: A "construction work zone" for purposes of §1904.39(b) (3) is an area of a street or highway where construction activities are taking place, and is typically marked by signs, channeling devices, barriers,

pavement markings and/or work vehicles. The work zone extend from the first warning sign or rotating/ strobe lights on a vehicle to the "END ROAD WORK" sign or the last temporary traffic control device.

Highlights from OSHA's Letters of Interpretation

Medical treatment: 10/29/2001

Q: Do you always record cases in which a health care professional issues a prescription, whether that prescription is filled or not?

A: Section 1904.7(b)(5)(ii)(A) defines first aid as: Using a nonprescription medication at nonprescription strength (for medications available in both prescription and non prescription form, a recommendation by a physician or other licensed healthcare professional to use a non prescription medication at prescription strength is considered medical treatment for recordkeeping purposes).

OSHA has not included prescription medications, whether given once or over a longer period of time, in the list of first aid treatments. The Agency believes that the use of prescription medications is not first aid because prescription medications are powerful substances that can only be prescribed by a physician or licensed healthcare professional. The availability of these substances is carefully controlled and limited because they must be prescribed and administered by a highly trained and knowledgeable professional.

OSHA maintains its longstanding policy of requiring the recording of cases in which a healthcare professional issues a prescription, whether that prescription is filled or not. Medical treatment includes treatment that is used, as well as those that should have been used. The patient's acceptance or refusal of the treatment does not alter the fact that, in the healthcare professional's judgement, the case warranted a script for the issuance of prescription medicine. For these reasons, the new recordkeeping rule continues OSHA's longstanding policy of considering the use of prescription medication as medical treatment, regardless of the reason it is prescribed.

No-fault recordkeeping: 02/06/02

Q: Does OSHA's no-fault recordkeeping system require recording work-related injuries and illnesses, regardless of the level of an employer's control or non-control?

A: In the final rule, OSHA notes that many circumstances that lead to a recordable work-related injury or illness are "beyond the employer's control." Nevertheless, because such an injury or illness was caused, contributed to, or significantly aggravated by an event or exposure at work, it must be recorded on the OSHA form (assuming that it meets one or more of the recording criteria and does not qualify for an exception to the geographic presumption).

This approach is consistent with the no-fault recordkeeping system OSHA has historically adopted, which includes work-related injuries and illnesses, regardless of the level of employer control or non-control involved. The concept of fault has never been a consideration in any recordkeeping system of the U.S. Department of Labor. Both the Note to Subpart A of the final rule and the new OSHA Form 300 expressly state that recording a case does not indicate fault, negligence, or compensability.

In addition, OSHA recognizes that injury and illness rates do not necessarily indicate a lack of interest in safety and health or success or failure per se. OSHA feels it is to the benefit of all parties to go beyond the numbers and look at an employer's safety and health program.

First aid or medical treatment: 08/08/2002

Question: **Is an injury that results in treatment with Band-Aid Brand Liquid Bandage™ considered first aid or medical treatment?**

The concept that underlies the medical treatment vs. first aid distinction made between this type of treatment centers around the basic difference between wound closures and wound coverings.

The recordkeeping rule defines first aid under §1904.7(b)(5)(ii)(D). Using wound coverings, such as bandages, Band-Aids™, gauze pads, etc.; or using butterfly bandages or Steri-strips™ (other wound closing devices, such as sutures, staples, etc. are considered medical treatment). Therefore, the use of wound coverings, like Band-Aid Brand Liquid Bandage™ is deemed to be first aid treatment.

Physician's recommendation: 03/19/03

Question: **An employee who sustained a work-related bruise on his knee was told by a physician not to return to work until undergoing an MRI. The employee was off work for some days before the procedure could be performed. The employer recorded the case based on the days away from work. The MRI showed that no OSHA recordable injury occurred. Should the entry be lined out?**

The case was properly recorded based on the physician's recommendation that the employee not return to work before undergoing an MRI for his bruised knee. Paragraph 1904.7(b)(3) contains the requirements for recording work-related injuries and illnesses that result in days away from work and for counting the total number of days away associated with a given case. In addition, paragraphs 1904.7(b)(3)(ii) and (iii) direct employers how to record days away cases when a physician or other licensed health care professional (HCP) recommends that the injured or ill worker stay at home or that he or she return to work but the employee chooses not to do so.

As these paragraphs make clear, OSHA requires employers to follow the physician's or HCP's recommendation when recording a case. For purposes of OSHA recordkeeping, the case met the criteria in 1904.7 at the time of recording because the employee had sustained a work-related injury — a bruised knee — involving one or more days away from work. The subsequent MRI results do not change these facts. Accordingly, the MRI results are not a basis to line out the entry.

Baseline audiogram revisions: 05/08/03

Question: **When the baseline audiogram has to be revised due to persistent STS or improved thresholds, must the revisions be made for each ear separately?**

The Occupational Noise standard, §1910.95, requires employers to establish and maintain an audiometric testing program for all employees whose exposures equal or exceed an 8-hour time-weighted average (TWA) of 85 decibels on the "A" scale (dBA). Annual audiograms are compared to the baseline audiogram to determine if hearing loss is occurring.

If a standard threshold shift (STS), defined as an average of 10 dBA or more at 2000, 3000, and 4000 Hz, occurs in either ear, the employer must follow certain procedures outlined in the standard, including notifying the affected employee in writing. Hearing loss cases that meet specific criteria must be recorded on the OSHA 300 log according to the recordkeeping requirements of §1904.10.

With regard to your request for a clarification as to how to revise the baseline, OSHA allows employers to revise the baseline by substituting the annual audiogram for the baseline audiogram when the reviewing professional determines that an STS is persistent. Such a revision would serve to prevent the same STS from being identified repeatedly for an employee whose hearing has stabilized. As a corollary, an annual audiogram may be substituted for the baseline audiogram when thresholds have significantly improved.

When the professional evaluating the audiogram determines that a baseline revision is appropriate, whether due to a persistent STS or improved thresholds, the baseline must be revised for each ear separately. For example, although an employee's annual audiogram shows hearing thresholds deteriorating in both ears simultaneously, occasionally an audiogram will show that an employee is suffering an STS in only one ear. This can sometimes be attributed to working near a loud noise source that is close to the affected ear. If such a shift is shown to be persistent in the judgment of the professional evaluating the audiogram, then the baseline audiogram may be revised due to the persistent STS. A baseline audiogram that shows a persistent shift for only one ear may be revised for only that ear. The baseline may not be revised for the other unaffected ear. This procedure is required because it provides a clear indication of how each ear is affected by noise.

Clarifying the recording criteria for temporary or leased workers: 06/23/03

Question 1: **Under §1904.31, employers who supervise temporary or leased employees at their facility are required to maintain the OSHA 300 Logs for those employees. With respect to those injuries, can the employer keep a separate 300 Log for the company employees and one log for the temporary or leased employees?**

The log is to be kept for an establishment. Under §1904.46 Definitions, an establishment is a single physical location where business is conducted or where services or industrial operations are performed. The controlling employer (using firm) may subdivide the OSHA 300 Log to provide separate listings of temporary workers, but must consider the separate listings to be one record for all recordkeeping purposes, including access by government representatives, employees, former employees and employee representatives as required by §§1904.35 and 1904.40 in the recordkeeping regulation. OSHA's view is that a given establishment should have one OSHA Log. Injuries and illnesses for all the covered employees at the establishment are then entered into that record to create a single OSHA 300A Summary form at the end of the year.

Question 2: **Under §1904.31, while the standard clearly indicates the 300 Logs must be maintained for supervised temporary or leased employees, it does not indicate who maintains the 301 documents or the first report of injuries, as well as the medical records on those employees. Also, if a temporary or leased employee has days away from work, it is normally the temporary or leased employee provider's contractual responsibility to handle the medical treatment of the employee. The temporary or leased employee provider is the only person/entity to have the information on days away from work. Who is responsible for maintaining the 301 logs or the first report of injury forms as well as the medical records for these employees, assuming that the employee provider can produce the required documents to the employer for production in the time periods set forth in the standard?**

Paragraph 1904.29(a) says: "You must use OSHA 300, 300A and 301 forms, or equivalent forms, for recordable injuries and illnesses." In addition, §1904.29(b)(2) says: "You must complete an OSHA 301 Incident Report form, or an equivalent form, for each recordable injury or illness entered on the OSHA 300 Log." Therefore, when the workers from a temporary help service or leasing firm are under the day-to-day supervision of the controlling party (using firm), the entire OSHA injury and illness recordkeeping responsibility belongs to the using firm.

Question 3: **Using the facts in Question 2, it is also important to note that an injured temporary or leased employee, who requires days from work, may be replaced by another leased or temporary employee at the worksite. From time of the injury, the employer has no information about the return to work status of the injured employee. In fact, the injured employee may be assigned to another employer once he or she is able to return to work. How can the original employer keep accurate 300 Logs when the employee provider has sole access to information on days away from work and return to work status?**

The controlling employer has the ultimate responsibility for making good-faith recordkeeping determinations regarding an injury and illness to any of those temporary employees they supervise on a day-to-day basis. Although controlling employers ultimately decide if and how a particular case should be recorded, their decision must not be an arbitrary one, but should be made in accordance with the requirements of the Act, regulation, and the instructions on the forms.

Therefore, the controlling employer must make reasonable efforts to acquire the necessary information in order to satisfy its Part 1904 recordkeeping requirements. However, if the controlling employer is not able to obtain information from the employer of the leased or temporary employee, the controlling employer should record the injury based on whatever information is available to the controlling employer. The preamble contains a brief reference about OSHA's expectation that the employers share information to produce accurate records, stating that "the two employers have shared responsibilities and may share information when there is a need to do so."

Finally, the last question you raised is whether your client or contractor has any requirements under the recordkeeping standard to provide the new contractor the current OSHA 300 Logs for that facility covering those employees who now work for that contractor. Since there was no change of your client's business ownership, he or she needs only to retain the records as per §1904.33 and provide access under §§1904.35 and 1904.40.

Clarification for recording a work-related exception: 07/22/03

Question: **An employee experienced an injury in the work environment during his assigned working hours, but the task was unrelated to the employee's job, and therefore would not be considered work-related. Is this correct based on OSHA's work-related exception specified at §1904.5(b)(2)(v) in which an injury or illness is solely the result of an employee doing personal tasks (unrelated to their employment) at the establishment outside of the employee's assigned working hours?**

OSHA explains that in order to correctly apply the work-related exception §1904.5(b)(2)(v), the case must meet both of the following conditions. The case must involve first, personal tasks at the establishment and second, must have occurred outside of the employee's assigned working hours. The nature of the activity in which the employee is engaged in at the time of the event or exposure, the degree of employer control over the employee's activity, the preventability of the incident, or the concept of fault do not affect the determination of work-relationship. For purposes of OSHA recordkeeping, the case did not meet the entire criteria under§1904.5(b)(2)(v).

Access rights to OSHA 300 and 300A: 11/07/03

Question: **Under §1904.35(b)(2), employees, former employees, their personal representatives, and their authorized employee representatives have the right to access the OSHA 300 Log and the OSHA 300A Summary. Does this apply to all or just some of the OSHA injury and illness records, specifically the OSHA 300A, the Summary of Work-Related Injuries and Illnesses?**

The employer must give the requester a copy of the OSHA 300 and the OSHA 300A by the end of the next business day. In addition, employees, former employees, and their representatives have the right to access the OSHA 301 incident report with some limitations and provision time frame differences, as set out in §1904.35(b)(2)(v) of the recordkeeping regulation.

Posting the OSHA 300 Log and 300A summary: 12/18/03

Question: **An employer has received several complaints regarding the medical privacy of employees and the recordkeeping requirements. Is it appropriate for an employer to post the entire OSHA 300 Log in the employer's establishment?**

OSHA responds that she is correct in understanding that, while employers are required to complete both OSHA Form 300 Log of Work-Related Injuries and Illnesses and OSHA Form 300A Summary of Work-Related Injuries and Illnesses, only the latter, Form 300A, is required to be posted in the workplace.

Despite the fact that only the Summary Form 300A is required to be posted, some employers apparently have posted both the Form 300 and Form 300A in the workplace. The writer suggests that further clarification is needed with the recordkeeping forms or elsewhere, making clear to employers that the Form 300 should not be posted along with the Summary Form 300A.

The instructions that accompany the OSHA recordkeeping forms do include the following Question and Answer: "When must you post the Summary? You must post the Summary only — not the Log — by February 1 of the year following the year covered by the form and keep it posted until April 30 of that year."

OSHA further clarified that, while the rules do not require the Form 300 to be posted, the regulation also does not prohibit an employer from posting the Form 300 along with the Form 300A. However, if the employer does choose to post the full Form 300 Log, they should post the Log in an area only accessible by those granted access under the rule (i.e., employees, former employees, employee representatives, and an authorized employee representative).

If the posting area is accessible by others (e.g., members of the public) the employer must remove or hide all names of the injured or ill employees as set out in §1904.29(b)(10). In addition, §1910.29 prohibits the employer from including the employee's name for "privacy concern" cases whenever the Form 300 Log is made available to coworkers, former employees, or employee representatives.

Medical glue: 08/26/04

Question: **Is the use of glue to close a wound considered first aid or medical treatment?**

The use of medical glue to close a wound is not first aid, and therefore must be considered medical treatment. First aid includes the use of the following wound-covering devices: bandages, Band Aids©, gauze pads, butterfly bandages, or Steri-Strips©. Other wound-closing devices, such as sutures, staples, tapes, or glues are considered medical treatment.

Prescription antibiotics: 08/26/04

Question: **Is the use of a prescription antibiotic or antiseptic for preventive treatment of a wound considered first aid or medical treatment?**

The use of a prescription antibiotic to treat a wound is medical treatment. This follows even if the medication is an antibiotic or antiseptic administered following an injury to prevent a possible infection. In the preamble to the rule, OSHA specifically considered and rejected an exception for prescription antibiotics or antiseptics.

Personal task at lunch: 03/10/05

Question: **An employee is knitting a sweater during the lunch break. She lacerates her hand and needed sutures. She is engaged in a personal task. Are lunch breaks or other breaks considered "assigned working hours?" Is the case recordable?**

This case must be recorded because it does not meet the exception to work-relatedness in 1904.5(b)(2)(v) for injuries that occur in the work environment but are solely due to personal tasks. For the "personal tasks" exception to apply, the injury or illness must:

- Be solely the result of the employee doing personal tasks (unrelated to their employment), and
- Occur outside of the employee's assigned working hours.

OSHA has clarified that 1904.5(b)(2)(v) does not apply to injuries and illnesses that occur during breaks in the normal work schedule. Here, the exception does not apply because the injury occurred during the employee's lunch break.

Clocking in and out of work: 03/10/05

Q: Does an employee become a part of the general public once they have timed out? Or are they considered part of the work force from the time they get out of their car coming in to work to the time they step into their car to go home at the end of their workday? For example, if an employee experienced an injury or illness in the work environment before they had "clocked in" for the day. Is the case considered work related even if that employee was not officially "on the clock" for pay purposes?

A: Injuries and illnesses occurring in the work environment are considered work-related. Punching in and out with a time clock (or signing in and out) does not affect the outcome for determining work-relatedness. If the employee experienced a work-related injury or illness, and it meets one or more of the general recording criteria under section 1904.7, it must be entered on the employer's OSHA 300 log.

Antibiotics as a preventive measure: 03/10/05

Q: An employee was sent to the hospital to have a splinter removed and was given an antibiotic as a precautionary measure. Can you consider this case to be non-recordable because the medication was given only as a preventive measure?

A: If the antibiotic was a prescription medication, the case is recordable regardless of whether the medication was given solely as a preventive measure. In the preamble to the final recordkeeping rule, OSHA specifically addressed the use of prescription antibiotics for prophylactic reasons. It concluded that all prescription medications should be considered medical treatment because they are powerful substances that can only be prescribed by a licensed health care professional.

Doctor's visits are not days away from work: 11/30/05

Q: An employee sustained a work-related ankle injury (sprain) and received medical treatment. The employee immediately returned to work with restrictions. The employee's doctor has requested that the employee return for periodic office visits so that he can observe the patient's improvement. The employee's doctor states that on the days the employee has an appointment, the employee is ″unable to work that date.″ Are the days used by the employee to visit the doctor for follow-up considered as days away from work?

A: The days the employee did not work because he needed to travel to his doctor's office for observation of the injury should not be counted as days away from work on the OSHA Log. As long as the employee was physically able to perform his restricted duty job, and the doctor's recommendation not to work on the days in question was made solely to ensure that the employee was free to keep the appointment for observation, you would count the time as restricted work activity.

Employer has ultimate responsibility to restrict work: 08/03/06

Q: For injury and illness recording, who has the ultimate responsibility?

A: It is the employer who has the ultimate responsibility for making good-faith recordkeeping decisions regarding an injury and/or illness. OSHA was asked to clarify a case where the physician recommends an employee be placed on restricted work, but the employer can't accommodate the restriction. Should the employer follow the physician's mandate and record the injury as restricted work, or because no restricted work was available and the employee was sent home, must the injury be recorded as days away from work?

OSHA says that the case should be designated as "days away from work" based on the following discussion.

The final rule's restricted work provisions also clarify that work restriction must be imposed by the employer or be recommended by a healthcare professional before the case is recordable. Only the employer has the ultimate authority to restrict an employee's work, so the definition is clear that, although a healthcare professional may recommend the restriction, the employer makes the final determination of whether or not the healthcare professional's recommended restriction involves the employee's routine functions.

Restricted work assignments may involve several steps:

- A healthcare professional's recommendation, or
- Employer's determination to restrict the employee's work,
- Employer's analysis of jobs to determine whether a suitable job is available, and
- Assignment of the employee to that job.

All such restricted work cases are recordable, even if the healthcare professional allows some discretion in defining the type or duration of the restriction.

Routine job functions: 04/25/06

Q: An employee has a work-related occupational injury and is examined by the company physician. The employee can be returned to work, full duty; however, the employee is given a 20-pound lifting restriction, or a ″do not use left hand″ restriction for 3 weeks.

A: The restriction is given because the employees may get rotated for non-routine tasks, or equipment breakdown that might occur once or twice a month. By issuing the restriction, the supervisor knows not to allow that employee to do non-routine tasks. Is this still considered a work restriction for recordkeeping purposes and do the total days need to be counted on the OSHA Log since the restriction is for non-routine tasks and the physician is saying the employee can perform all of his normal routine work and work the full work day?

This case should not be considered as a case involving restricted work activity. §1904.7(b)(4)(i)(A) states that restricted work occurs when an employer keeps the employee from performing one or more of the routine functions of his or her job. For recordkeeping purposes, an employee's routine functions are those work activities the employee regularly performs at least once per week. In the above scenario, the

employee is restricted from activities he or she may have performed only once or twice a month and therefore does not meet the definition of routine job functions.

No restricted work available: 06/23/06

Question: **An employee is injured and is placed under a work restriction(s) by a physician; however, the employer does not have any available restricted work for a period of time. Should this case be classified as ″Days away from work″ or ″Job transfer or restriction″?**

Assuming the employer sent the employee home since there wasn't any restricted work available for the employee at the establishment, OSHA states, ″the final rule's restricted work provisions also clarify that work restriction must be imposed by the employer or be recommended by a health care professional before the case is recordable. Only the employer has the ultimate authority to restrict an employee's work, so the definition is clear that, although a healthcare professional may recommend the restriction, the employer makes the final determination of whether or not the health care professional's recommended restriction involves the employee's routine functions.

Restricted work assignments may involve several steps: an HCP's recommendation, or employer's determination to restrict the employee's work, the employer's analysis of jobs to determine whether a suitable job is available, and assignment of the employee to that job. All such restricted work cases are recordable, even if the health care professional allows some discretion in defining the type or duration of the restriction....″ In this scenario, the employer was more restrictive than the physician. Since the employer sent the employee home, this injury must be recorded as ″Days away from work.″

Take medication as needed: 02/06/07

Question: **An employee is hurt on the job and that employee is sent to a medical center. At the medical center, the doctor gives the employee a prescription and tells the employee to take if needed. Are there any circumstances that would keep this incident from being recordable?**

Section 1904.7(b) states that a work-related injury or illness must be recorded on the OSHA 300 Log if it results in death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, loss of consciousness, or diagnosis of a serious injury or illness.

Any treatment not included on OSHA's first aid list is not considered first aid for recordkeeping purposes. The preamble to the final rule states: ″In the final rule, OSHA has not included prescription medications, whether given once or over a longer period of time, in the list of first aid treatments. Moreover, OSHA's longstanding policy has been that if a prescription medication of this type has been issued, medical treatment has been provided, and the case must therefore be recorded.″ As a result, the patient's acceptance or refusal of the treatment does not alter the fact that, in the healthcare professional's judgment, the case warrants medical treatment, making it recordable.

Damage to dentures or prosthetic devices: 04/03/07

Question: **Would damage to dentures or a prosthetic device, in the presence of no other discernable injury, be considered a recordable case requiring entry on the OSHA 300 Log even when medical treatment is not administered?**

Damage to an employee's dentures or prosthetic device only would not be a recordable injury. Section 1904.7(b) provides that a work-related injury or illness must be recorded on the OSHA 300 Log if it results in death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, loss of consciousness, or a serious injury or illness diagnosed by a physician or other licensed healthcare professional.

Thus, recording injuries and illnesses is limited to disorders and abnormal conditions related to a person. Damage to artificial or mechanical devices, such as dentures, eye glasses, canes, or prosthetic arms or

legs, would not be considered an injury or illness under Part 1904. Even if the employee is unable to work or must be placed on restricted duty until the prosthetic device is repaired or replaced, the case is not recordable.

Commuting to work: 07/14/08

Question: **Are the following two instances where employees commute from home to work and park their personally-owned vehicles in the company-controlled parking lot recordable cases?**

1. **An employee parked his car in the company parking lot, opened the driver side door and started to exit the car when he caught his right foot on the raised door threshold. The employee subsequently fell onto the parking lot surface and sustained a right knee cap injury.**
2. **Another employee was in the process of exiting his parked pick-up truck when he slipped on a rail used to enter and exit the vehicle. This employee fell onto the parking lot surface and sustained a twisted right knee.**

OSHA defines the work environment as the establishment and other locations where one or more employees are working or are present as a condition of their employment. Company parking lots and company access roads are included within this definition.

Section 1904.5(b)(2)(vii) provides that employers can exclude cases when an employee is injured in a motor vehicle accident occurring in a company parking lot or company access road while commuting to or from work. For example, if an employee is injured in a car accident in the company parking lot while arriving at work or while leaving the company's property at the end of the day, the case would not be work-related. Likewise, if an employee is commuting to work and is struck by a motor vehicle while walking across the company parking lot, the case would not be considered work-related.

For this exception to apply, the case must meet *all three* of the following conditions. The injury must:

1. Occur when the employee is commuting to or from work, and not when the employee is traveling in the interest of the employer.
2. Take place in the company parking lot or company access road (the work establishment).
3. Result from a motor vehicle accident.

In other words, it narrowly applies to only those ″motor vehicle accidents″ involving moving vehicles which are solely being used for commuting at the time of the accident; that is, vehicles which have not been parked and which are not being used for work.

In the scenarios previously described, while both employees sustained injuries in the company parking lot, neither case involved a motor vehicle accident. Instead, the two employees were injured when they fell out of their parked vehicle and struck the parking lot surface (work environment). As a result, neither case meets the exception and, therefore, must be recorded on the 300 Log if they meet the other recording criteria listed in the regulation (e.g., medical treatment, days away from work, etc.).

Working from home: 08/26/08

Question: **An employee who performs office clerical work injures her knee in a work-related accident. She has out-patient surgery one month after the knee injury and is released by her doctor with the only restriction being: ″May work at home.″ The company sets up a computer and forwards her business phone to the employee's house so she can work while recovering from surgery.**

The employee works from home, but does not work the full 8 hours during the work day. The employee was able to perform all of her routine job functions from home during this time. Should

the days that the employee is performing clerical services for the company from her home be treated as restricted work activity or days-away-from work?

A: OSHA requires employers to record a work-related injury or illness that results in days away from work, restricted work, or job transfer. Section 1904.7(b)(4)(i) makes clear that ″restricted work″ occurs when the employer keeps the employee from performing one or more routine job functions of his or her job, or from working the full workday that he or she would otherwise have been scheduled to work.

Based on the information provided in the question, and assuming that the employee does not work from home as part of her normal work schedule, the case should be recorded as days away from work. In this instance, the employer has made the determination that the employee cannot work in the office, but allows her to work from home while she recovers from surgery. In other words, the employer has made a decision that the employee needs days away (from the office) in order to recover from a work-related injury.

However, the answer would be different if the employee's normal work schedule includes one or more work days at home. For example, if the employee is normally scheduled to work from home two days (8-hour work days) per week, you would count the days worked at home as restricted work because the employee did not work the full 8-hour work day. Under such a scenario, the other three days of the week the employee is scheduled to work in the office would be recorded as days away from work.

Electronic signatures: 01/29/09

Q: Prior to posting, is it permissible to use an electronic signature to certify the OSHA 300-A Annual Summary?

A: The OSHA recordkeeping regulation does not prohibit the use of electronic signature to satisfy the Annual Summary certification requirement. The certification required by the regulation may be made by either signing and dating the certification section on the OSHA 300-A form, or by signing and dating a separate certification statement and appending it to the OSHA Form 300-A.

The requirement in Section 1904.32(a)(4) to post the Annual Summary also means that the certification must be posted in the workplace. In other words, if an employer chooses to certify the Annual Summary for an establishment by electronic signature, such certification must be printed and posted in the workplace from February 1 through April 30 of the year following the year covered by the OSHA Form 300-A.

Horseplay/fighting: 02/09/09

Q: Two supervisors had completed their work for the day and had entered the change trailer to change clothes and proceed home. There was some bantering back and forth concerning how to beat the traffic at shift's end. The discussion escalated into a physical confrontation where one supervisor allegedly pulled a knife and struck the other in the right bicep, causing a laceration that required sutures to close. Is the injury work-related?

A: An injury is presumed to be work-related if it results from an event occurring in the work environment, unless an enumerated exception to this geographic presumption applies. (See 29 CFR §1904.5(a).) The work environment includes any location where one or more employees are working or are present as a condition of their employment. If the supervisors were in the change trailer as a part of their work or as a condition of their employment, the injury resulted from an event (the altercation between the two supervisors) occurring in the work environment and was thus work-related. When a work-related injury requires treatment beyond first aid, it is recordable unless it falls within one of the §1904.5(b)(2) exceptions to the geographic presumption. Violence in the workplace does not generally qualify as an exception.

Furthermore, the geographic presumption (that is, an injury is work-related if it occurs in the work environment) covers cases in which an injury or illness results from activities that occur at work but that are not directly productive, such as horseplay.

OSHA's position is that the injury was work-related and required medical treatment beyond first aid. This is so whether the incident leading to the injury is characterized as horseplay or as workplace violence, neither of which is covered by any exception to the geographic presumption.

Off-site team-building event: 02/24/09

Q: An employee is injured while participating in go-cart racing, which occurred during an off-site team-building event. Employees were required to attend the off-site meeting and lunch, but were then free to choose among the following options: (1) Participating in the team-building event; (2) Returning to the office to finish the work day; or (3) Taking a half-day vacation. Is an injury incurred during the go-cart racing considered to be work-related?

A: Under Section 1904.5(b)(1), OSHA defines the work environment as ″the establishment and other locations where one or more employees are working or are present as a condition of their employment. The work environment includes not only physical locations, but also the equipment or materials used by the employee during the course of his or her work.″

In the scenario presented, the employee is at the go-cart facility as a condition of employment. Therefore, he or she is in the work environment and any injury or illness that arises is presumed to be work-related and must then be evaluated for its recordability under the general recording criteria. This holds true for both participating in and observing the races.

Two physician's opinions – Who to follow: 02/25/2011

Q: An employee reports subjective, work-related aches and pains to the company doctor, who treats the employee with 400 mg of ibuprofen and returns the employee to full duty. The employee then goes to a doctor who writes a prescription for pain relief and puts the employee out of work for a few days. Can the employer rely on the first provider's opinion above, assuming that the first provider's opinion is more authoritative, about the need for both "medical treatment" and "days away from work," and not record the case?

A: The concept of "most authoritative" conflicting medical opinion is intended to ensure that the severity of an occupational injury or illness is accurately recorded. OSHA has stated in the past that an employer can decline to record a case based on a contemporaneous second provider's opinion that the recommended medical treatment, days away from work or work restriction are unnecessary, **if** the employer believes the second opinion is more authoritative. (**Note**: Once medical treatment is provided for a work-related injury or illness, or days away from work or work restriction have occurred, the case is recordable, regardless of a contemporaneous second opinion. In the case of prescription medications, OSHA considers that medical treatment is provided once a prescription is issued.)

In the most recent Letter, OSHA says that it considers evaluations to be contemporaneous if they are conducted within a time frame so that the underlying condition does not change. In other words, it is important for the physicians or licensed health care professionals involved in the examination of the injured or ill employee to evaluate the same condition. If the employee's condition either improves or worsens between the examinations, they would not be evaluating the same condition. In most cases, medical recommendations provided on the day of the injury or illness would be "contemporaneous."

Some factors an employer might consider when determining whether physicians or licensed health care professionals are examining the same condition might include, for example: whether the examination of the injured or ill employee is in person (i.e., review of documents only is generally not a substitute for a physical examination); whether the examinations were conducted on the same day; whether the employee was subjected to additional events or exposures between the examinations; and, whether medical treatment, restricted work activity, or days away from work occurred between the examinations.

Based on the information described in the question, the two physical examinations were conducted in person; it appears that the physicians evaluated the injury on the same day (day of injury) and in the same condition; and, the employee was not subjected to additional events or exposures between the examinations. Also, no medical treatment was provided or days away from work or work restriction

occurred between the two examinations. Accordingly, the employer in this scenario may rely on the first medical opinion if they determine the opinion is the most authoritative. OSHA considers a contemporaneous medical opinion that is best documented, best reasoned and most persuasive as the most authoritative. Finally, please be aware that OSHA would consider the medical treatment and days away from work directed by the second physician as necessary unless the employer can document that the first opinion is most authoritative.

Physician says employee can work, employee doesn't: 03/22/2011

Q: An employee incurred a work-related injury on a Saturday, but did not think it was severe enough to see a doctor. He was not scheduled to work on Sunday, but did report at his assigned time on Monday. After working six hours, the employee left work and sought treatment at an emergency room for the injury from Saturday. After receiving treatment, the emergency room physician released the employee to return to work the next day (Tuesday), which was the employee's next normally scheduled workday, with work restrictions. On Tuesday, prior to his next shift, the employee contacted the employer and stated that he was in so much pain he needed to see a doctor right away. The employee requested to use a bonus holiday (similar to a vacation day) for that day (Tuesday). The employer approved the request, and the employee saw the doctor and was again released to return to work with restricted duty. However, because the employee had already been approved to take a bonus holiday, he did not return to work until the next day (Wednesday). Is the absence on Tuesday recordable on the OSHA 300 Log as a day away from work or just as a day of restricted work? Does it make a difference if the employer tells the employee that he has been released to return to work with restricted work and can take the day off, but only as an unexcused absence?

A: Section 1904.7(b)(3) provides that work-related injuries and illnesses involving one or more days away from work must be recorded on the OSHA Log. Section 1904.7(b)(3)(iii) goes on to state that if a physician or other licensed health care professional recommends the employee can return to work, but the employee stays at home, the case does not have to be recorded as a day away.

Section 1904.7(b)(4)(i) provides that a work-related injury or illness must be recorded on the OSHA Log as restricted work activity if the employer assigns restricted work, or a physician or other licensed health care professional recommends restricted work. The preamble to the January 19, 2001, final rule revising OSHA's recordkeeping regulation states that employers must follow the recommendation of a physician or licensed health care professional. Under OSHA's recordkeeping system, an employee does not make the determination as to whether the physician's recommendation affects the employee's "routine job functions" and therefore is "restricted work activity."

In the scenario described above, the physician recommended that the employee could return to work with restricted work duties. However, the injured employee decided not to return to work until Wednesday. Therefore, the day in question (Tuesday) should be recorded as a day of restricted work activity.

Additionally, please know that OSHA does not consider time spent traveling to and from medical evaluations as either days away from work or restricted work activity. Instead, the focus is on whether the injured or ill employee needs days away from work or restricted work activity to recuperate from the work-related injury or illness. Classification of the day off as a "bonus holiday" is not relevant to this determination.

In response to the second part of the question, OSHA said that the employer must count the number of calendar days the employee was unable to work (days away or restricted work activity) as a result of the injury or illness. If the employer determines that the employee needed time off because of their severe pain and was unable to work, the case should be recorded as a day away from work. On the other hand, if the employer determines that the injured employee was able to come to work, and perform restricted work, the case should be recorded as restricted work activity.

Exercise recommended by athletic trainer: 05/20/2011

Q: If an exercise regime is directed by a Certified Athletic Trainer (ATC), does that constitute "first aid" or "medical treatment" for OSHA injury and illness recordkeeping purposes?

A: In general, if the ATC recommends exercise to an employee **who exhibits any signs or symptoms of a work related injury**, the case involves medical treatment and is a recordable case.

OSHA discussed the issue of therapeutic exercise in the preamble to the final rule revising OSHA's injury and illness recordkeeping regulation. OSHA stated that it considers therapeutic exercise as a form of physical therapy and intentionally did not include it on the list of first aid treatments in Section 1904.7(b)(5)(ii). Section 1904.7(b)(5)(ii)(M) states that physical therapy or chiropractic treatment are considered medical treatment for OSHA recordkeeping purposes and are not considered first aid. Section 1904.7(b)(5)(iii) goes on to state that the treatments included in Section 1904.7(b)(5)(ii) is a comprehensive list of first aid treatments. Any treatment not included on this list is not considered first aid for OSHA recordkeeping purposes.

Please be aware that if a treatment is administered as a purely precautionary measure to an employee who does not exhibit any signs or symptoms of an injury or illness, the case is not recordable. For a case to be recordable, an injury or illness must exist. For example, if, as part of an employee wellness program, an ATC recommends exercise to employees that do not exhibit signs or symptoms of an abnormal condition, there is no case to record. Furthermore, if an employee has an injury or illness that is not work-related, (e.g., the employee is experiencing muscle pain from home improvement work) the administration of exercise does not make the case recordable either.

Trigger point injections: 04/18/2011

Q: Are "trigger point" injections medical treatment since they can be either diagnostic or treatment?.

A: Section 1904.7(b)(5)(i) states that the administering of prescription medication **solely** for diagnostic purposes is not medical treatment. Although "trigger point" injections may be used diagnostically (for muscle knots), ultimately they also provide medical treatment (pain relief). Because the medication serves these dual purposes, it does not meet the criterion of being solely used for diagnostic procedure. Therefore, when "trigger point" injections are administered, the work-related injury or illness is recordable.

Recordable bites: OSHA Recordkeeping Handbook

Q: Are insect bites and bee stings always recordable?

A: Most insect bites or stings that happen at work won't result in recordable cases. However, if an insect bite or sting happens at work and results in medical treatment, it becomes recordable. In these cases, "medical treatment" usually means a shot to prevent an allergic reaction. Even if the shot is given only once, the case is recordable.

Additionally, if this treatment is given to prevent an allergic reaction to a work-related poison oak, ivy, or sumac exposure, it is considered medical treatment and recordable.

Recordkeeping forms

Optional

Calculating Injury and Illness Incidence Rates

What is an incidence rate?

An incidence rate is the number of recordable injuries and illnesses occurring among a given number of full-time workers (usually 100 full-time workers) over a given period of time (usually one year). To evaluate your firm's injury and illness experience over time or to compare your firm's experience with that of your industry as a whole, you need to compute your incidence rate. Because a specific number of workers and a specific period of time are involved, these rates can help you identify problems in your workplace and/or progress you may have made in preventing work-related injuries and illnesses.

How do you calculate an incidence rate?

You can compute an occupational injury and illness incidence rate for all recordable cases or for cases that involved days away from work or your firm quickly and easily. The formula requires that you follow instructions in paragraph (a) below for the total recordable cases or those in paragraph (b) for cases that involved days away from work, *and* for both rates the instructions in paragraph (c).

(a) *To find out the total number of recordable injuries and illnesses that occurred during the year,* count the number of line entries on your OSHA Form 300, or refer to the OSHA Form 300A and sum the entries for columns (G), (H), (I), and (J).

(b) *To find out the number of injuries and illnesses that involved days away from work,* count the number of line entries on your OSHA Form 300 that received a check mark in column (H), or refer to the entry for column (H) on the OSHA Form 300A.

(c) *The number of hours all employees actually worked during the year.* Refer to OSHA Form 300A and optional worksheet to calculate this number.

You can compute the incidence rate for all recordable cases of injuries and illnesses using the following formula:

Total number of injuries and illnesses x *200,000* ÷ *Number of hours worked by all employees* = *Total recordable case rate*

(The 200,000 figure in the formula represents the number of hours 100 employees working 40 hours per week, 50 weeks per year would work, and provides the standard base for calculating incidence rates.)

You can compute the incidence rate for recordable cases involving days away from work, days of restricted work activity or job transfer (DART) using the following formula:

(Number of entries in column H + Number of entries in column I) x *200,000* ÷ *Number of hours worked by all employees* = *DART incidence rate*

You can use the same formula to calculate incidence rates for other variables such as cases involving restricted work activity (column (I) on Form 300A), cases involving skin disorders (column (M-2) on Form 300A), etc. Just substitute the appropriate total for these cases, from Form 300A, into the formula in place of the total number of injuries and illnesses.

What can I compare my incidence rate to?

The Bureau of Labor Statistics (BLS) conducts a survey of occupational injuries and illnesses each year and publishes incidence rate data by various classifications (e.g., by industry, by employer size, etc.). You can obtain these published data at www.bls.gov/iif/ or by calling a BLS Regional Office.

Worksheet

Total number of injuries and illnesses		200,000	÷	Number of hours worked by all employees	=	Total recordable case rate
	x					

Number of entries in Column H + Column I		200,000	÷	Number of hours worked by all employees	=	DART incidence rate
	x					

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ________________

City ____________ State ________

Identify the person			Describe the case			Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
								Remained at Work									
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
					Page totals ➤	___	___	___	___	___	___	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Page ___ of ___

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Optional

Worksheet to Help You Fill Out the Summary

At the end of the year, OSHA requires you to enter the average number of employees and the total hours worked by your employees on the summary. If you don't have these figures, you can use the information on this page to estimate the numbers you will need to enter on the Summary page at the end of the year.

How to figure the average number of employees who worked for your establishment during the year:

❶ ***Add*** the total number of employees your establishment paid in all pay periods during the year. Include all employees: full-time, part-time, temporary, seasonal, salaried, and hourly.

The number of employees paid in all pay periods = ❶ _____

❷ ***Count*** the number of pay periods your establishment had during the year. Be sure to include any pay periods when you had no employees.

The number of pay periods during the year = ❷ _____

❸ ***Divide*** the number of employees by the number of pay periods.

❶ _____ / ❷ _____ = ❸ _____

❹ ***Round the answer*** to the next highest whole number. Write the rounded number in the blank marked *Annual average number of employees.*

The number rounded = ❹ _____

For example, Acme Construction figured its average employment this way:

For pay period...	Acme paid this number of employees...	
1	10	Number of employees paid = 830 ❶
2	0	
3	15	Number of pay periods = 26 ❷
4	30	830 ÷ 31.92 ❸
5	40	26
▼	▼	
24	20	31.92 rounds to 32 ❹
25	15	
26	+10	32 is the annual average number of employees
	830	

How to figure the total hours worked by all employees:

Include hours worked by salaried, hourly, part-time and seasonal workers, as well as hours worked by other workers subject to day to day supervision by your establishment (e.g., temporary help services workers).

Do not include vacation, sick leave, holidays, or any other non-work time, even if employees were paid for it. If your establishment keeps records of only the hours paid or if you have employees who are not paid by the hour, please estimate the hours that the employees actually worked.

If this number isn't available, you can use this optional worksheet to estimate it.

Optional Worksheet

_____ ***Find*** the number of full-time employees in your establishment for the year.

X _____ ***Multiply*** by the number of work hours for a full-time employee in a year.

_____ This is the number of full-time hours worked.

\+ _____ ***Add*** the number of any overtime hours as well as the hours worked by other employees (part-time, temporary, seasonal)

_____ ***Round*** the answer to the next highest whole number. Write the rounded number in the blank marked *Total hours worked by all employees last year.*

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA's Form 301
Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary,* these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (_____)_____-_____ **Date** ____/ ____/ ____

Information about the employee

1) **Full name** _____

2) **Street** _____

City _____ **State** _____ **ZIP** _____

3) **Date of birth** ____/ ____/ ____

4) **Date hired** ____/ ____/ ____

5) ☐ **Male**
☐ **Female**

Information about the physician or other health care professional

6) **Name of physician or other health care professional** _____

_____

7) **If treatment was given away from the worksite, where was it given?**

Facility _____

Street _____

City _____ **State** _____ **ZIP** _____

8) **Was employee treated in an emergency room?**
☐ **Yes**
☐ **No**

9) **Was employee hospitalized overnight as an in-patient?**
☐ **Yes**
☐ **No**

Information about the case

10) **Case number from the *Log*** _____ *(Transfer the case number from the Log after you record the case.)*

11) **Date of injury or illness** ____/ ____/ ____

12) **Time employee began work** _____ **AM / PM**

13) **Time of event** _____ **AM / PM** ☐ **Check if time cannot be determined**

14) ***What was the employee doing just before the incident occurred?*** **Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific.** ***Examples:*** **"climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."**

15) ***What happened?*** **Tell us how the injury occurred.** ***Examples:*** **"When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."**

16) ***What was the injury or illness?*** **Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore."** ***Examples:*** **"strained back"; "chemical burn, hand"; "carpal tunnel syndrome."**

17) ***What object or substance directly harmed the employee?*** ***Examples:*** **"concrete floor"; "chlorine"; "radial arm saw."** ***If this question does not apply to the incident, leave it blank.***

18) ***If the employee died, when did death occur?*** **Date of death** ____/ ____/ ____

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .	(M)		
(1) Injuries	_____	(4) Poisonings	_____
		(5) Hearing loss	_____
(2) Skin disorders	_____	(6) All other illnesses	_____
(3) Respiratory conditions	_____		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

___ ___ ___ ___

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

___ ___ ___ ___ ___ ___

Employment information *(If you don't have these figures, see the Worksheet on the back of this page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____
Company executive — Title

( ) - / /
Phone — Date

Reserved

OSHA COMPLIANCE MANUAL

MEDICAL AND EXPOSURE RECORDS

OSHA COMPLIANCE MANUAL

OSHA COMPLIANCE MANUAL

Access to medical and exposure records

Introduction

More than 32 million workers may be exposed to toxic substances and harmful physical agents to an extent that may severely impair their health. Yet workers are often the least informed about the toxic exposures they face and their potential health effects.

In 1980, OSHA issued a standard requiring employers to provide employees with information to assist in the management of their own safety and health. The standard, §1910.1020, *Access to Employee Exposure and Medical Records*, permits direct access by employees or their designated representatives and by OSHA to employer-maintained exposure and medical records. It limits access, however, only to those employees who are, have been (including former employees), or will be exposed to toxic substances or harmful physical agents.

This access is designed to yield both direct and indirect improvements in the detection, treatment, and prevention of occupational disease. For example, access to these records will enable workers to determine patterns of health impairment and disease and to establish causal relationships between disease and exposure to particular hazards. Access to these records also should result in a decreased incidence of occupational exposure and should aid in designing and implementing new control measures.

Of violations to the medical and exposure records standard, §1910.1020(g) was the most frequently cited.

> (g) *Employee information.* (1) Upon an employee's first entering into employment, and at least annually thereafter, each employer shall inform current employees covered by this section of the following:
>
> (i) The existence, location, and availability of any records covered by this section;
>
> (ii) The person responsible for maintaining and providing access to records; and
>
> (iii) Each employee's rights of access to these records.
>
> (2) Each employer shall keep a copy of this section and its appendices, and make copies readily available, upon request, to employees. The employer shall also distribute to current employees any informational materials concerning this section which are made available to the employer by the Assistant Secretary of Labor for Occupational Safety and Health.

OSHA revised the standard in 1988 to eliminate certain recordkeeping requirements and to provide additional protection for employer trade secrets and redesignated the 1910.20 section to 1910.1020 in June 1996. Today, the standard still provides employees with the basic right to know the extent of their exposure to the harmful substances they work with and any associated health effects. This knowledge, in turn, allows them to detect, treat, and help prevent occupational disease.

Access

Access means that an employee has the right and opportunity to examine and copy his or her medical and exposure records. It also implies that access must be provided in a reasonable manner and place. If you can't provide the material within 15 days after the employee's request, you are required to state the reason for the delay and the earliest date when the records will be made available.

Responses to initial requests and new information that has been added to an initial request are to be provided without cost to the employee or representative. You may give employees copies of the requested records, give them the records and the use of mechanical copying facilities so they can copy them, or lend them their records for copying off the premises. In addition, make medical and exposure records available, on request, to OSHA representatives to examine and copy.

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Exposure records

Upon request, provide the employee, or employee's designated representative access to employee exposure records. If no records exist, provide records of other employees with job duties similar to those of the employee. Access to these records does not require the written consent of the other employees.

In addition, these records must reasonably indicate the identity, amount, and nature of the toxic substances or harmful physical agents to which the employee has been exposed. Union representatives have to indicate an occupational health need for requested records when seeking access to exposure records without the written authorization of the employee(s) involved.

Medical records

You also are required to provide employees and their designated representatives access to medical records relevant to the employee. Access to the medical records of another employee may be provided only with the specific written consent of that employee. A sample authorization letter is included in this chapter for your use.

Prior to employee access to medical records, physicians, on behalf of employers, are encouraged to discuss with employees the contents of their medical records. Physicians also may recommend ways of disclosing medical records other than by direct employee access. Where appropriate, a physician representing the employer can elect to disclose information on specific diagnoses of terminal illness or psychiatric conditions only to an employee's designated representative, and not directly to the employee.

In addition, a physician, nurse, or other responsible healthcare person who maintains medical records may delete from requested medical records the names of persons who provided confidential information concerning an employee's health status.

Analyses using exposure or medical records

The standard assures that an employee (or designated representative), as well as OSHA, can have access to analyses that were developed using information from exposure or medical records about the employee's working conditions or workplaces. Personal identities, such as names, addresses, social security and payroll numbers, age, race, and sex, must be removed from the data analyses prior to access.

Trade secrets

In providing access to records, you may withhold trade secret information but must provide information needed to protect employee health. Where it is necessary to protect employee health, you may be required to release trade secret information but condition access on a written agreement not to abuse the trade secret or to disclose the chemical's identity.

OSHA allows you to delete from records any trade secret that discloses manufacturing processes or the percentage of a chemical substance in a mixture, but you must state when such deletions are made. When deletion impairs the evaluation of where or when exposure occurs, provide alternative information that is sufficient to permit the requester to make such evaluations.

A specific chemical identity may be withheld when you can demonstrate it is a trade secret, you state this to the requester, and all other information on the properties and effects of the toxic substance is disclosed. The specific chemical identity, however, must be disclosed to a treating physician or nurse when that physician or nurse states that a medical emergency exists and the identity is necessary for treatment. When the emergency is over, you may require the physician or nurse to sign a confidentiality agreement.

Provide access to a specific chemical identity in *non-emergency situations* to an employee, an employee's designated representative, or a healthcare professional if it will be used for one or more of the following activities:

- Assess the hazards of the chemicals to which employees will be exposed.

- Conduct or assess sampling of the workplace atmosphere to determine employee exposure levels.
- Conduct pre-assignment or periodic medical surveillance of exposed employees.
- Provide medical treatment to exposed employees.
- Select or assess appropriate personal protective equipment for exposed employees.
- Design or assess engineering controls or other protective measures for exposed employees.
- Conduct studies to determine the health effects of exposure.

In these instances, however, you can require the requester to submit a written statement of need, the reasons why alternative information will not suffice, and to sign a confidentiality agreement not to use the information for any purpose other than the health need stated and not to release it under any circumstances, except to OSHA.

The standard further prescribes the steps you must follow if your company decides not to disclose the specific chemical identity requested by the healthcare professional, employee, or designated representative. Briefly, these steps are:

- Provide a written denial.
- Provide the denial within 30 days of the request.
- Provide evidence that the chemical identity is a trade secret.
- Explain why alternative information is adequate.
- Give specific reasons for the denial.

An employee, designated representative, or healthcare professional may refer such a denial to OSHA for review and comment.

Provide employee information

At the time of initial employment and at least annually thereafter, employees have to be told of the existence, location, and availability of their medical and exposure records. Additionally, you must:

- Inform them of their rights under the access standard;
- Make copies of the standard available; and
- Inform them of who is responsible for maintaining and providing access to records.

Records transfer

When or if your company ceases to do business, you are required to provide the successor employer with all employee medical and exposure records. When there is no successor to receive the records for the prescribed period, you must inform the current affected employees of their access rights at least three months prior to the cessation of business and notify the Director of the National Institute for Occupational Safety and Health (NIOSH) in writing at least three months prior to the disposal of records.

Records retention

It is each employer's responsibility to preserve and maintain accurate medical and exposure records for his or her employees. Section 1910.1020 imposes no obligation to create records, but does apply to any medical or exposure records created by your company in compliance with other OSHA rules or at your own volition.

Exposure records: Keep exposure records and data analyses based on them for 30 years.

Medical records: Keep medical records for at least the duration of employment plus 30 years.

OSHA COMPLIANCE MANUAL

Background information: Keep background data for exposure records such as laboratory reports and work sheets for one year.

First aid records: First aid records of one-time treatment need not be retained for any specified period.

Records of employees who have worked for less than one year need not be retained after employment. You must, however, provide these records to the employee upon employment termination. OSHA does not mandate the form, manner, or process by which your company preserves records, except that chest X-ray films must be preserved in their original state.

Three months before disposing of records, you must notify the Director of NIOSH.

OSHA COMPLIANCE MANUAL

SAMPLE AUTHORIZATION LETTER

Authorization letter for the release of employee medical record information to a designated representative

I, *(full name of worker/patient)*, hereby authorize *(individual or organization holding the medical records)* to release to *(individual or organization authorized to receive the medical information)*, the following medical information from my personal medical records: *(Describe generally the information desired to be released)*

_____

_____

_____

I give my permission for this medical information to be used for the following purpose: _____

_____

but I do not give permission for any other use or re-disclosure of this information.

(Note: Several extra lines are provided below so that you can place additional restrictions on this authorization letter, if necessary. You may, however, leave these lines blank. You may, however, want to (1) specify a particular expiration date for this letter (if less than 1 year); (2) describe medical information to be created in the future that you intend to be covered by this authorization; or (3) describe portions of the medical information in your records that you do not intend to be released as a result of this letter.)

_____

_____

_____

_____

_____

_____

Full name of employee or legal representative

_____

Signature of employee or legal representative

_____

Date of signature

OSHA COMPLIANCE MANUAL

RECORDKEEPING AT-A-GLANCE

Page

OSHA COMPLIANCE MANUAL

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Recordkeeping requirements at-a-glance

* Indicates annual requirements

Inspections, citations, and proposed penalties (1903.2)

Who's covered: All employers

When: Time frame is not specified

What records: Post OSHA form 3165 notifying employees of their rights and responsibilities under the OSH Act

---

Citations (1903.16)

Who's covered: Employers who receive citations for violations of OSHA regulations

When: On receiving a citation

What records:
- Immediately post the citation at or near the place where the violation occurred
- Post the citation until the violation has been abated or for three working days, whichever is later

---

Abatement verification procedures (1903.19)

Who's covered: Employers who receive citations for violations of OSHA regulations

When: Within 10 calendar days after the abatement date

What records:
- Submit documentation showing that abatement is complete for the following violations:
  - willful
  - repeat
  - serious
- Abatement plans may be required when abatement time is more than 90 calendar days
- Periodic progress reports may also be required

Injury and illness recordkeeping (1904)*

Who's covered: Employers with 11 or more employees (except listed low-hazard industries)

When:
- Annually, post 300A summary from February 1 through April 30
- Retain recordkeeping forms for five years following the covered year

What records: OSHA forms 300, 301, 300A, and privacy list (if one exists)

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Reporting fatalities and multiple hospitalization incidents (1904.39)

Who's covered: Employers covered by the OSH Act of 1970

When: Within eight hours of an employee death from a work-related incident or the in-patient hospitalization of three or more employees from a work-related incident

What records: Report the following information verbally to the nearest OSHA office or the OSHA hotline at (800) 321-6742:

- Establishment name
- Location of incident
- Number of fatalities or hospitalizations
- Contact person
- Telephone number
- Brief description of the incident

Annual OSHA injury and illness survey of 10 or more employers (1904.41)

Who's covered: Employers selected by OSHA via mailed letter

When: Send form to OSHA within 30 calendar days, or the time stated on the survey form, whichever is longer

What records: Report the number of workers employed and the number of hours worked for the designated time period

---

Emergency action plans (1910.38)

Who's covered: Employers required by a specific OSHA standard to have an emergency action plan

When: Time frame is not specified

What records:

- Emergency action plan must contain, at minimum:
  - fire and emergency reporting protocol
  - evacuation procedures
  - protocol for employees who must remain to operate critical plant equipment
  - method to account for employees after evacuation
  - rescue and first aid responsibilities for those assigned these duties
  - names or job titles of individuals to contact for more information about the plan
- Written plan is required for employers with 11 or more employees
- Verbal plan is allowed for employers with 10 or fewer employees

---

Fire prevention plans (1910.39)

Who's covered: Employers required by a specific OSHA standard to have a fire prevention plan

When: Time frame is not specified

What records:
- Fire prevention plan must include:
  - list of workplace fire hazards
  - procedures to handle and store hazardous materials
  - potential ignition sources and appropriate fire protection
  - procedures to control accumulations of flammable and combustible wastes
  - procedures for maintenance of safeguards installed on heat-producing equipment
  - names and job titles of individuals who control fuel source hazards
- Written plan is required for employers with 11 or more employees
- Verbal plan is allowed for employers with 10 or fewer employees

---

Powered platforms (1910.66)

Who's covered: Employers that use and/or maintain powered platforms

When: Maintenance inspection and test every 30 days

What records: Certification record has to include:
- Date of the inspection and test
- Signature of the inspector/tester
- Identifier of the inspected platform

Occupational noise exposure (1910.95)*

Who's covered: Employers with employees exposed to noise that equals or exceeds an 8-hour time-weighted average of 85 dBA

When:
- Monitor noise initially and when workplace situation changes
- Audiometric test within six months of employee exposure and annually thereafter

What records:
- Retain noise exposure measurement records for two years
- Retain audiometric test records for the duration of employment which include:
  - name and job classification
  - date of audiogram
  - examiner's name
  - date of last acoustic or exhaustive calibration of the audiometer
  - employee's most recent noise exposure assessment
- Retain measurement records of background sound pressure levels in audiometric test rooms for duration of employment

---

Hydrogen (1910.103)

Who's covered: Employers with liquefied hydrogen systems

When: Installation of equipment

What records: Maintain legible instructions at the operating location of installations requiring the user to operate equipment

---

Process safety management of highly hazardous chemicals (1910.119)

Who's covered: Employers with processes involving certain chemicals, flammable liquids or gases, or hydrocarbon fuels

When: Time frame is not specified

What records:
- Written process safety information (chemical hazards, process technology, process equipment)
- Written process hazard analysis
- Written operating procedures
- Document employee training

Hazardous waste operations and emergency response (1910.120)

Who's covered: Employers whose operations involve employee exposure to hazardous substances

When: Time frame is not specified

What records: Written safety and health program and site-specific safety and health plan for employees involved in hazardous waste operations that includes methods to:
- Identify, evaluate, and control safety and health hazards
- Provides for emergency response for hazardous waste operations

---

Personal protective equipment (1910.132)

Who's covered: Employers with employees who have to use personal protective equipment

When: Employees must demonstrate an understanding of proper equipment selection and use prior to assignment

I What records:
- Hazard assessment written certification includes:
  - statement identifying the document as a certification of the assessment
  - name of person certifying that the assessment has been performed
  - date of the assessment

Respiratory protection (1910.134)

Who's covered: Employers with operations exposing employees to air contaminants:
- Which cannot be controlled by engineering methods, or
- For which respiratory protective equipment is used in conjunction with engineering controls

When: No time frame specified

What records: Retain written documentation regarding:
- Medical evaluations
- Fit tests
- Respirator program

Permit-required confined spaces (1910.146)*

Who's covered: Employers whose operations require employee entry into permit-required confined spaces

When: Retain cancelled entry permits for at least one year to allow program evaluation

What records:
- The entry permit at §1910.146(f) lists the elements required
- Training certification must include:
  - each employee's name
  - signature or initials of the trainers,
  - dates of training

Lockout/tagout (1910.147)

Who's covered: Employers whose employees service and maintain machines and equipment in which the *unexpected* energization or start up, or the release of stored energy, could cause injury

When: Varies - Annual certification of periodic inspections; other timeframes not specified

What records:
- Document procedures to control potentially hazardous energy, including:
  - statement of intent
  - steps to shut down and isolate
  - blocking and securing machines and equipment
  - steps to ensure lockout/ tagout
  - steps to test lockout/tagout
- Documentation to verify employee training in lockout/tagout procedures
- Certification that annual periodic inspections of the energy control procedures have been performed, including:
  - the machine or equipment on which the energy control procedure was being utilized
  - the date of the inspection
  - the employees included in the inspection
  - the person performing the inspection.

Fire brigades (1910.156)

Who's covered: Employers who have established formal fire brigades

When: No time frame specified

What records: Maintain a written statement or policy which establishes the:

- Existence of a fire brigade
- Basic organizational structure
- Type, amount, and frequency of training to be provided to fire brigade members
- Expected number of members in the fire brigade
- Functions that the fire brigade is to perform at the workplace

---

Portable fire extinguishers (1910.157)*

Who's covered: Employers who use portable fire extinguishers as part of their fire protection plan

When:

- Perform visual inspections monthly
- Perform maintenance inspections annually

What records: Record and retain the annual maintenance date for one year after the last entry or the life of the shell, whichever is less

---

Automatic sprinkler systems (1910.159)*

Who's covered: Employers who must install automatic sprinkler systems to meet a particular OSHA standard

When:

- Perform a main drain flow test on each system annually
- Open the inspector's test valve at least every two years

What records:

- Record dates of acceptance tests
- Maintain records of hydrostatically designed systems

OSHA COMPLIANCE MANUAL

Fixed extinguishing systems (1910.160)*

Who's covered: Employers who must install fixed extinguishing systems to meet a particular OSHA standard

When:
- Annual inspection of fixed systems
- Weigh factory charged nonrefillable containers least semi-annually
- Annual training review for employees who maintain the system

What records:
- Record inspection and maintenance dates:
  - on the factory charged nonrefillable container
  - on a tag attached to the container, or
  - in a central location
- Maintain a record of the last semi-annual check:
  - until the container is checked again, or
  - for the life of the container

Powered industrial trucks - Operator training (1910.178(l))

Who's covered: Employers with employees who operate powered industrial trucks

When:
- Initially on employment
- At least once every three years thereafter

What records: Certify that each forklift operator has been trained and evaluated, including:
- Name of operator
- Date of training
- Date of evaluation
- Name of the person(s) doing the training or evaluation

Overhead and gantry cranes (1910.179)

Who's covered: Employers with overhead and gantry cranes, including semigantry, cantilever gantry, wall cranes, storage bridge cranes, and others with the same functional characteristics

When: As specified below

What records:
- Inspect all new and altered cranes prior to initial use
- Maintain the following records for cranes in regular service:
  - inspection-frequent — hooks: certification record
  - inspection-frequent — hoists: certification record
  - inspection-periodic — hooks and hoists: certification record
  - testing: rated load test report
  - maintenance: out-of-order posting
  - rope inspection: certification record

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Crawler locomotive and truck cranes (1910.180)

Who's covered: Employers with crawler cranes, locomotive cranes, wheel mounted cranes, and others with the same fundamental characteristics

When: As specified below

What records:
- Maintain inspection certification of cranes that have been idle for one to six months, six months or longer, and standby cranes inspected at least semi-annually
- Keep the following certification records readily available:
  - testing — rated load rate tests: repair reports
  - rope inspection — running ropes: certification record
  - rope inspection — other ropes: certification record

Derricks (1910.181)

Who's covered: Employers who have derricks

When: At least once a month

What records:
- Keep a certification record for running ropes
- For ropes that have been idle for one month or more, inspect the ropes before use and keep a certification record

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Slings (1910.184)

Who's covered: Employers using slings in conjunction with other material handling equipment for the moving material by hoisting

When: Inspect all fastenings and attachments:
- Each day before use
- During use when conditions warrant

What records:
- Alloy steel chain sling: inspection record
- Proof-testing: certification record
- Wire rope slings end attachments: certification record
- Metal mesh slings: repairs and maintenance record

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Mechanical power presses (1910.217)

Who's covered: Employers with mechanical power presses

When: As specified below

What records:
- Safeguarding point of operation:
  - visually inspect pull-out devices at the start of each shift
  - perform maintenance and repairs before the press is operated
  - keep inspection and maintenance records
- Inspect and test each press at least weekly and keep certification records
- Presence Sensing Device Initiation (PSDI):
  - brake monitoring, installation certification
  - safeguarding of point of operation — alternate safeguard: certification
  - test rod instructions must be posted
  - safety system certification/validation records
  - operator training certification records
- Within 30 days of an injury, submit an injury report to OSHA

Forging machines (1910.218)

Who's covered: Employers with forging machines

Whe: No time frame specified

What records: Keep certification of periodic and regular maintenance and inspections

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Welding, cutting and brazing (1910.252)

Who's covered: Employers who perform welding operations

When: No time frame specified

What records: Fire protection — before cutting or welding is permitted, the area must be inspected and authorization to proceed must be granted, preferably in the form of a written permit

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Oxygen-fuel gas welding and cutting (1910.253)

Who's covered: Employers who perform welding operations using oxygen-fuel gas

When: No time frame specified

What records:
- Make operating rules and instructions available to workers
- Promptly report to supplier when there are problems with cylinder and container valves
- Post operation instructions for acetylene generators

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Resistance welding (1910.255)

Who's covered: Employers who perform resistance welding

When: No time frame specified

What records:
- Periodic equipment inspections by a qualified maintenance person
- Keep a certification record

Logging operations (1910.266)

Who's covered: All logging operations as defined 1910.266

When: No time frame specified

What records:
- Keep each employee's first aid and CPR training and/or certificate of training current
- Keep certification that all training required in the standard has been completed
- Retain the most recent training record

Telecommunications (1910.268)*

Who's covered: Telecommunications centers and telecommunications field centers located outdoors or in building spaces used for such field installations

When: As specified below

What records:
- Inspection of derrick trucks and associated equipment by a competent person at intervals set by the manufacturer but in no case less than once per year
- Maintain records including:
  - dates of inspections
  - necessary repairs made, if corrective action was required
- Test and mark insulating gloves, blankets, and other rubber insulating equipment to indicate compliance with the retest schedule and next test date in the following intervals:
  - new natural rubber equipment — tested and marked every 12 months
  - new synthetic rubber equipment — tested and marked every 18 months
  - re-issued natural rubber equipment — tested and marked every 9 months
  - re-issued synthetic rubber equipment — tested and marked every 15 months

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Electric power generation, transmission, and distribution (1910.269)*

Who's covered: Employers of generation, transmission, and distribution installations of electric utilities and equivalent installations of industrial establishments, and line-clearance tree-trimming operations

When: Procedure inspected at least annually

What records: Certify procedures for control of potentially hazardous energy (lockout/tagout) including:
- Identity of machine or equipment on which energy control procedure was used
- Inspection date
- Employees participating in inspection
- Person performing inspection

Commercial diving operations (1910.440)

Who's covered: Employers involved in commercial diving operations

When: As specified below

What records:
- Record any diving-related injury or illness which requires any dive team member to be hospitalized for 24 hours or more
- Specify the circumstances of the incident and the extent of any injuries or illnesses

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Asbestos (1910.1001)

Who's covered: Employers with employees exposed to airborne asbestos in excess of 0.1 fiber per cubic centimeter of air over an 8 hour time-weighted average

When: When asbestos exposure exceeds exposure limits

What records: Maintain records of:
- Asbestos measurement
- Type of operation
- Sampling and analytical records
- Applicable personal protective equipment
- Training for one year beyond an employee's last day of employment

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Access to employee exposure and medical records (1910.1020)

Who's covered: Employers whose employees experience occupational exposure to toxic substances or harmful physical agents

When: As specified below

What records:
- Maintain medical records related to occupational exposure for each employee for the duration of employment plus 30 years
- Maintain exposure records for a duration of at least 30 years
- Assure preservation and access to occupationally-related medical records and exposure records by the employee or designated representative

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Lead (1910.1025)

Who's covered: Employers with employees having occupational exposures to lead

When: When employees are exposed to lead at concentrations specified in the standard.

What records: Maintain records of:
- Exposure monitoring
- Medical surveillance
- Medical examinations and consultations
- Medical removal

Chromium (VI) (1910.1026)

Who's covered: Employers with employees exposed or potentially exposed to hexavalent chromium in all forms and compounds in excess of 5 $\mu g/m^3$, except:
- Exposures regulated by the EPA or another federal government agency,
- Exposures to portland cement, and
- Operations where data shows that chromium cannot be released.

When:
- Maintain all air monitoring at least 30 years
- Maintain historical monitoring data at least 30 years
- Maintain record of all objective data at least 30 years
- Maintain medical surveillance for each employee for the duration of employment plus 30 years
- Maintain respirator fit test records until the next fit test is administered

What records: Review 1910.1020, Access to Employee Exposure and Medical Records, and 1910.134, Respiratory Protection, for specific data

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Benzene (1910.1028)

Who's covered: Employers with employees exposed to airborne concentrations of benzene in excess of 1 ppm over an 8-hour time weighted average

When: When employee exposure exceeds exposure limits

What records:
- Keep benzene exposure measurements for at least 30 years
- Keep medical surveillance records for the duration of employment plus 30 years

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Bloodborne pathogens (1910.1030)

Who's covered: Employers whose operations involve occupational exposure to blood or other potentially infectious materials

When:
- Keep training records for three years
- Keep medical records for the duration of employment plus 30 years

What records:
- Written exposure control plan
- Employee:
  - training records
  - medical records

1,3-Butadiene (1910.1051)

Who's covered: Employers with employees who have occupational exposure to 1,3-Butadiene

When:
- Maintain objective data records for the duration of the employer's reliance upon such objective data
- Maintain exposure measurement records for at least 30 years
- Maintain medical screening and surveillance records for the duration of employment plus 30 years

What records: Review 1910.1020, Access to Employee Exposure and Medical Records, for specific details. Also, see 1910.134 for requirements related to respirator fit testing records.

Methylene chloride (1910.1052)

Who's covered: Employers with employees potentially exposed to methylene chloride

When:
- Maintain objective data records for as long as the employer relies on the information
- Keep employee exposure measurement records for at least 30 years
- Maintain medical surveillance records for the duration of each affected employee's employment plus 30 years

What records: Review §1910.1020, Access to Employee Exposure and Medical Records, for specific details

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Hazard communication (1910.1200)

Who's covered: Employers who stock, use, manufacture, or import hazardous chemicals

When: No time frame specified

What records: Maintain a written hazard communication program that documents all hazard communication efforts in a given worksite, including:
- Hazard evaluation procedures
- Chemical inventory
- Labeling procedures
- MSDS/SDS system
- Training outline

Occupational exposure to hazardous chemicals in the laboratory (1910.1450)

Who's covered: Laboratory operators whose facilities involve the use of hazardous chemicals, or chemicals which cause health problems in exposed employees

When:
- Medical records must be kept for the duration of employment plus 30 years
- Exposure records must be kept for at least 30 years

What records:
- Employee exposure monitoring
- Written chemical hygiene plan
- Medical consultations and examinations

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Workplace injuries and illnesses in 2011

Many employers find it helpful to compare their rates of injuries and illnesses with those of employers in their industry. The Bureau of Labor Statistics (BLS) publishes data each year that gives employers the opportunity to gauge their own safety performance in terms of injuries and illnesses with industry averages. The following table contains data for all industries for year 2011 (the most current year available).

Comparing your injury rates

There are two types of rates reflected in the BLS data:

- Total recordable cases (this is what most employers refer to as the "incidence rate"
- Cases with days away from work, job transfer, or restriction (this is what is known as the "DART Rate")

To use the table, you must know your establishment's NAICS code. (If you do not know this code, you can self-select a code by visiting the online NAICS Manual at http://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2007. (Drill-down through the Manual to the most precise level available.)

Once you have your establishment's NAICS code, scroll through the BLS table and find the corresponding code in the left-hand column (NAICS data are presented in numeric order in the BLS Table). To compare your injury and illness rates, use the number listed in the "Total recordable cases" column for your NAICS as the industry average incidence rate. Use the number listed in the "total" from the "Cases with days away from work, job transfer, or restriction" column as the industry average DART rate.

Tables

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011**

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
All industries including State and local government[6]		126,140.9	3.8	1.9	1.2	0.7	1.9
Private industry[6]		107,654.2	3.5	1.8	1.1	.7	1.7
Goods producing[6]		18,849.0	4.2	2.3	1.2	1.1	1.9
Natural resources and mining[6,7]		1,644.6	4.0	2.4	1.4	.9	1.6
Agriculture, forestry, fishing and hunting[6]	11	974.9	5.5	3.2	1.8	1.4	2.3
Crop production[6,8]	111	413.8	5.5	3.2	1.7	1.5	2.2
Oilseed and grain farming[6]	1111	17.4	–	1.2	1.0	.2	–
Vegetable and melon farming[6]	1112	84.9	5.2	3.1	2.0	1.2	2.1
Fruit and tree nut farming[6]	1113	154.0	5.5	3.5	2.0	1.5	2.0
Greenhouse, nursery, and floriculture production[6]	1114	121.5	5.7	3.7	1.6	2.1	2.1
Other crop farming[6,8]	1119	36.0	4.3	2.1	1.5	.7	2.2
Animal production[6,8]	112	163.6	6.7	4.1	2.3	1.8	2.6
Cattle ranching and farming[6]	1121	92.6	6.8	4.2	2.5	–	2.6
Beef cattle ranching and farming, including feedlots[6]	11211	24.0	8.7	6.6	2.6	4.0	2.1
Dairy cattle and milk production[6]	11212	68.7	6.2	3.4	2.4	1.0	2.8
Hog and pig farming[6]	1122	20.9	7.2	4.1	1.9	2.2	3.1
Poultry and egg production[6]	1123	35.3	5.7	3.9	1.7	2.2	1.7
Other animal production[6]	1129	10.7	7.1	3.7	2.8	.9	3.4
Forestry and logging	113	57.1	5.0	3.3	2.9	.3	1.8
Logging	1133	50.2	5.4	3.6	3.3	.3	1.8
Fishing, hunting and trapping	114	8.6	4.8	1.6	1.1	–	3.2
Fishing	1141	6.8	4.7	2.0	1.3	–	2.7
Hunting and trapping	1142	1.8	5.0	–	–	–	4.6
Support activities for agriculture and forestry	115	331.7	4.8	2.7	1.5	1.1	2.2
Support activities for crop production	1151	290.4	4.8	2.7	1.4	1.2	2.1
Support activities for crop production	11511	290.4	4.8	2.7	1.4	1.2	2.1
Soil preparation, planting, and cultivating	115112	23.6	1.8	1.5	–	.7	–
Crop harvesting, primarily by machine	115113	9.4	4.3	2.9	1.1	1.8	1.4
Postharvest crop activities (except cotton ginning)	115114	79.4	6.0	2.9	1.6	1.4	3.1
Farm labor contractors and crew leaders	115115	155.2	4.9	2.9	1.6	1.3	2.1
Support activities for animal production	1152	27.0	4.7	2.4	1.5	.9	2.3
Support activities for forestry	1153	14.3	5.8	3.0	2.8	–	2.9
Mining[7]	21	669.7	2.2	1.4	.9	.5	.9
Oil and gas extraction	211	149.4	.9	.5	.4	.1	.4
Oil and gas extraction	2111	149.4	.9	.5	.4	.1	.4

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Oil and gas extraction	21111	149.4	0.9	0.5	0.4	0.1	0.4
Crude petroleum and natural gas extraction	211111	144.1	.9	.4	.4	.1	.4
Natural gas liquid extraction	211112	5.3	2.2	1.3	1.3	–	.9
Mining (except oil and gas)[9]	212	208.1	3.0	1.9	1.5	.5	1.1
Coal mining[9]	2121	82.6	3.7	2.5	2.2	.3	1.3
Coal mining[9]	21211	82.6	3.7	2.5	2.2	.3	1.3
Bituminous coal and lignite surface mining[9]	212111	37.6	1.8	1.2	1.1	.1	.6
Bituminous coal underground mining[9]	212112	44.0	5.3	3.4	3.0	.5	1.8
Anthracite mining[9]	212113	1.0	4.7	3.8	3.8	–	–
Metal ore mining[9]	2122	38.4	2.3	1.5	.9	.5	.9
Iron ore mining[9]	21221	5.6	1.8	.9	.7	.2	.9
Gold ore and silver ore mining[9]	21222	13.6	2.4	1.6	.8	.7	.9
Gold ore mining[9]	212221	12.4	2.1	1.3	.6	.7	.8
Silver ore mining[9]	212222	1.3	5.8	4.3	3.2	1.2	1.4
Copper, nickel, lead, and zinc mining[9]	21223	14.6	2.2	1.4	.9	.5	.8
Lead ore and zinc ore mining[9]	212231	2.4	3.3	2.1	1.1	1.0	1.2
Copper ore and nickel ore mining[9]	212234	12.2	2.1	1.3	.9	.4	.8
Other metal ore mining[9]	21229	4.6	3.2	2.0	1.6	.4	1.3
Uranium-radium-vanadium ore mining[9]	212291	1.0	–	–	–	–	–
All other metal ore mining[9]	212299	3.6	3.4	2.0	1.6	.4	1.3
Nonmetallic mineral mining and quarrying[9]	2123	87.1	2.4	1.6	.9	.7	.9
Stone mining and quarrying[9]	21231	40.5	2.6	1.7	1.0	.7	.9
Dimension stone mining and quarrying[9]	212311	6.8	3.5	2.4	1.8	.6	1.0
Crushed and broken limestone mining and quarrying[9]	212312	21.2	2.3	1.6	.8	.7	.8
Crushed and broken granite mining and quarrying[9]	212313	4.8	2.0	1.3	.6	.7	.7
Other crushed and broken stone mining and quarrying[9]	212319	7.7	2.9	1.8	1.1	.7	1.1
Sand, gravel, clay, and ceramic and refractory minerals mining and quarrying[9]	21232	34.7	2.3	1.4	.9	.6	.8
Construction sand and gravel mining[9]	212321	25.3	2.2	1.4	.9	.5	.8
Kaolin and ball clay mining[9]	212324	2.3	1.8	1.3	.6	.7	.5
Clay and ceramic and refractory minerals mining[9]	212325	3.4	3.0	1.8	1.0	.8	1.2
Other nonmetallic mineral mining and quarrying[9]	21239	11.9	2.3	1.5	.7	.8	.9
Potash, soda, and borate mineral mining[9]	212391	3.8	2.0	1.4	.7	.7	.6
Phosphate rock mining[9]	212392	1.7	1.4	1.0	–	.7	–
Other chemical and fertilizer mineral mining[9]	212393	2.7	3.2	1.9	1.1	.8	1.3
All other nonmetallic mineral mining[9]	212399	3.7	2.8	1.6	.7	.9	1.2
Support activities for mining	213	312.1	2.3	1.4	.8	.6	.9
Support activities for mining	2131	312.1	2.3	1.4	.8	.6	.9
Support activities for mining	21311	312.1	2.3	1.4	.8	.6	.9
Drilling oil and gas wells	213111	75.9	3.0	1.6	.9	.7	1.4
Support activities for oil and gas operations	213112	221.1	2.1	1.3	.8	.6	.8

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Construction		5,576.7	3.9	2.1	1.5	0.7	1.8
Construction	23	5,576.7	3.9	2.1	1.5	.7	1.8
Construction of buildings	236	1,259.6	3.6	1.9	1.2	.7	1.7
Residential building construction	2361	609.2	4.3	2.3	1.6	–	2.0
Nonresidential building construction	2362	650.4	3.1	1.7	.9	.7	1.4
Heavy and civil engineering construction	237	826.4	3.5	2.0	1.2	.7	1.5
Utility system construction	2371	394.1	2.9	1.8	1.1	.6	1.2
Water and sewer line and related structures construction	23711	156.2	3.6	2.1	1.3	.8	1.5
Oil and gas pipeline and related structures construction	23712	101.0	1.3	.7	.4	.3	.6
Power and communication line and related structures construction	23713	136.9	3.6	2.3	1.5	.8	1.3
Land subdivision	2372	48.9	3.2	1.9	1.2	–	1.3
Highway, street, and bridge construction	2373	285.9	4.4	2.4	1.5	.8	2.0
Other heavy and civil engineering construction	2379	97.5	3.6	1.9	1.0	.9	1.6
Specialty trade contractors	238	3,490.6	4.1	2.2	1.6	.6	1.9
Foundation, structure, and building exterior contractors	2381	673.5	5.1	3.0	2.0	.9	2.2
Poured concrete foundation and structure contractors	23811	143.7	6.5	3.7	2.3	–	–
Structural steel and precast concrete contractors	23812	64.3	5.5	2.2	1.5	.7	3.3
Framing contractors	23813	52.3	7.3	5.5	4.2	1.3	1.8
Masonry contractors	23814	132.5	3.3	2.1	1.4	.7	1.2
Glass and glazing contractors	23815	47.3	4.1	2.2	1.5	.7	2.0
Roofing contractors	23816	163.3	5.6	3.4	2.4	1.0	2.2
Siding contractors	23817	32.7	4.4	2.8	2.5	.3	1.6
Other foundation, structure, and building exterior contractors	23819	37.3	2.8	1.3	1.0	.3	1.5
Building equipment contractors	2382	1,649.3	4.1	2.0	1.5	.6	2.1
Electrical contractors	23821	723.5	3.6	1.8	1.2	.5	1.9
Plumbing, heating, and air-conditioning contractors	23822	807.8	4.5	2.3	1.7	.6	2.2
Other building equipment contractors	23829	118.0	3.8	1.8	1.2	.5	–
Building finishing contractors	2383	641.9	3.7	2.3	1.7	.6	1.4
Drywall and insulation contractors	23831	197.1	4.4	2.7	1.8	.9	1.7
Painting and wall covering contractors	23832	168.1	2.5	1.4	1.0	.4	1.1
Flooring contractors	23833	61.5	3.0	2.2	1.7	.5	.8
Tile and terrazzo contractors	23834	41.4	3.3	2.3	1.8	.6	1.0
Other building finishing contractors	23839	61.2	4.2	2.7	2.0	.8	1.5
Other specialty trade contractors	2389	525.9	3.6	1.9	1.5	.4	1.7
Site preparation contractors	23891	268.1	3.1	1.7	1.3	.4	1.4
All other specialty trade contractors	23899	257.8	4.2	2.2	1.8	.3	2.0

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Manufacturing		11,627.7	4.4	2.4	1.1	1.3	2.0
Manufacturing	31-33	11,627.7	4.4	2.4	1.1	1.3	2.0
Food manufacturing	311	1,458.8	5.6	3.5	1.5	2.1	2.1
Animal food manufacturing	3111	51.6	4.9	2.4	1.2	1.2	2.5
Animal food manufacturing	31111	51.6	4.9	2.4	1.2	1.2	2.5
Dog and cat food manufacturing	311111	20.1	4.1	2.0	.9	1.1	2.1
Other animal food manufacturing	311119	31.5	5.5	2.7	1.4	1.3	2.8
Grain and oilseed milling	3112	59.2	3.3	1.8	1.0	.8	1.6
Flour milling and malt manufacturing	31121	18.1	3.9	2.1	1.1	1.0	1.8
Flour milling	311211	12.7	3.6	1.6	.9	.7	2.0
Starch and vegetable fats and oils manufacturing	31122	26.7	3.2	1.6	1.0	.6	1.7
Wet corn milling	311221	12.2	2.3	1.0	.9	.1	1.3
Soybean processing	311222	6.4	3.2	1.5	1.0	.4	1.8
Fats and oils refining and blending	311225	6.0	4.1	2.3	1.2	1.1	1.8
Breakfast cereal manufacturing	31123	14.4	2.8	1.7	.8	.9	1.1
Sugar and confectionery product manufacturing	3113	66.7	5.1	2.7	1.4	1.3	2.4
Sugar manufacturing	31131	12.0	7.8	3.5	2.1	1.4	4.2
Beet sugar manufacturing	311313	6.2	9.4	3.7	1.7	1.9	5.8
Chocolate and confectionery manufacturing from cacao beans	31132	7.0	5.4	3.4	2.2	1.2	2.0
Confectionery manufacturing from purchased chocolate	31133	31.1	4.0	2.2	.9	1.3	1.8
Nonchocolate confectionery manufacturing	31134	16.5	4.4	2.3	1.3	1.0	2.1
Fruit and vegetable preserving and specialty food manufacturing	3114	174.2	5.3	3.4	1.6	1.7	1.9
Frozen food manufacturing	31141	88.2	5.2	3.6	1.8	1.8	1.6
Frozen fruit, juice, and vegetable manufacturing	311411	31.4	5.5	3.4	1.5	1.9	2.0
Frozen specialty food manufacturing	311412	56.7	5.1	3.7	1.9	1.8	1.4
Fruit and vegetable canning, pickling, and drying	31142	86.0	5.4	3.2	1.5	1.7	2.3
Fruit and vegetable canning	311421	63.1	5.2	3.0	1.4	1.6	2.2
Specialty canning	311422	11.9	4.5	2.3	1.3	.9	2.2
Dried and dehydrated food manufacturing	311423	11.0	7.7	5.2	2.1	3.1	2.5
Dairy product manufacturing	3115	133.8	5.9	3.8	2.0	1.9	2.1
Dairy product (except frozen) manufacturing	31151	113.0	6.3	4.0	2.0	2.0	2.2
Fluid milk manufacturing	311511	54.2	6.8	4.3	2.1	2.3	2.5
Cheese manufacturing	311513	41.8	6.1	4.0	2.0	2.0	2.1
Dry, condensed, and evaporated dairy product manufacturing	311514	14.7	5.2	3.5	2.2	1.3	1.7
Ice cream and frozen dessert manufacturing	31152	20.8	3.9	2.6	1.5	1.0	1.3
Animal slaughtering and processing	3116	487.8	6.4	4.3	1.2	3.1	2.2
Animal slaughtering and processing	31161	487.8	6.4	4.3	1.2	3.1	2.2
Animal (except poultry) slaughtering	311611	145.4	7.8	5.3	1.3	3.9	2.5
Meat processed from carcasses	311612	109.8	6.0	3.8	1.5	2.3	2.2

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Rendering and meat byproduct processing	311613	8.4	5.0	3.1	1.1	2.0	1.9
Poultry processing	311615	224.1	5.8	3.9	.9	3.0	1.9
Seafood product preparation and packaging	3117	36.1	7.4	4.5	2.6	1.8	3.0
Seafood product preparation and packaging	31171	36.1	7.4	4.5	2.6	1.8	3.0
Seafood canning	311711	6.2	10.2	5.4	3.6	1.8	4.8
Fresh and frozen seafood processing	311712	29.8	6.8	4.3	2.4	1.8	2.6
Bakeries and tortilla manufacturing	3118	283.2	5.0	3.1	1.5	1.6	1.9
Bread and bakery product manufacturing	31181	212.0	5.0	3.1	1.6	1.5	1.9
Retail bakeries	311811	70.3	2.6	1.2	.9	.3	1.5
Commercial bakeries	311812	130.5	5.8	3.7	1.9	1.8	2.1
Frozen cakes, pies, and other pastries manufacturing	311813	11.2	7.3	5.2	2.1	3.1	2.1
Cookie, cracker, and pasta manufacturing	31182	53.8	5.5	3.3	1.3	2.1	2.1
Cookie and cracker manufacturing	311821	31.6	6.2	4.1	1.3	2.7	2.1
Flour mixes and dough manufacturing from purchased flour	311822	16.6	4.4	2.3	1.3	1.0	2.1
Dry pasta manufacturing	311823	5.6	4.5	2.7	1.1	1.6	1.8
Tortilla manufacturing	31183	17.3	3.9	3.0	1.6	1.5	.9
Other food manufacturing	3119	166.4	4.9	3.0	1.6	1.4	1.9
Snack food manufacturing	31191	47.3	4.3	2.3	.9	1.4	1.9
Roasted nuts and peanut butter manufacturing	311911	12.8	5.9	3.2	.8	2.4	2.7
Other snack food manufacturing	311919	34.5	3.7	2.0	1.0	1.0	1.7
Coffee and tea manufacturing	31192	14.3	4.9	3.6	2.0	1.6	1.3
Flavoring syrup and concentrate manufacturing	31193	10.2	1.6	1.0	.2	.8	.6
Seasoning and dressing manufacturing	31194	32.7	5.3	3.7	2.2	1.5	1.5
Mayonnaise, dressing, and other prepared sauce manufacturing	311941	12.4	6.2	4.4	2.6	1.8	1.8
Spice and extract manufacturing	311942	20.3	4.7	3.3	2.0	1.4	1.3
All other food manufacturing	31199	61.9	5.7	3.4	1.9	1.5	2.4
Perishable prepared food manufacturing	311991	34.7	6.7	4.2	2.6	1.6	2.5
All other miscellaneous food manufacturing	311999	27.3	4.6	2.4	1.1	1.3	2.2
Beverage and tobacco product manufacturing	312	186.2	6.9	5.3	–	2.5	1.6
Beverage manufacturing	3121	169.2	7.3	5.6	–	2.7	1.6
Soft drink and ice manufacturing	31211	93.5	9.4	7.6	–	3.5	1.8
Soft drink manufacturing	312111	73.1	9.8	–	–	3.8	1.7
Bottled water manufacturing	312112	13.2	5.8	4.1	1.6	2.5	1.7
Ice manufacturing	312113	7.3	11.9	9.0	8.0	1.1	2.8
Breweries	31212	26.0	3.9	1.7	.7	1.0	2.2
Wineries	31213	41.8	4.1	3.4	1.5	1.9	.8
Distilleries	31214	7.8	3.0	1.3	.5	.8	1.7
Tobacco manufacturing	3122	17.0	3.3	2.0	1.3	.7	1.3
Tobacco product manufacturing	31222	13.6	2.9	1.7	1.2	.6	1.1
Cigarette manufacturing	312221	7.4	2.8	1.7	1.5	–	1.2
Other tobacco product manufacturing	312229	6.2	3.0	1.9	.7	1.2	1.1

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Textile mills	313	120.8	3.5	2.0	0.9	1.1	1.5
Fiber, yarn, and thread mills	3131	29.5	2.5	1.4	.6	.8	1.1
Fiber, yarn, and thread mills	31311	29.5	2.5	1.4	.6	.8	1.1
Yarn spinning mills	313111	21.1	2.4	1.3	.5	.8	1.1
Yarn texturizing, throwing, and twisting mills	313112	7.4	2.3	1.7	.6	1.0	.6
Thread mills	313113	1.0	5.7	2.9	–	–	2.8
Fabric mills	3132	55.5	3.5	2.0	1.1	.9	1.4
Broadwoven fabric mills	31321	29.5	3.1	2.1	1.0	1.1	.9
Nonwoven fabric mills	31323	11.4	4.0	2.0	1.2	.8	2.1
Knit fabric mills	31324	6.9	2.5	1.8	1.4	.4	.7
Weft knit fabric mills	313241	3.1	2.5	2.1	1.5	.6	–
Other knit fabric and lace mills	313249	3.8	2.5	1.6	1.3	–	.9
Textile and fabric finishing and fabric coating mills	3133	35.9	4.3	2.4	.9	1.5	1.9
Textile and fabric finishing mills	31331	28.8	3.3	1.9	.6	1.3	1.5
Broadwoven fabric finishing mills	313311	17.0	3.5	2.1	.6	1.4	1.4
Textile and fabric finishing (except broadwoven fabric) mills	313312	11.7	3.1	1.5	.6	1.0	1.5
Fabric coating mills	31332	7.1	7.8	4.2	1.9	2.3	3.6
Textile product mills[8]	314	119.6	3.5	1.9	.9	1.0	1.5
Textile furnishings mills	3141	56.8	2.4	1.6	.6	1.0	.8
Carpet and rug mills	31411	34.6	2.3	1.5	.6	1.0	.8
Curtain and linen mills	31412	22.2	2.5	1.7	.7	.9	.8
Curtain and drapery mills	314121	10.3	.8	.4	.4	–	.3
Other household textile product mills	314129	12.0	3.8	2.6	1.0	1.6	1.2
Other textile product mills[8]	3149	62.8	4.5	2.3	1.2	1.1	2.2
Textile bag and canvas mills	31491	24.8	5.1	2.6	1.2	1.4	2.6
Canvas and related product mills	314912	16.8	6.8	3.3	1.4	1.9	3.6
All other textile product mills[8]	31499	38.0	4.1	2.1	1.1	1.0	2.0
Tire cord and tire fabric mills	314992	2.6	6.1	2.5	1.5	1.1	3.6
All other miscellaneous textile product mills[8]	314999	31.4	3.5	1.9	1.1	.7	1.6
Apparel manufacturing[8]	315	163.3	2.5	1.1	.6	.6	1.4
Apparel knitting mills	3151	17.9	2.9	1.5	.7	.7	1.4
Hosiery and sock mills	31511	11.1	2.9	1.7	.6	1.1	1.1
Other hosiery and sock mills	315119	5.3	2.6	1.4	.6	.8	1.1
Other apparel knitting mills	31519	6.7	3.0	1.0	.9	–	1.9
Outerwear knitting mills	315191	5.1	3.9	1.3	1.1	–	2.6
Underwear and nightwear knitting mills	315192	1.6	–	–	–	–	–
Cut and sew apparel manufacturing[8]	3152	131.6	2.3	1.0	.5	.6	1.3
Cut and sew apparel contractors[8]	31521	47.4	2.5	1.0	.4	.6	1.5
Men's and boys' cut and sew apparel contractors[8]	315211	10.6	1.6	1.0	.5	.6	.5
Men's and boys' cut and sew apparel manufacturing	31522	33.2	3.1	1.3	.7	.6	1.8
Men's and boys' cut and sew work clothing manufacturing	315225	6.2	4.1	1.9	.7	1.2	2.2

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Men's and boys' cut and sew other outerwear manufacturing	315228	5.6	2.3	1.2	0.4	0.8	1.1
Women's and girls' cut and sew apparel manufacturing	31523	35.0	1.4	.8	.3	.5	.6
Other cut and sew apparel manufacturing	31529	16.0	2.2	1.0	.5	.6	1.2
All other cut and sew apparel manufacturing	315299	11.9	2.9	1.4	.6	.8	1.5
Apparel accessories and other apparel manufacturing	3159	13.8	3.7	1.3	1.2	.1	2.3
Apparel accessories and other apparel manufacturing	31599	13.8	3.7	1.3	1.2	.1	2.3
Hat, cap, and millinery manufacturing	315991	4.6	6.2	1.5	1.5	–	4.6
Other apparel accessories and other apparel manufacturing	315999	6.6	1.4	.5	.3	–	1.0
Leather and allied product manufacturing	316	29.9	6.1	3.4	1.7	1.7	2.7
Leather and hide tanning and finishing	3161	4.0	7.8	4.5	3.0	1.6	3.3
Footwear manufacturing	3162	14.3	5.7	3.0	1.5	1.5	2.8
Footwear manufacturing	31621	14.3	5.7	3.0	1.5	1.5	2.8
Men's footwear (except athletic) manufacturing	316213	6.3	7.0	3.5	1.6	1.9	3.5
Other leather and allied product manufacturing	3169	11.6	6.0	3.5	1.6	1.9	2.5
Other leather and allied product manufacturing	31699	11.6	6.0	3.5	1.6	1.9	2.5
Luggage manufacturing	316991	3.8	6.1	1.9	1.5	–	4.2
Personal leather good (except women's handbag and purse) manufacturing	316993	1.3	3.7	1.7	–	–	1.9
All other leather good and allied product manufacturing	316999	4.9	6.3	4.9	2.1	2.8	1.4
Wood product manufacturing	321	338.1	6.5	3.5	1.9	1.6	3.0
Sawmills and wood preservation	3211	84.3	6.4	3.4	2.2	1.2	3.0
Sawmills and wood preservation	32111	84.3	6.4	3.4	2.2	1.2	3.0
Sawmills	321113	75.9	6.5	3.3	2.0	1.3	3.2
Wood preservation	321114	8.4	6.0	4.3	3.6	.7	1.7
Veneer, plywood, and engineered wood product manufacturing	3212	62.3	4.8	2.3	1.3	1.1	2.5
Veneer, plywood, and engineered wood product manufacturing	32121	62.3	4.8	2.3	1.3	1.1	2.5
Hardwood veneer and plywood manufacturing	321211	14.9	5.1	2.3	1.2	1.1	2.8
Softwood veneer and plywood manufacturing	321212	13.8	4.0	2.1	.9	1.2	1.9
Engineered wood member (except truss) manufacturing	321213	4.1	3.8	2.0	.7	1.3	1.8
Truss manufacturing	321214	17.4	7.6	3.5	2.1	1.5	4.1
Reconstituted wood product manufacturing	321219	12.2	2.3	1.3	.9	.4	1.0
Other wood product manufacturing	3219	191.6	7.1	3.9	1.9	2.0	3.2
Millwork	32191	89.5	6.0	3.3	1.6	1.6	2.7
Wood window and door manufacturing	321911	43.0	5.6	3.2	1.8	1.4	2.4
Cut stock, resawing lumber, and planing	321912	11.8	5.5	2.9	1.5	1.4	2.7
Other millwork (including flooring)	321918	34.7	6.6	3.5	1.6	1.9	3.1
Wood container and pallet manufacturing	32192	52.4	7.6	4.1	2.1	2.0	3.5
All other wood product manufacturing	32199	49.6	8.3	4.8	2.2	2.6	3.5
Manufactured home (mobile home) manufacturing	321991	17.9	10.9	5.8	2.1	3.7	5.1
Prefabricated wood building manufacturing	321992	13.1	8.2	5.4	2.1	3.3	2.8
All other miscellaneous wood product manufacturing	321999	18.7	6.1	3.4	2.3	1.1	2.7

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Paper manufacturing	322	386.1	3.4	1.9	1.0	0.9	1.5
Pulp, paper, and paperboard mills	3221	108.1	2.7	1.4	.9	.6	1.3
Pulp mills	32211	5.9	1.9	1.1	.8	.3	.8
Paper mills	32212	72.6	2.7	1.4	.9	.5	1.3
Paper (except newsprint) mills	322121	65.0	2.7	1.3	.8	.5	1.4
Newsprint mills	322122	7.6	2.7	1.7	1.3	.4	1.0
Paperboard mills	32213	29.6	2.9	1.6	.8	.8	1.3
Converted paper product manufacturing	3222	278.0	3.7	2.1	1.0	1.0	1.6
Paperboard container manufacturing	32221	146.5	3.4	1.9	1.1	.9	1.5
Corrugated and solid fiber box manufacturing	322211	92.6	3.6	2.1	1.1	.9	1.6
Folding paperboard box manufacturing	322212	28.5	3.4	1.9	1.1	.8	1.5
Fiber can, tube, drum, and similar products manufacturing	322214	7.8	2.9	1.3	.6	.7	1.6
Nonfolding sanitary food container manufacturing	322215	11.2	3.1	1.8	.8	1.0	1.2
Paper bag and coated and treated paper manufacturing	32222	62.6	4.5	2.6	1.2	1.4	1.9
Coated and laminated packaging paper manufacturing	322221	17.5	5.1	2.8	1.3	1.4	2.4
Coated and laminated paper manufacturing	322222	26.7	4.0	2.1	1.1	1.0	1.9
Coated paper bag and pouch manufacturing	322223	8.0	5.3	3.3	1.0	2.3	2.0
Uncoated paper and multiwall bag manufacturing	322224	7.7	3.7	2.9	1.4	1.6	.8
Stationery product manufacturing	32223	24.3	4.6	2.3	1.1	1.2	2.3
Die-cut paper and paperboard office supplies manufacturing	322231	10.1	5.7	1.9	1.4	.5	3.8
Envelope manufacturing	322232	11.2	4.3	3.0	1.1	1.8	1.3
Other converted paper product manufacturing	32229	44.7	3.0	1.6	.7	.8	1.4
Sanitary paper product manufacturing	322291	28.9	2.4	1.4	.5	.9	1.0
All other converted paper product manufacturing	322299	15.8	4.1	1.9	1.1	.7	2.3
Printing and related support activities	323	478.1	2.9	1.6	.8	.8	1.3
Printing and related support activities	3231	478.1	2.9	1.6	.8	.8	1.3
Printing	32311	444.6	3.0	1.7	.8	.9	1.3
Commercial lithographic printing	323110	161.6	3.6	2.0	1.0	1.1	1.5
Commercial flexographic printing	323112	29.6	3.0	1.8	1.0	.8	1.2
Commercial screen printing	323113	60.9	2.3	1.1	.5	.6	1.3
Quick printing	323114	41.3	1.0	.6	.5	.1	.4
Digital printing	323115	21.0	1.8	1.2	.3	.9	.6
Manifold business forms printing	323116	20.9	3.3	1.6	.7	.9	1.7
Books printing	323117	22.8	3.6	2.0	.9	1.2	1.6
Blankbook, looseleaf binders, and devices manufacturing	323118	4.7	4.5	1.0	–	.6	3.5
Other commercial printing	323119	34.4	3.6	2.1	1.3	.8	1.5
Support activities for printing	32312	33.5	2.0	1.1	.6	.5	.9
Tradebinding and related work	323121	18.3	2.7	1.6	.8	.7	1.1
Prepress services	323122	15.2	1.0	.5	.3	–	.6
Petroleum and coal products manufacturing	324	109.6	2.0	1.0	.5	.6	.9
Petroleum and coal products manufacturing	3241	109.6	2.0	1.0	.5	.6	.9

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Petroleum refineries	32411	69.9	1.1	0.6	0.4	0.2	0.5
Asphalt paving, roofing, and saturated materials manufacturing	32412	24.5	3.0	1.3	.6	.7	1.7
Asphalt paving mixture and block manufacturing	324121	13.9	3.7	1.5	1.0	.5	2.2
Asphalt shingle and coating materials manufacturing	324122	10.6	2.2	1.1	.2	.9	1.1
Other petroleum and coal products manufacturing	32419	15.2	4.6	2.8	.9	1.8	1.9
All other petroleum and coal products manufacturing	324199	5.4	3.5	2.6	1.7	.9	.9
Chemical manufacturing	325	808.2	2.4	1.4	.7	.7	1.0
Basic chemical manufacturing	3251	142.4	2.1	1.2	.6	.5	1.0
Petrochemical manufacturing	32511	24.4	.6	.4	.2	.2	.3
Industrial gas manufacturing	32512	17.5	.9	.5	.3	.2	.4
Synthetic dye and pigment manufacturing	32513	13.8	2.4	1.3	.5	.8	1.1
Inorganic dye and pigment manufacturing	325131	8.7	1.5	.9	.5	.5	.6
Synthetic organic dye and pigment manufacturing	325132	5.1	3.9	1.9	.5	1.3	2.0
Other basic inorganic chemical manufacturing	32518	40.0	3.4	2.0	1.3	.7	1.3
Alkalies and chlorine manufacturing	325181	11.7	2.9	1.3	.8	.5	1.6
Carbon black manufacturing	325182	1.7	3.5	2.3	1.4	.9	1.2
All other basic inorganic chemical manufacturing	325188	26.7	3.6	2.4	1.5	.8	1.2
Other basic organic chemical manufacturing	32519	46.7	2.2	1.0	.4	.6	1.2
Gum and wood chemical manufacturing	325191	2.2	4.1	1.2	–	–	2.9
Ethyl alcohol manufacturing	325193	9.9	3.7	1.3	.4	.9	2.4
All other basic organic chemical manufacturing	325199	33.7	1.7	.9	.4	.6	.7
Resin, synthetic rubber, and artificial and synthetic fibers and filaments manufacturing	3252	89.2	2.8	1.8	.8	1.0	1.1
Resin and synthetic rubber manufacturing	32521	64.0	3.2	2.0	.9	1.1	1.3
Plastics material and resin manufacturing	325211	53.3	3.1	2.0	.9	1.1	1.1
Synthetic rubber manufacturing	325212	10.7	3.8	1.9	.9	1.1	1.8
Artificial and synthetic fibers and filaments manufacturing	32522	25.2	1.8	1.2	.5	.7	.6
Cellulosic organic fiber manufacturing	325221	12.7	1.7	1.1	.5	.6	.6
Noncellulosic organic fiber manufacturing	325222	12.6	1.9	1.2	.5	.7	.7
Pesticide, fertilizer, and other agricultural chemical manufacturing	3253	36.0	3.1	1.7	.7	1.0	1.5
Fertilizer manufacturing	32531	22.1	3.5	1.8	.8	1.0	1.8
Nitrogenous fertilizer manufacturing	325311	7.4	1.5	.6	.2	.4	.9
Phosphatic fertilizer manufacturing	325312	6.8	1.7	.7	–	.6	1.0
Fertilizer (mixing only) manufacturing	325314	7.9	7.7	4.2	2.1	2.1	3.4
Pesticide and other agricultural chemical manufacturing	32532	13.9	2.5	1.5	.5	1.0	1.0
Pharmaceutical and medicine manufacturing	3254	297.4	2.0	1.2	.5	.6	.8
Pharmaceutical and medicine manufacturing	32541	297.4	2.0	1.2	.5	.6	.8
Medicinal and botanical manufacturing	325411	22.6	3.2	1.9	1.1	.7	1.4
Pharmaceutical preparation manufacturing	325412	225.3	2.0	1.2	.5	.7	.8
In-vitro diagnostic substance manufacturing	325413	23.1	1.5	.8	.5	.4	.7
Biological product (except diagnostic) manufacturing	325414	26.4	1.6	.8	.4	.4	.8

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Paint, coating, and adhesive manufacturing	3255	56.9	2.5	1.5	0.8	0.7	1.0
Paint and coating manufacturing	32551	36.6	2.7	1.6	.8	.8	1.0
Adhesive manufacturing	32552	20.3	2.2	1.2	.8	.4	1.0
Soap, cleaning compound, and toilet preparation manufacturing	3256	102.0	2.5	1.6	.7	.8	.9
Soap and cleaning compound manufacturing	32561	51.9	2.6	1.5	.7	.8	1.1
Soap and other detergent manufacturing	325611	24.0	2.2	1.3	.4	.9	.9
Polish and other sanitation good manufacturing	325612	23.2	2.9	1.8	1.0	.8	1.0
Surface active agent manufacturing	325613	4.6	3.5	1.4	–	.5	2.1
Toilet preparation manufacturing	32562	50.1	2.3	1.6	.8	.8	.7
Other chemical product and preparation manufacturing	3259	84.2	3.4	2.0	1.1	.8	1.4
Printing ink manufacturing	32591	9.4	4.7	2.9	1.5	1.4	1.8
Explosives manufacturing	32592	7.2	6.1	1.9	1.0	.9	4.2
All other chemical product and preparation manufacturing	32599	67.6	2.9	1.9	1.1	.7	1.1
Custom compounding of purchased resins	325991	15.3	3.1	2.4	1.4	1.0	.7
Photographic film, paper, plate, and chemical manufacturing	325992	17.8	2.7	1.4	.6	.8	1.3
All other miscellaneous chemical product and preparation manufacturing	325998	34.5	3.0	1.8	1.2	.6	1.1
Plastics and rubber products manufacturing[8]	326	632.2	4.9	2.8	1.3	1.5	2.1
Plastics product manufacturing[8]	3261	507.4	4.7	2.7	1.3	1.4	2.1
Plastics packaging materials and unlaminated film and sheet manufacturing	32611	81.1	4.4	2.9	1.5	1.5	1.4
Plastics bag and pouch manufacturing	326111	30.6	5.3	3.8	1.6	2.2	1.5
Plastics packaging film and sheet (including laminated) manufacturing	326112	12.6	3.4	2.3	1.0	1.3	1.1
Unlaminated plastics film and sheet (except packaging) manufacturing	326113	38.0	4.0	2.5	1.5	1.0	1.5
Plastics pipe, pipe fitting, and unlaminated profile shape manufacturing	32612	47.7	4.0	2.2	.9	1.3	1.8
Unlaminated plastics profile shape manufacturing	326121	22.7	4.0	2.2	1.0	1.3	1.7
Plastics pipe and pipe fitting manufacturing	326122	25.0	4.0	2.2	.9	1.3	1.8
Laminated plastics plate, sheet (except packaging), and shape manufacturing	32613	16.1	5.5	3.2	1.3	1.9	2.4
Polystyrene foam product manufacturing	32614	25.1	5.6	3.0	1.3	1.8	2.5
Urethane and other foam product (except polystyrene) manufacturing	32615	30.5	3.6	2.2	1.2	1.0	1.5
Plastics bottle manufacturing	32616	31.8	3.6	1.3	.8	.5	2.3
Other plastics product manufacturing[8]	32619	275.1	5.1	2.9	1.3	1.5	2.3
Plastics plumbing fixture manufacturing	326191	12.0	5.4	2.7	1.5	1.2	2.7
All other plastics product manufacturing[8]	326199	241.1	5.2	2.9	1.4	1.6	2.3
Rubber product manufacturing[8]	3262	124.8	5.6	3.3	1.5	1.8	2.3
Tire manufacturing	32621	53.5	5.4	3.3	1.3	2.0	2.1
Tire manufacturing (except retreading)	326211	46.6	5.5	3.4	1.3	2.2	2.1

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Rubber and plastics hoses and belting manufacturing	32622	22.0	5.6	3.1	1.3	1.8	2.5
Other rubber product manufacturing[8]	32629	49.3	5.8	3.4	1.9	1.5	2.3
Rubber product manufacturing for mechanical use	326291	25.5	6.0	3.5	2.1	1.4	2.5
All other rubber product manufacturing[8]	326299	23.8	5.5	3.4	1.7	1.7	2.1
Nonmetallic mineral product manufacturing	327	367.4	5.4	3.0	1.7	1.4	2.4
Clay product and refractory manufacturing	3271	40.6	5.7	2.9	1.3	1.6	2.8
Pottery, ceramics, and plumbing fixture manufacturing	32711	16.2	4.8	2.4	1.5	.8	2.5
Vitreous china plumbing fixture and china and earthenware bathroom accessories manufacturing	327111	4.1	2.2	1.1	.4	.7	1.2
Vitreous china, fine earthenware, and other pottery product manufacturing	327112	6.6	5.7	2.7	2.2	.5	3.0
Porcelain electrical supply manufacturing	327113	5.6	6.0	3.1	1.9	1.2	3.0
Clay building material and refractories manufacturing	32712	24.3	6.3	3.3	1.1	2.2	3.0
Clay refractory manufacturing	327124	4.3	8.2	3.9	1.5	2.4	4.3
Nonclay refractory manufacturing	327125	5.5	7.7	4.2	1.5	2.8	3.5
Glass and glass product manufacturing	3272	79.1	5.1	2.8	1.1	1.6	2.3
Glass and glass product manufacturing	32721	79.1	5.1	2.8	1.1	1.6	2.3
Flat glass manufacturing	327211	9.6	4.4	2.5	.9	1.5	1.9
Other pressed and blown glass and glassware manufacturing	327212	15.9	3.5	2.0	1.2	.8	1.5
Glass container manufacturing	327213	15.6	5.4	2.7	.8	1.8	2.7
Glass product manufacturing made of purchased glass	327215	38.1	5.9	3.2	1.2	2.0	2.7
Cement and concrete product manufacturing	3273	168.7	6.1	3.6	2.3	1.3	2.5
Ready-mix concrete manufacturing	32732	83.2	5.8	3.6	2.7	.9	2.3
Concrete pipe, brick, and block manufacturing	32733	25.0	6.4	3.2	1.1	2.1	3.2
Concrete block and brick manufacturing	327331	17.0	6.0	2.2	.9	1.3	3.8
Concrete pipe manufacturing	327332	8.0	7.3	5.0	1.5	3.6	2.3
Other concrete product manufacturing	32739	46.1	6.7	4.2	2.6	1.6	2.5
Lime and gypsum product manufacturing	3274	12.7	4.4	2.1	1.2	.9	2.3
Gypsum product manufacturing	32742	9.3	3.0	1.6	.9	.7	1.4
Other nonmetallic mineral product manufacturing	3279	66.3	4.3	2.3	1.3	1.0	2.1
Abrasive product manufacturing	32791	9.8	4.3	2.4	1.3	1.2	1.8
All other nonmetallic mineral product manufacturing	32799	56.5	4.3	2.2	1.3	.9	2.1
Cut stone and stone product manufacturing	327991	22.5	4.6	2.3	1.7	.6	2.4
Ground or treated mineral and earth manufacturing	327992	6.6	3.4	2.0	.7	1.3	1.3
Mineral wool manufacturing	327993	16.1	4.0	1.4	.6	.8	2.6
All other miscellaneous nonmetallic mineral product manufacturing	327999	11.3	5.0	3.5	1.9	1.6	1.5
Primary metal manufacturing	331	375.9	6.1	3.5	1.8	1.7	2.7
Iron and steel mills and ferroalloy manufacturing	3311	88.3	3.2	1.7	.9	.9	1.5
Iron and steel mills and ferroalloy manufacturing	33111	88.3	3.2	1.7	.9	.9	1.5
Iron and steel mills	331111	85.9	3.2	1.7	.9	.9	1.5
Electrometallurgical ferroalloy product manufacturing	331112	2.4	3.4	1.8	.9	.9	1.5

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Steel product manufacturing from purchased steel	3312	55.1	7.1	4.1	2.1	2.0	2.9
Iron and steel pipe and tube manufacturing from purchased steel	33121	24.7	7.5	4.2	2.3	2.0	3.3
Rolling and drawing of purchased steel	33122	30.4	6.7	4.1	2.0	2.1	2.6
Rolled steel shape manufacturing	331221	21.0	6.5	3.5	2.2	1.3	3.0
Steel wire drawing	331222	9.4	7.1	5.3	1.4	3.8	1.8
Alumina and aluminum production and processing	3313	55.1	4.3	2.4	1.0	1.4	1.9
Alumina and aluminum production and processing	33131	55.1	4.3	2.4	1.0	1.4	1.9
Alumina refining	331311	1.9	4.1	2.1	1.6	–	2.1
Primary aluminum production	331312	8.6	3.1	1.8	.7	1.2	1.3
Secondary smelting and alloying of aluminum	331314	5.1	6.1	3.2	1.0	2.3	2.8
Aluminum sheet, plate, and foil manufacturing	331315	14.7	2.8	1.5	.8	.7	1.3
Aluminum extruded product manufacturing	331316	18.5	5.4	3.1	1.3	1.8	2.3
Other aluminum rolling and drawing	331319	6.3	4.3	2.5	.9	1.5	1.9
Nonferrous metal (except aluminum) production and processing	3314	59.9	4.7	2.7	1.5	1.2	1.9
Nonferrous metal (except aluminum) smelting and refining	33141	9.7	3.3	2.2	.6	1.6	1.1
Copper rolling, drawing, extruding, and alloying	33142	27.2	4.9	2.9	1.7	1.2	2.1
Copper rolling, drawing, and extruding	331421	13.5	6.5	3.9	2.4	1.5	2.6
Copper wire (except mechanical) drawing	331422	12.9	3.4	1.9	1.0	1.0	1.4
Nonferrous metal (except copper and aluminum) rolling, drawing, extruding, and alloying	33149	23.0	5.0	2.8	1.7	1.1	2.2
Nonferrous metal (except copper and aluminum) rolling, drawing, and extruding	331491	13.0	3.9	2.1	1.3	.8	1.8
Secondary smelting, refining, and alloying of nonferrous metal (except copper and aluminum)	331492	10.0	6.2	3.6	2.1	1.5	2.6
Foundries	3315	117.4	9.6	5.4	2.8	2.7	4.2
Ferrous metal foundries	33151	67.8	10.7	6.2	3.1	3.1	4.5
Iron foundries	331511	39.8	10.9	6.0	3.2	2.7	4.9
Steel investment foundries	331512	11.0	7.3	4.7	2.7	2.1	2.5
Steel foundries (except investment)	331513	17.0	12.7	7.8	3.1	4.7	4.9
Nonferrous metal foundries	33152	49.6	8.1	4.3	2.3	2.0	3.8
Aluminum die-casting foundries	331521	17.7	7.8	4.2	2.3	1.9	3.6
Aluminum foundries (except die-casting)	331524	15.9	9.5	6.0	3.1	2.9	3.5
Copper foundries (except die-casting)	331525	5.0	10.3	4.8	2.3	2.5	5.5
Other nonferrous foundries (except die-casting)	331528	6.5	4.2	1.8	1.2	.6	2.4
Fabricated metal product manufacturing	332	1,312.3	5.6	2.6	1.3	1.3	3.0
Forging and stamping	3321	91.8	7.0	3.4	1.6	1.7	3.6
Forging and stamping	33211	91.8	7.0	3.4	1.6	1.7	3.6
Iron and steel forging	332111	22.2	7.4	4.1	1.9	2.1	3.3
Nonferrous forging	332112	5.8	6.5	3.7	1.7	2.0	2.8
Custom roll forming	332114	5.1	5.9	3.2	1.2	2.0	2.7
Metal stamping	332116	44.1	7.4	3.0	1.6	1.4	4.4

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Cutlery and handtool manufacturing	3322	40.5	5.2	2.2	1.1	1.0	3.0
Cutlery and handtool manufacturing	33221	40.5	5.2	2.2	1.1	1.0	3.0
Cutlery and flatware (except precious) manufacturing	332211	6.5	4.1	1.6	.9	.7	2.5
Hand and edge tool manufacturing	332212	26.1	4.9	2.1	1.0	1.1	2.9
Saw blade and handsaw manufacturing	332213	4.9	7.0	2.8	1.6	1.3	4.2
Architectural and structural metals manufacturing	3323	325.5	6.8	3.2	1.6	1.7	3.6
Plate work and fabricated structural product manufacturing	33231	147.5	7.3	3.5	1.7	1.8	3.8
Prefabricated metal building and component manufacturing	332311	26.3	6.0	3.1	1.8	1.3	2.9
Fabricated structural metal manufacturing	332312	77.3	6.9	3.5	1.7	1.9	3.4
Plate work manufacturing	332313	43.9	8.6	3.5	1.7	1.8	5.1
Ornamental and architectural metal products manufacturing	33232	178.0	6.4	3.0	1.4	1.6	3.4
Metal window and door manufacturing	332321	52.8	5.7	3.1	1.1	2.0	2.6
Sheet metal work manufacturing	332322	93.3	6.1	2.4	1.3	1.1	3.7
Ornamental and architectural metal work manufacturing	332323	31.9	8.4	4.5	2.3	2.2	3.8
Boiler, tank, and shipping container manufacturing	3324	86.4	6.1	2.7	1.4	1.2	3.4
Metal tank (heavy gauge) manufacturing	33242	28.3	9.3	3.9	2.2	1.7	5.4
Metal can, box, and other metal container (light gauge) manufacturing	33243	35.8	5.3	2.4	1.2	1.2	2.9
Metal can manufacturing	332431	20.5	4.0	1.7	.9	.8	2.3
Other metal container manufacturing	332439	15.3	7.2	3.4	1.6	1.8	3.8
Hardware manufacturing	3325	23.5	4.3	2.5	1.1	1.4	1.8
Spring and wire product manufacturing	3326	41.3	5.1	2.7	1.3	1.4	2.4
Spring and wire product manufacturing	33261	41.3	5.1	2.7	1.3	1.4	2.4
Spring (light gauge) manufacturing	332612	9.0	7.0	2.9	.9	2.0	4.1
Other fabricated wire product manufacturing	332618	27.6	4.5	2.5	1.4	1.1	2.0
Machine shops; turned product; and screw, nut, and bolt manufacturing	3327	327.1	5.2	2.2	1.3	.8	3.0
Machine shops	33271	255.1	5.0	2.0	1.2	.7	3.0
Turned product and screw, nut, and bolt manufacturing	33272	72.0	5.8	2.8	1.6	1.2	2.9
Precision turned product manufacturing	332721	36.9	7.3	3.7	2.2	1.5	3.6
Bolt, nut, screw, rivet, and washer manufacturing	332722	35.0	4.2	1.9	1.0	.9	2.3
Coating, engraving, heat treating, and allied activities	3328	126.5	5.4	2.9	1.3	1.6	2.6
Coating, engraving, heat treating, and allied activities	33281	126.5	5.4	2.9	1.3	1.6	2.6
Metal heat treating	332811	16.8	5.9	3.8	1.4	2.4	2.1
Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers	332812	50.7	5.4	2.7	1.2	1.5	2.6
Electroplating, plating, polishing, anodizing, and coloring	332813	59.0	5.4	2.7	1.4	1.4	2.6
Other fabricated metal product manufacturing	3329	249.8	4.4	2.1	1.0	1.1	2.3
Metal valve manufacturing	33291	80.8	3.8	1.6	.8	.8	2.2
Industrial valve manufacturing	332911	23.8	3.6	1.4	.7	.7	2.2
Fluid power valve and hose fitting manufacturing	332912	31.1	3.6	1.9	.8	1.1	1.6
Plumbing fixture fitting and trim manufacturing	332913	9.6	2.7	1.0	.4	.6	1.7
Other metal valve and pipe fitting manufacturing	332919	16.3	5.2	1.5	.8	.7	3.7

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
All other fabricated metal product manufacturing	33299	169.0	4.7	2.3	1.1	1.2	2.3
Ball and roller bearing manufacturing	332991	27.7	4.1	2.0	.9	1.1	2.1
Small arms ammunition manufacturing	332992	10.5	3.0	1.8	1.0	.8	1.2
Ammunition (except small arms) manufacturing	332993	16.1	1.3	.6	.2	.4	.7
Small arms manufacturing	332994	11.2	5.2	2.8	1.4	1.3	2.5
Fabricated pipe and pipe fitting manufacturing	332996	28.8	4.0	2.2	1.0	1.2	1.7
Enameled iron and metal sanitary ware manufacturing	332998	10.4	5.6	2.0	.5	1.4	3.6
All other miscellaneous fabricated metal product manufacturing	332999	52.7	6.2	2.9	1.6	1.4	3.3
Machinery manufacturing[8]	333	1,015.6	4.4	2.0	1.0	1.0	2.3
Agriculture, construction, and mining machinery manufacturing	3331	210.0	4.4	2.1	1.1	1.0	2.3
Agricultural implement manufacturing	33311	73.6	5.9	2.8	1.5	1.3	3.1
Farm machinery and equipment manufacturing	333111	57.2	6.3	3.1	1.8	1.4	3.1
Lawn and garden tractor and home lawn and garden equipment manufacturing	333112	16.4	4.7	1.8	.7	1.1	2.9
Construction machinery manufacturing	33312	65.0	4.3	2.1	1.0	1.1	2.2
Mining and oil and gas field machinery manufacturing	33313	71.4	3.0	1.3	.7	.6	1.7
Mining machinery and equipment manufacturing	333131	11.1	5.7	1.9	1.1	.8	3.8
Oil and gas field machinery and equipment manufacturing	333132	60.2	2.6	1.2	.7	.6	1.3
Industrial machinery manufacturing[8]	3332	99.3	4.3	1.8	1.2	.7	2.4
Sawmill and woodworking machinery manufacturing	33321	4.7	7.1	3.2	1.6	1.6	3.9
Plastics and rubber industry machinery manufacturing	33322	14.6	5.4	2.7	1.7	1.0	2.7
Other industrial machinery manufacturing[8]	33329	80.0	3.9	1.6	1.0	.6	2.3
Paper industry machinery manufacturing	333291	8.3	4.7	1.7	1.1	.6	3.0
Printing machinery and equipment manufacturing	333293	9.8	3.7	1.8	1.4	.4	1.9
Food product machinery manufacturing	333294	16.2	5.9	2.0	1.1	.8	4.0
Semiconductor machinery manufacturing	333295	14.9	1.0	.8	.4	.4	.2
All other industrial machinery manufacturing[8]	333298	26.3	3.8	1.5	1.0	.6	2.3
Commercial and service industry machinery manufacturing	3333	90.3	3.2	1.6	.7	.9	1.6
Commercial and service industry machinery manufacturing	33331	90.3	3.2	1.6	.7	.9	1.6
Automatic vending machine manufacturing	333311	6.9	3.1	1.6	.7	.9	1.5
Commercial laundry, drycleaning, and pressing machine manufacturing	333312	3.4	6.3	3.3	.8	2.5	3.0
Office machinery manufacturing	333313	5.8	2.3	.9	.8	–	1.4
Optical instrument and lens manufacturing	333314	20.9	1.9	1.3	.8	.5	.6
Photographic and photocopying equipment manufacturing	333315	9.2	2.2	1.1	.6	.5	1.1
Other commercial and service industry machinery manufacturing	333319	44.0	3.9	1.9	.7	1.2	2.0
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing[8]	3334	128.7	4.7	2.5	1.0	1.5	2.2
Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing[8]	33341	128.7	4.7	2.5	1.0	1.5	2.2
Air purification equipment manufacturing	333411	16.6	4.7	2.6	1.0	1.6	2.1

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Heating equipment (except warm air furnaces) manufacturing	333414	17.0	4.9	2.4	1.2	1.3	2.4
Air-conditioning and warm air heating equipment and commercial and industrial refrigeration equipment manufacturing[8]	333415	85.0	4.3	2.3	.9	1.4	2.0
Metalworking machinery manufacturing	3335	160.8	5.3	2.3	1.3	.9	3.0
Metalworking machinery manufacturing	33351	160.8	5.3	2.3	1.3	.9	3.0
Industrial mold manufacturing	333511	33.1	5.9	2.4	1.4	.9	3.5
Machine tool (metal cutting types) manufacturing	333512	23.8	4.1	1.8	1.1	.7	2.3
Machine tool (metal forming types) manufacturing	333513	10.8	4.8	2.8	2.0	.8	1.9
Special die and tool, die set, jig, and fixture manufacturing	333514	59.6	5.5	2.5	1.3	1.2	3.0
Cutting tool and machine tool accessory manufacturing	333515	22.3	4.9	2.0	1.2	.9	2.9
Other metalworking machinery manufacturing	333518	6.9	5.0	.9	.3	.6	4.1
Engine, turbine, and power transmission equipment manufacturing	3336	93.6	3.8	1.8	.9	1.0	2.0
Engine, turbine, and power transmission equipment manufacturing	33361	93.6	3.8	1.8	.9	1.0	2.0
Turbine and turbine generator set units manufacturing	333611	27.5	3.3	1.8	.7	1.1	1.5
Speed changer, industrial high-speed drive, and gear manufacturing	333612	12.6	6.6	3.6	1.7	1.9	3.1
Mechanical power transmission equipment manufacturing	333613	12.9	5.8	2.2	1.4	.8	3.6
Other engine equipment manufacturing	333618	40.6	2.7	1.2	.6	.6	1.5
Other general purpose machinery manufacturing[8]	3339	232.9	4.2	1.9	.9	1.0	2.3
Pump and compressor manufacturing	33391	47.6	3.6	1.8	.7	1.1	1.7
Pump and pumping equipment manufacturing	333911	26.2	3.3	1.8	.7	1.2	1.5
Air and gas compressor manufacturing	333912	18.7	3.8	1.8	.8	1.0	2.0
Measuring and dispensing pump manufacturing	333913	2.7	4.1	2.0	–	1.7	2.1
Material handling equipment manufacturing	33392	64.2	5.2	2.3	1.1	1.2	2.9
Elevator and moving stairway manufacturing	333921	7.8	4.9	2.8	1.0	1.8	2.1
Conveyor and conveying equipment manufacturing	333922	26.2	5.1	1.9	1.0	.9	3.3
Overhead traveling crane, hoist, and monorail system manufacturing	333923	11.8	6.6	3.0	1.4	1.6	3.6
Industrial truck, tractor, trailer, and stacker machinery manufacturing	333924	18.5	4.6	2.3	1.0	1.3	2.3
All other general purpose machinery manufacturing[8]	33399	121.1	3.9	1.7	.8	.9	2.2
Power-driven handtool manufacturing	333991	7.5	2.5	1.4	.5	.9	1.1
Welding and soldering equipment manufacturing	333992	12.5	7.3	2.1	1.4	.6	5.3
Packaging machinery manufacturing	333993	17.0	4.7	2.5	1.0	1.5	2.2
Industrial process furnace and oven manufacturing[8]	333994	10.5	4.6	1.6	.6	1.0	3.0
Fluid power cylinder and actuator manufacturing	333995	15.3	5.1	2.4	.9	1.5	2.7
Fluid power pump and motor manufacturing	333996	17.0	2.4	.9	.4	.5	1.4
Scale and balance manufacturing[8]	333997	4.0	2.5	1.4	.6	.7	1.1
All other miscellaneous general purpose machinery manufacturing[8]	333999	37.4	2.9	1.5	.8	.6	1.4
Computer and electronic product manufacturing	334	1,091.4	1.4	.7	.4	.3	.7
Computer and peripheral equipment manufacturing	3341	159.6	.7	.4	.2	.2	.3

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Computer and peripheral equipment manufacturing	33411	159.6	0.7	0.4	0.2	0.2	0.3
Electronic computer manufacturing	334111	89.8	.6	.3	.2	.2	.2
Computer storage device manufacturing	334112	21.3	.9	.5	.3	.2	.4
Computer terminal manufacturing	334113	13.5	.3	.2	.1	–	–
Other computer peripheral equipment manufacturing	334119	35.0	1.0	.5	.3	.2	.6
Communications equipment manufacturing[8]	3342	113.7	1.3	.7	.3	.4	.6
Telephone apparatus manufacturing	33421	24.6	.5	.1	–	–	.4
Radio and television broadcasting and wireless communications equipment manufacturing[8]	33422	66.1	1.6	1.0	.4	.6	.7
Other communications equipment manufacturing	33429	23.0	1.1	.6	.3	.2	.6
Audio and video equipment manufacturing	3343	19.5	2.1	1.4	.4	1.0	.7
Semiconductor and other electronic component manufacturing	3344	371.6	1.6	.8	.5	.4	.8
Semiconductor and other electronic component manufacturing	33441	371.6	1.6	.8	.5	.4	.8
Electron tube manufacturing	334411	6.6	1.9	1.5	1.1	.4	.4
Bare printed circuit board manufacturing	334412	36.5	2.4	1.3	.6	.7	1.0
Semiconductor and related device manufacturing	334413	181.3	1.1	.6	.4	.2	.6
Electronic coil, transformer, and other inductor manufacturing	334416	9.1	3.2	1.9	1.0	.8	1.4
Electronic connector manufacturing	334417	18.7	2.8	1.2	.6	.6	1.5
Printed circuit assembly (electronic assembly) manufacturing	334418	50.3	1.6	.7	.3	.3	.9
Other electronic component manufacturing	334419	59.3	2.0	1.0	.5	.5	1.0
Navigational, measuring, electromedical, and control instruments manufacturing[8]	3345	403.1	1.5	.6	.4	.3	.8
Navigational, measuring, electromedical, and control instruments manufacturing	33451	403.1	1.5	.6	.4	.3	.8
Electromedical and electrotherapeutic apparatus manufacturing[8]	334510	62.1	1.9	.9	.5	.4	1.0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing	334511	136.6	1.1	.5	.3	.2	.6
Automatic environmental control manufacturing for residential, commercial, and appliance use	334512	17.3	2.3	1.0	.3	.7	1.3
Instruments and related products manufacturing for measuring, displaying, and controlling industrial process variables	334513	57.4	1.5	.7	.4	.3	.8
Totalizing fluid meter and counting device manufacturing	334514	11.0	2.4	1.2	.6	.6	1.2
Instrument manufacturing for measuring and testing electricity and electrical signals[8]	334515	41.6	1.3	.6	.3	.3	.7
Analytical laboratory instrument manufacturing	334516	30.8	1.5	.7	.6	.1	.8
Irradiation apparatus manufacturing	334517	13.3	1.5	.6	.3	.3	.9
Other measuring and controlling device manufacturing	334519	28.1	1.5	.6	.4	.2	.9
Manufacturing and reproducing magnetic and optical media	3346	23.8	1.5	.9	.4	.6	.5
Manufacturing and reproducing magnetic and optical media	33461	23.8	1.5	.9	.4	.6	.5
Prerecorded compact disc (except software), tape, and record reproducing	334612	8.5	2.6	2.0	.9	1.1	.6

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Magnetic and optical recording media manufacturing	334613	4.1	1.4	1.0	–	1.0	–
Electrical equipment, appliance, and component manufacturing	335	366.9	3.1	1.6	.6	1.0	1.5
Electric lighting equipment manufacturing	3351	45.1	3.7	1.9	.8	1.1	1.8
Lighting fixture manufacturing	33512	35.9	3.7	1.9	.7	1.2	1.8
Commercial, industrial, and institutional electric lighting fixture manufacturing	335122	19.0	4.4	2.2	.9	1.3	2.2
Other lighting equipment manufacturing	335129	8.7	3.1	1.7	.5	1.1	1.5
Household appliance manufacturing	3352	57.5	2.9	1.6	.6	1.0	1.3
Small electrical appliance manufacturing	33521	12.1	3.7	2.1	.9	1.2	1.6
Electric housewares and household fan manufacturing	335211	9.0	3.9	2.3	.8	1.5	1.5
Major appliance manufacturing	33522	45.4	2.7	1.5	.5	.9	1.2
Household cooking appliance manufacturing	335221	10.4	2.9	1.5	.9	.7	1.4
Other major household appliance manufacturing	335228	–	3.5	1.9	.7	1.2	1.6
Electrical equipment manufacturing	3353	138.9	2.9	1.5	.6	.9	1.4
Electrical equipment manufacturing	33531	138.9	2.9	1.5	.6	.9	1.4
Power, distribution, and specialty transformer manufacturing	335311	24.1	5.2	2.8	1.3	1.6	2.4
Motor and generator manufacturing	335312	39.1	3.8	1.9	.8	1.2	1.9
Switchgear and switchboard apparatus manufacturing	335313	30.7	2.6	1.3	.5	.9	1.3
Relay and industrial control manufacturing	335314	45.0	1.1	.5	.2	.3	.6
Other electrical equipment and component manufacturing	3359	125.3	3.1	1.7	.7	1.0	1.4
Battery manufacturing	33591	24.8	4.3	2.6	.9	1.7	1.7
Storage battery manufacturing	335911	13.7	4.3	2.7	.8	1.9	1.6
Primary battery manufacturing	335912	11.2	4.3	2.4	.9	1.5	1.9
Communication and energy wire and cable manufacturing	33592	20.2	2.5	1.3	.6	.7	1.2
Fiber optic cable manufacturing	335921	8.1	1.5	1.1	.3	.8	.4
Other communication and energy wire manufacturing	335929	12.1	3.0	1.4	.7	.7	1.7
Wiring device manufacturing	33593	46.4	3.0	1.5	.5	1.0	1.5
Current-carrying wiring device manufacturing	335931	36.0	2.6	1.5	.5	1.0	1.1
Noncurrent-carrying wiring device manufacturing	335932	10.4	4.5	1.7	.8	.9	2.8
All other electrical equipment and component manufacturing	33599	33.9	2.8	1.4	.7	.7	1.3
Carbon and graphite product manufacturing	335991	7.1	3.5	2.2	1.1	1.1	1.3
All other miscellaneous electrical equipment and component manufacturing	335999	26.8	2.6	1.2	.6	.6	1.3
Transportation equipment manufacturing[8]	336	1,337.6	5.2	2.7	1.1	1.6	2.5
Motor vehicle manufacturing	3361	145.9	7.5	3.8	1.6	2.2	3.7
Automobile and light duty motor vehicle manufacturing	33611	121.4	7.5	3.9	1.6	2.3	3.6
Automobile manufacturing	336111	86.3	6.7	3.8	1.7	2.1	2.9
Light truck and utility vehicle manufacturing	336112	35.1	9.4	4.0	1.3	2.7	5.4
Heavy duty truck manufacturing	33612	24.5	7.3	3.3	1.5	1.9	4.0
Motor vehicle body and trailer manufacturing	3362	113.3	8.6	4.0	1.8	2.3	4.5
Motor vehicle body and trailer manufacturing	33621	113.3	8.6	4.0	1.8	2.3	4.5

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Motor vehicle body manufacturing	336211	48.0	6.7	3.5	1.4	2.1	3.2
Truck trailer manufacturing	336212	26.1	9.4	4.6	2.1	2.5	4.8
Travel trailer and camper manufacturing	336214	26.9	11.2	5.1	2.1	3.0	6.1
Motor vehicle parts manufacturing	3363	423.5	5.2	2.7	1.0	1.7	2.5
Motor vehicle gasoline engine and engine parts manufacturing	33631	48.7	5.0	2.7	1.3	1.5	2.2
Carburetor, piston, piston ring, and valve manufacturing	336311	13.4	4.8	2.5	1.0	1.5	2.3
Gasoline engine and engine parts manufacturing	336312	35.3	5.1	2.8	1.4	1.5	2.2
Motor vehicle electrical and electronic equipment manufacturing	33632	53.2	4.1	2.3	.8	1.5	1.8
Vehicular lighting equipment manufacturing	336321	14.5	4.3	2.4	.6	1.8	1.9
Other motor vehicle electrical and electronic equipment manufacturing	336322	38.8	4.0	2.3	.8	1.5	1.7
Motor vehicle steering and suspension components (except spring) manufacturing	33633	26.8	5.6	3.0	1.1	1.9	2.5
Motor vehicle brake system manufacturing	33634	21.8	4.0	2.2	.7	1.4	1.8
Motor vehicle transmission and power train parts manufacturing	33635	55.2	4.9	2.3	1.0	1.4	2.5
Motor vehicle seating and interior trim manufacturing	33636	43.4	5.5	3.5	.8	2.7	2.1
Motor vehicle metal stamping	33637	59.2	7.4	3.1	1.1	2.0	4.3
Other motor vehicle parts manufacturing	33639	115.1	4.9	2.6	1.0	1.5	2.4
Motor vehicle air-conditioning manufacturing	336391	12.0	4.0	2.2	1.0	1.1	1.8
All other motor vehicle parts manufacturing	336399	103.1	5.0	2.6	1.0	1.6	2.4
Aerospace product and parts manufacturing	3364	480.6	3.3	1.8	.6	1.2	1.5
Aerospace product and parts manufacturing	33641	480.6	3.3	1.8	.6	1.2	1.5
Aircraft manufacturing	336411	233.8	3.8	2.4	.8	1.6	1.4
Aircraft engine and engine parts manufacturing	336412	76.0	2.5	1.1	.6	.5	1.4
Other aircraft parts and auxiliary equipment manufacturing	336413	96.7	4.5	2.0	.7	1.2	2.6
Guided missile and space vehicle manufacturing	336414	54.5	.8	.5	.2	.2	.4
Guided missile and space vehicle propulsion unit and propulsion unit parts manufacturing	336415	11.7	1.5	.8	.5	.3	.7
Other guided missile and space vehicle parts and auxiliary equipment manufacturing	336419	7.9	1.5	.9	.4	.5	.6
Railroad rolling stock manufacturing	3365	19.0	4.8	2.6	1.1	1.5	2.2
Ship and boat building[8]	3366	122.9	7.5	4.5	2.5	2.0	3.0
Ship and boat building[8]	33661	122.9	7.5	4.5	2.5	2.0	3.0
Ship building and repairing	336611	95.5	7.8	4.8	2.7	2.1	3.0
Boat building[8]	336612	27.4	6.4	3.3	1.6	1.7	3.1
Other transportation equipment manufacturing	3369	32.4	4.2	2.0	.9	1.0	2.3
Other transportation equipment manufacturing	33699	32.4	4.2	2.0	.9	1.0	2.3
Motorcycle, bicycle, and parts manufacturing	336991	12.2	4.2	1.9	1.1	.8	2.3
Military armored vehicle, tank, and tank component manufacturing	336992	8.9	3.4	1.9	.9	1.0	1.5
All other transportation equipment manufacturing	336999	11.3	5.0	2.1	.8	1.4	2.8
Furniture and related product manufacturing[8]	337	353.9	5.3	2.7	1.3	1.5	2.6

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Household and institutional furniture and kitchen cabinet manufacturing[8]	3371	220.8	5.5	2.9	1.3	1.5	2.7
Wood kitchen cabinet and countertop manufacturing	33711	97.9	4.2	2.2	1.2	1.0	2.0
Household and institutional furniture manufacturing[8]	33712	122.9	6.5	3.4	1.4	1.9	3.1
Upholstered household furniture manufacturing	337121	51.0	6.2	3.4	1.2	2.1	2.8
Nonupholstered wood household furniture manufacturing	337122	38.0	6.2	2.9	1.4	1.5	3.4
Metal household furniture manufacturing	337124	5.7	6.3	2.2	1.7	.5	4.0
Household furniture (except wood and metal) manufacturing	337125	5.2	4.6	3.0	1.6	1.3	1.6
Institutional furniture manufacturing[8]	337127	21.4	8.5	4.8	1.8	3.0	3.7
Wood television, radio, and sewing machine cabinet manufacturing	337129	1.7	–	–	–	–	–
Office furniture (including fixtures) manufacturing	3372	97.0	5.2	2.4	1.2	1.2	2.7
Office furniture (including fixtures) manufacturing	33721	97.0	5.2	2.4	1.2	1.2	2.7
Wood office furniture manufacturing	337211	16.8	4.2	2.1	.9	1.2	2.1
Custom architectural woodwork and millwork manufacturing	337212	15.2	5.6	1.8	1.6	.2	3.8
Office furniture (except wood) manufacturing	337214	20.6	3.9	2.1	.7	1.4	1.8
Showcase, partition, shelving, and locker manufacturing	337215	44.4	6.0	3.0	1.5	1.5	3.1
Other furniture related product manufacturing	3379	36.1	4.6	2.6	.9	1.7	2.0
Mattress manufacturing	33791	23.4	5.6	3.2	1.1	2.1	2.4
Miscellaneous manufacturing	339	575.8	3.3	1.7	.8	.9	1.5
Medical equipment and supplies manufacturing	3391	309.5	2.5	1.3	.6	.7	1.2
Medical equipment and supplies manufacturing	33911	309.5	2.5	1.3	.6	.7	1.2
Surgical and medical instrument manufacturing	339112	115.8	2.3	1.2	.6	.6	1.1
Surgical appliance and supplies manufacturing[8]	339113	102.3	2.7	1.5	.6	.9	1.2
Dental equipment and supplies manufacturing	339114	15.9	4.2	1.3	.6	.7	2.9
Ophthalmic goods manufacturing	339115	30.4	2.5	1.3	.5	.8	1.2
Dental laboratories	339116	45.1	2.1	1.2	.7	.4	.9
Other miscellaneous manufacturing	3399	266.3	4.2	2.2	1.1	1.1	1.9
Jewelry and silverware manufacturing	33991	29.4	2.8	1.5	1.1	.4	1.3
Jewelry (except costume) manufacturing	339911	21.1	2.5	1.4	1.0	.4	1.0
Jewelers' material and lapidary work manufacturing	339913	2.3	2.9	1.7	1.1	–	1.2
Sporting and athletic goods manufacturing	33992	41.5	4.3	2.0	.7	1.4	2.3
Doll, toy, and game manufacturing	33993	12.0	4.0	2.0	1.0	1.0	2.0
Pen and mechanical pencil manufacturing	339941	3.2	2.6	.5	–	–	2.0
Sign manufacturing	33995	63.0	4.6	2.2	1.3	.9	2.4
All other miscellaneous manufacturing	33999	107.2	4.4	2.6	1.2	1.4	1.7
Gasket, packing, and sealing device manufacturing	339991	28.2	4.2	2.5	.9	1.5	1.7
Musical instrument manufacturing	339992	10.4	5.6	3.2	1.4	1.8	2.4
Fastener, button, needle, and pin manufacturing	339993	5.1	3.7	3.5	1.5	–	–
Burial casket manufacturing	339995	4.3	9.0	4.2	2.9	1.3	4.8
All other miscellaneous manufacturing	339999	50.3	3.9	2.5	1.3	1.2	1.5
Service providing		88,805.3	3.3	1.6	1.0	.6	1.6

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Trade, transportation, and utilities[10]		24,924.6	3.9	2.3	1.3	1.0	1.6
Wholesale trade	42	5,580.0	3.2	1.9	1.1	.9	1.3
Merchant wholesalers, durable goods	423	2,762.9	2.8	1.5	.9	.7	1.3
Motor vehicle and motor vehicle parts and supplies merchant wholesalers	4231	313.8	4.2	2.0	1.0	1.0	2.2
Furniture and home furnishing merchant wholesalers	4232	93.0	2.7	1.4	.7	.6	1.3
Lumber and other construction materials merchant wholesalers	4233	186.8	3.9	2.5	–	1.0	1.4
Professional and commercial equipment and supplies merchant wholesalers	4234	611.1	1.4	.8	.4	.3	.6
Metal and mineral (except petroleum) merchant wholesalers	4235	115.0	4.3	2.5	1.6	.9	1.9
Electrical goods merchant wholesalers	4236	314.8	1.7	1.0	.5	.5	.7
Hardware, and plumbing and heating equipment and supplies merchant wholesalers	4237	220.8	3.3	1.7	.9	.8	–
Machinery, equipment, and supplies merchant wholesalers	4238	618.9	3.1	1.6	.9	.6	1.5
Miscellaneous durable goods merchant wholesalers	4239	288.6	3.4	2.1	1.1	1.0	1.3
Toy and hobby goods and supplies merchant wholesalers	42392	20.9	1.7	1.2	.5	.8	.4
Recyclable material merchant wholesalers	42393	113.1	5.8	3.5	2.0	1.5	2.3
Jewelry, watch, precious stone, and precious metal merchant wholesalers	42394	42.0	.5	.3	.1	.1	.2
Other miscellaneous durable goods merchant wholesalers	42399	67.3	1.7	1.1	.5	.5	.6
Merchant wholesalers, nondurable goods	424	1,960.9	4.4	2.9	1.6	1.3	1.5
Paper and paper product merchant wholesalers	4241	124.0	2.4	1.4	.8	.6	1.0
Drugs and druggists' sundries merchant wholesalers	4242	195.2	2.1	1.3	.7	.6	.8
Apparel, piece goods, and notions merchant wholesalers	4243	135.3	2.0	1.3	.7	.6	.7
Grocery and related product merchant wholesalers	4244	717.9	5.8	4.1	2.2	1.9	1.6
Farm product raw material merchant wholesalers	4245	74.5	4.9	2.3	1.7	.6	2.6
Chemical and allied products merchant wholesalers	4246	123.8	2.9	1.4	.9	.5	1.5
Petroleum and petroleum products merchant wholesalers	4247	94.1	2.6	1.3	1.0	.3	1.2
Beer, wine, and distilled alcoholic beverage merchant wholesalers	4248	164.3	7.3	5.1	2.7	2.4	2.2
Miscellaneous nondurable goods merchant wholesalers	4249	331.8	3.9	2.4	1.3	1.1	1.5
Wholesale electronic markets and agents and brokers	425	856.3	1.9	1.0	.6	–	.9
Retail trade	44-45	14,773.9	3.9	2.2	1.2	1.0	1.7
Motor vehicle and parts dealers	441	1,680.1	3.9	1.9	1.3	.6	2.0
Automobile dealers	4411	1,043.0	3.7	1.5	1.1	.4	2.2
New car dealers	44111	921.1	3.9	1.6	1.2	.4	2.3
Used car dealers	44112	121.9	2.0	1.0	.7	.3	1.0
Other motor vehicle dealers	4412	127.9	3.1	1.6	1.1	.5	1.5
Recreational vehicle dealers	44121	28.9	3.6	1.5	.7	.8	2.2

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Motorcycle, boat, and other motor vehicle dealers	44122	99.0	2.9	1.6	1.2	0.4	1.3
Automotive parts, accessories, and tire stores	4413	509.2	4.5	2.9	1.9	1.0	1.6
Automotive parts and accessories stores	44131	339.6	3.7	2.8	1.6	1.1	.9
Tire dealers	44132	169.6	6.0	3.2	2.3	.9	2.8
Furniture and home furnishings stores	442	442.7	4.0	2.4	1.5	.9	1.5
Furniture stores	4421	217.5	3.7	2.4	1.2	1.2	1.2
Home furnishings stores	4422	225.3	4.3	2.4	1.9	.5	1.9
Floor covering stores	44221	66.5	2.2	1.7	1.4	.3	.6
Other home furnishings stores	44229	158.7	5.5	2.9	2.2	.6	2.7
Electronics and appliance stores	443	517.9	2.1	.8	.5	.3	1.3
Electronics and appliance stores	4431	517.9	2.1	.8	.5	.3	1.3
Appliance, television, and other electronics stores	44311	400.5	2.4	.8	.5	.4	1.6
Computer and software stores	44312	107.8	1.0	.7	.5	.2	.3
Building material and garden equipment and supplies dealers	444	1,156.9	5.4	3.5	1.7	1.8	1.9
Building material and supplies dealers	4441	1,025.0	5.5	3.6	1.7	1.9	1.9
Home centers	44411	635.3	6.5	4.5	2.0	2.5	2.0
Paint and wallpaper stores	44412	34.8	2.5	1.6	–	.3	.9
Hardware stores	44413	146.7	3.0	1.7	1.0	.7	1.3
Other building material dealers	44419	208.3	4.3	2.2	1.3	1.0	2.1
Lawn and garden equipment and supplies stores	4442	131.9	4.6	2.6	1.8	.8	2.0
Outdoor power equipment stores	44421	29.7	3.5	.7	.6	–	2.8
Nursery, garden center, and farm supply stores	44422	102.2	5.0	3.1	2.1	1.0	1.8
Food and beverage stores	445	2,859.7	4.7	2.7	1.4	1.2	2.0
Grocery stores	4451	2,499.7	5.0	2.9	1.5	1.3	2.1
Supermarkets and other grocery (except convenience) stores	44511	2,355.1	5.2	3.0	1.6	1.4	2.2
Convenience stores	44512	144.6	–	.9	.6	–	1.2
Specialty food stores	4452	219.0	2.8	1.6	1.0	.6	1.2
Meat markets	44521	48.2	3.1	2.0	.8	1.2	1.1
Fruit and vegetable markets	44523	39.3	3.0	1.7	1.4	.3	1.4
Other specialty food stores	44529	118.4	2.6	1.4	.9	.5	1.2
Beer, wine, and liquor stores	4453	141.1	1.6	.6	.4	.2	1.0
Health and personal care stores	446	999.3	2.2	.9	.6	.3	1.3
Health and personal care stores	4461	999.3	2.2	.9	.6	.3	1.3
Pharmacies and drug stores	44611	717.8	2.5	1.0	.6	.4	1.5
Cosmetics, beauty supplies, and perfume stores	44612	111.6	1.2	.4	.3	–	.8
Other health and personal care stores	44619	103.6	1.4	.9	.7	.2	.4
Gasoline stations	447	832.9	2.5	1.1	.7	.4	1.4
Gasoline stations	4471	832.9	2.5	1.1	.7	.4	1.4
Gasoline stations with convenience stores	44711	732.8	2.3	1.0	.7	.3	1.3
Other gasoline stations	44719	100.1	3.7	1.7	1.1	.7	2.0
Clothing and clothing accessories stores	448	1,424.1	2.6	.9	.7	.3	1.6

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Clothing stores	4481	1,098.1	3.0	1.1	0.8	0.3	1.8
Men's clothing stores	44811	56.9	3.1	1.8	1.5	.3	1.3
Women's clothing stores	44812	289.5	–	.9	.6	.4	–
Children's and infants' clothing stores	44813	74.2	2.9	1.1	1.1	–	1.8
Family clothing stores	44814	502.1	3.5	1.4	.9	.5	2.1
Other clothing stores	44819	116.6	1.7	1.0	1.0	([11])	.7
Shoe stores	4482	188.8	2.0	.5	.4	–	1.4
Luggage and leather goods stores	44832	14.1	1.8	.3	.3	–	1.4
Sporting goods, hobby, book, and music stores	451	595.0	2.6	1.2	.6	.6	1.3
Sporting goods, hobby, and musical instrument stores	4511	474.0	2.4	1.1	.6	.5	1.3
Sporting goods stores	45111	244.4	2.4	1.4	.8	.6	1.0
Hobby, toy, and game stores	45112	154.9	2.9	1.0	.4	.5	1.9
Sewing, needlework, and piece goods stores	45113	44.4	2.3	.9	.7	–	1.4
Musical instrument and supplies stores	45114	30.4	1.1	.2	–	.1	.9
Book, periodical, and music stores	4512	121.0	3.0	1.4	.7	.7	1.5
Book stores and news dealers	45121	101.0	3.4	1.6	.7	.9	1.8
General merchandise stores	452	3,050.1	4.6	3.0	1.3	1.7	1.7
Department stores	4521	1,534.2	3.8	2.4	1.2	1.3	1.4
Other general merchandise stores	4529	1,515.9	5.3	3.5	1.4	2.1	1.9
Warehouse clubs and superstores	45291	1,154.3	5.4	3.6	1.3	2.3	1.8
All other general merchandise stores	45299	361.6	4.9	2.8	1.4	1.4	2.1
Miscellaneous store retailers	453	795.1	4.0	1.6	.9	.7	2.4
Office supplies, stationery, and gift stores	4532	315.4	2.0	.9	.5	.4	1.1
Office supplies and stationery stores	45321	147.3	2.3	1.0	.4	.5	1.4
Gift, novelty, and souvenir stores	45322	168.0	1.7	.9	.5	.3	.8
Used merchandise stores	4533	131.7	5.9	3.1	1.0	2.1	2.8
Other miscellaneous store retailers	4539	281.0	5.5	1.8	–	.5	3.7
Pet and pet supplies stores	45391	101.7	10.3	2.4	1.3	1.1	7.8
Manufactured (mobile) home dealers	45393	13.6	8.4	6.8	6.8	–	1.7
All other miscellaneous store retailers	45399	148.7	–	.9	.6	.3	–
Nonstore retailers	454	420.1	2.9	1.7	1.1	.6	1.2
Mail-order houses	454113	140.1	2.2	1.3	.6	.8	.9
Vending machine operators	4542	38.1	3.7	2.2	1.0	1.2	1.5
Direct selling establishments	4543	135.4	4.3	2.4	2.0	.4	1.9
Fuel dealers	45431	80.8	5.2	2.9	2.5	.4	2.3
Other direct selling establishments	45439	54.6	2.9	1.6	1.1	.5	1.2

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Transportation and warehousing[10]	48-49	4,017.8	5.0	3.4	2.3	1.1	1.6
Air transportation	481	450.5	7.3	5.5	4.3	1.2	1.8
Scheduled air transportation	4811	411.0	7.8	5.9	4.6	1.3	1.8
Scheduled air transportation	48111	411.0	7.8	5.9	4.6	1.3	1.8
Scheduled passenger air transportation	481111	399.2	7.9	6.1	4.8	1.3	1.8
Scheduled freight air transportation	481112	11.8	3.7	1.6	1.4	.2	2.2
Nonscheduled air transportation	4812	39.5	2.3	1.1	.9	.3	1.2
Rail transportation[10]	482	–	1.9	1.4	1.3	.1	.5
Water transportation	483	61.5	2.0	1.6	1.2	.3	.4
Deep sea, coastal, and Great Lakes water transportation	4831	37.6	2.1	1.6	1.3	.3	.5
Deep sea, coastal, and Great Lakes water transportation	48311	37.6	2.1	1.6	1.3	.3	.5
Deep sea passenger transportation	483112	8.4	1.8	1.4	.4	1.0	.4
Coastal and Great Lakes freight transportation	483113	10.2	2.6	2.2	2.0	.2	.5
Coastal and Great Lakes passenger transportation	483114	7.1	2.4	.8	–	.5	1.6
Inland water transportation	4832	23.9	1.9	1.5	1.2	.3	.3
Inland water transportation	48321	23.9	1.9	1.5	1.2	.3	.3
Inland water freight transportation	483211	19.7	1.8	1.5	1.2	.4	.3
Inland water passenger transportation	483212	4.3	2.1	1.5	1.3	–	–
Truck transportation	484	1,289.0	4.9	3.2	2.3	.9	1.7
General freight trucking	4841	893.2	4.9	3.2	2.3	.9	1.7
General freight trucking, local	48411	216.2	3.8	2.7	2.0	.7	1.1
General freight trucking, long-distance	48412	677.0	5.2	3.4	2.4	1.0	1.9
Specialized freight trucking	4842	395.8	5.0	3.2	2.4	.7	1.8
Used household and office goods moving	48421	85.3	8.1	4.4	2.7	1.7	–
Specialized freight (except used goods) trucking, local	48422	197.0	4.1	2.7	2.1	.5	1.5
Specialized freight (except used goods) trucking, long-distance	48423	113.5	4.6	3.3	2.8	.5	1.3
Transit and ground passenger transportation	485	425.7	4.7	2.9	2.1	.8	1.8
Urban transit systems	4851	42.0	6.8	4.8	3.4	1.4	2.0
Interurban and rural bus transportation	4852	18.1	6.6	4.1	2.8	1.3	2.5
Taxi and limousine service	4853	70.4	2.8	2.0	1.8	.3	.8
Taxi service	48531	32.7	3.9	2.7	2.3	.4	1.2
Limousine service	48532	37.6	1.8	1.4	1.3	.1	.4
School and employee bus transportation	4854	183.4	4.5	2.5	1.9	.6	2.0
Charter bus industry	4855	29.5	3.3	1.9	1.5	.3	1.4
Other transit and ground passenger transportation	4859	82.3	5.3	3.3	2.0	1.3	2.0

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Pipeline transportation	486	41.7	1.5	1.2	–	0.2	0.4
Pipeline transportation of natural gas	4862	26.6	2.3	1.7	–	.3	.6
Scenic and sightseeing transportation	487	28.1	3.5	2.1	1.7	.5	1.3
Scenic and sightseeing transportation, land	4871	11.3	2.6	2.4	1.9	–	.2
Scenic and sightseeing transportation, water	4872	14.3	4.5	2.2	1.9	.4	2.2
Support activities for transportation	488	560.5	3.8	2.5	1.6	.8	1.3
Support activities for air transportation	4881	158.0	4.1	2.4	1.2	1.3	1.7
Support activities for rail transportation	4882	23.2	4.1	2.7	1.2	1.6	1.4
Support activities for water transportation	4883	91.7	6.0	4.2	3.8	.4	1.8
Port and harbor operations	48831	18.1	5.6	4.4	4.4	–	1.2
Marine cargo handling	48832	44.5	8.3	5.8	5.1	.7	2.5
Navigational services to shipping	48833	19.1	2.7	1.8	1.6	.2	.9
Other support activities for water transportation	48839	10.0	6.3	3.9	3.1	.8	2.5
Support activities for road transportation	4884	85.0	3.7	2.2	1.6	.6	1.4
Motor vehicle towing	48841	51.5	4.4	2.9	2.1	.8	1.5
Other support activities for road transportation	48849	33.5	2.5	1.2	.8	.3	1.3
Freight transportation arrangement	4885	175.7	2.1	1.5	1.0	.6	.6
Other support activities for transportation	4889	27.0	5.5	3.5	1.6	1.9	2.0
Couriers and messengers	492	523.4	6.6	4.5	2.6	1.9	2.1
Couriers and express delivery services	4921	478.0	6.9	4.6	2.6	2.0	2.3
Local messengers and local delivery	4922	45.5	4.5	3.3	2.5	.8	1.2
Warehousing and storage	493	636.8	5.5	3.8	1.8	1.9	1.7
Warehousing and storage	4931	636.8	5.5	3.8	1.8	1.9	1.7
General warehousing and storage	49311	533.6	5.5	3.8	1.8	2.0	1.7
Refrigerated warehousing and storage	49312	48.6	6.4	4.6	2.6	2.0	1.8
Farm product warehousing and storage	49313	9.0	3.9	2.4	–	.8	1.4
Other warehousing and storage	49319	45.6	4.6	3.1	1.8	1.3	1.5
Utilities	22	552.9	3.5	1.9	1.0	.9	1.6
Utilities	221	552.9	3.5	1.9	1.0	.9	1.6
Electric power generation, transmission and distribution	2211	397.8	3.2	1.6	.9	.7	1.6
Electric power generation	22111	172.7	2.6	1.5	.8	.7	1.1
Fossil fuel electric power generation	221112	104.1	3.5	2.0	1.0	1.1	1.5
Nuclear electric power generation	221113	52.8	.4	.2	.1	.1	.3
Other electric power generation	221119	8.1	7.6	5.6	–	1.1	2.1
Electric power transmission, control, and distribution	22112	225.1	3.7	1.7	1.0	.6	2.0
Natural gas distribution	2212	107.7	4.0	2.5	.9	1.5	1.6

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Water, sewage and other systems	2213	47.3	5.2	3.3	2.3	1.1	1.9
Water supply and irrigation systems	22131	38.0	5.4	3.5	2.3	1.2	1.9
Sewage treatment facilities	22132	7.4	5.3	2.9	2.5	.5	2.3
Steam and air-conditioning supply	22133	1.9	2.7	1.3	–	–	–
Information		2,692.6	1.6	.9	.6	.3	.7
Information	51	2,692.6	1.6	.9	.6	.3	.7
Publishing industries (except Internet)	511	747.9	1.3	.7	.4	.2	.6
Newspaper, periodical, book, and directory publishers	5111	485.7	2.0	1.0	.7	.4	.9
Newspaper publishers	51111	247.1	2.6	1.4	.9	.5	1.2
Periodical publishers	51112	115.0	.7	.2	.2	–	.5
Book publishers	51113	71.0	1.3	.9	.5	.3	.5
Directory and mailing list publishers	51114	31.6	1.2	.4	.2	.1	.9
Other publishers	51119	21.0	2.0	1.1	.1	.9	.9
Software publishers	5112	262.1	.3	.1	.1	–	.2
Motion picture and sound recording industries	512	356.1	2.1	.6	.3	.2	1.5
Motion picture and video industries	5121	338.9	2.2	.6	.4	.2	1.6
Motion picture and video exhibition	51213	126.7	4.8	.9	.6	.3	3.9
Postproduction services and other motion picture and video industries	51219	19.3	.5	.3	–	.2	.2
Record production	51221	1.7	–	–	–	–	–
Other sound recording industries	51229	2.5	–	–	–	–	–
Broadcasting (except Internet)	515	293.9	1.9	1.2	.6	.5	.7
Radio and television broadcasting	5151	213.3	1.5	.7	.5	.2	.8
Radio broadcasting	51511	94.5	.8	.3	.3	.1	.4
Television broadcasting	51512	118.8	2.1	.9	.7	.3	1.1
Cable and other subscription programming	5152	80.6	–	2.4	1.0	1.4	.5
Telecommunications[8]	517	901.1	2.1	1.4	1.0	.4	.7
Wired telecommunications carriers[8]	5171	595.0	2.4	1.7	1.2	.5	.8
Wireless telecommunications carriers (except satellite)	5172	174.9	.9	.5	.3	.2	.3
Satellite telecommunications	5174	11.7	.2	.1	–	–	–
Other telecommunications[8]	5179	119.6	2.2	1.5	1.0	.5	.7
Data processing, hosting, and related services[8]	518	244.2	.6	.3	.2	.1	.4
Data processing, hosting, and related services	5182	244.2	.6	.3	.2	.1	.4
Other information services[8]	519	149.4	.6	.3	.2	.1	.3
Other information services[8]	5191	149.4	.6	.3	.2	.1	.3
News syndicates	51911	12.1	.4	–	–	–	.3
Libraries and archives	51912	27.9	1.8	1.1	.7	–	.7
Internet publishing and broadcasting and web search portals[12]	51913	98.5	.4	.2	.1	.1	.2
All other information services	51919	10.9	1.2	.3	.3	–	1.0

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Financial activities		7,505.6	1.4	0.6	0.4	0.2	0.7
Finance and insurance	52	5,543.4	.8	.3	.2	.1	.6
Monetary authorities - central bank	521	20.9	1.0	.4	.3	–	.6
Credit intermediation and related activities	522	2,549.2	1.1	.3	.3	.1	.7
Depository credit intermediation	5221	1,736.3	1.2	.4	.3	.1	.8
Commercial banking	52211	1,307.9	1.2	.4	–	.1	.8
Savings institutions	52212	183.2	–	.6	.4	.2	.7
Credit unions	52213	230.1	–	.4	.4	([11])	–
Other depository credit intermediation	52219	15.1	.2	–	–	–	.1
Nondepository credit intermediation	5222	558.0	.6	.2	.1	([11])	.4
Credit card issuing	52221	100.7	.6	.2	.1	([11])	.4
Sales financing	52222	78.8	.4	.1	.1	–	.3
Other nondepository credit intermediation	52229	378.5	.6	.2	.1	([11])	.5
Activities related to credit intermediation	5223	254.9	1.0	.3	.2	.1	.7
Mortgage and nonmortgage loan brokers	52231	61.2	.4	.1	.1	–	.3
Financial transactions processing, reserve, and clearinghouse activities	52232	107.5	1.4	.4	.3	.1	1.0
Other activities related to credit intermediation	52239	86.2	.9	.3	.3	.1	.6
Securities, commodity contracts, and other financial investments and related activities	523	822.8	–	.1	.1	([11])	.2
Securities and commodity contracts intermediation and brokerage	5231	464.7	.2	.1	([11])	([11])	.1
Investment banking and securities dealing	52311	156.8	.2	.1	.1	–	.1
Securities brokerage	52312	281.9	.2	([11])	([11])	–	.1
Securities and commodity exchanges	5232	7.6	.4	–	–	–	.2
Other financial investment activities	5239	350.6	–	.1	.1	([11])	.3
Portfolio management	52392	136.9	.6	([11])	([11])	–	.6
Investment advice	52393	146.3	.2	.1	.1	–	.1
All other financial investment activities	52399	42.4	.4	.1	.1	–	.3
Insurance carriers and related activities	524	2,065.9	.7	.2	.2	([11])	.5
Insurance carriers	5241	1,178.1	.9	.3	.2	.1	.7
Direct life, health, and medical insurance carriers	52411	614.3	1.0	.3	.2	.1	.7
Direct insurance (except life, health, and medical) carriers	52412	535.6	.9	.3	.3	([11])	.6
Reinsurance carriers	52413	28.2	.8	.3	.3	–	.5
Agencies, brokerages, and other insurance related activities	5242	887.8	.5	.2	.1	([11])	.3
Insurance agencies and brokerages	52421	650.4	.3	.1	.1	([11])	.2
Other insurance related activities	52429	237.4	1.0	.4	.3	.1	.6
Funds, trusts, and other financial vehicles	525	84.6	.6	.2	.1	.1	.4
Insurance and employee benefit funds	5251	44.8	.7	.2	.1	([11])	.6
Other insurance funds	52519	19.5	.9	.4	.3	.1	.6

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Other investment pools and funds	5259	39.7	0.6	0.3	0.2	0.1	0.2
Open-end investment funds	52591	21.2	.3	.2	.1	–	.2
Real estate and rental and leasing	53	1,962.2	3.0	1.7	1.1	.6	1.3
Real estate[8]	531	1,430.4	2.8	1.6	1.1	.5	1.2
Lessors of real estate[8]	5311	579.4	3.6	2.0	1.3	–	1.6
Lessors of residential buildings and dwellings[8]	53111	356.3	4.3	2.3	1.7	.6	2.0
Lessors of nonresidential buildings (except miniwarehouses)[8]	53112	137.3	2.3	.9	.7	.2	1.4
Lessors of miniwarehouses and self-storage units[8]	53113	45.5	2.4	1.8	.2	1.5	.7
Lessors of other real estate property[8]	53119	40.3	3.2	2.7	.6	–	.5
Offices of real estate agents and brokers	5312	288.1	–	.6	.5	.1	.5
Activities related to real estate	5313	562.9	2.8	1.6	1.2	.5	1.1
Real estate property managers	53131	485.5	3.0	1.8	1.3	.5	1.3
Offices of real estate appraisers	53132	37.2	1.3	1.0	.6	.4	.3
Other activities related to real estate	53139	40.3	.6	.4	.4	–	.2
Rental and leasing services	532	506.4	3.7	2.2	1.1	1.1	1.5
Automotive equipment rental and leasing	5321	166.5	2.9	1.4	.9	.5	–
Passenger car rental and leasing	53211	111.5	2.3	1.3	.9	.4	.9
Truck, utility trailer, and RV (recreational vehicle) rental and leasing	53212	55.0	–	1.5	.8	.7	–
Consumer goods rental	5322	182.8	4.8	3.1	1.4	–	–
Consumer electronics and appliances rental	53221	27.4	8.6	4.5	1.5	3.0	4.1
Formal wear and costume rental	53222	10.3	1.4	.9	.7	–	–
Other consumer goods rental	53229	99.7	5.2	3.6	1.7	1.9	1.5
General rental centers	5323	40.4	3.8	2.3	1.1	1.2	1.5
Construction, transportation, mining, and forestry machinery and equipment rental and leasing	53241	61.6	–	2.6	1.4	1.2	1.0
Other commercial and industrial machinery and equipment rental and leasing	53249	47.1	3.4	1.4	.5	.9	2.1
Lessors of nonfinancial intangible assets (except copyrighted works)	533	25.4	.6	.2	.2	–	.4
Professional and business services		17,299.2	1.7	.8	.5	.3	.9
Professional, scientific, and technical services	54	7,711.7	1.0	.4	.3	.1	.7
Professional, scientific, and technical services[8]	541	7,711.7	1.0	.4	.3	.1	.7
Legal services	5411	1,137.5	.4	.2	.2	([11])	.2
Other accounting services	541219	239.3	.7	.2	.1	.1	.5
Architectural, engineering, and related services	5413	1,295.9	1.0	.4	.3	.1	.6
Architectural services	54131	156.8	.3	.1	.1	–	.2
Engineering services	54133	875.8	1.0	.4	.3	.1	.6
Drafting services	54134	7.7	–	–	–	–	–
Geophysical surveying and mapping services	54136	15.7	1.2	.3	–	–	.9

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Testing laboratories	54138	148.9	1.4	0.7	0.3	0.4	0.7
Specialized design services	5414	119.2	1.0	.3	.2	–	.8
Computer systems design and related services	5415	1,513.8	.4	.2	.1	.1	.2
Computer systems design and related services	54151	1,513.8	.4	.2	.1	.1	.2
Custom computer programming services	541511	657.1	.3	.1	.1	–	.2
Computer systems design services	541512	694.7	.3	.2	.1	.1	.1
Computer facilities management services	541513	51.7	1.2	.7	.6	.1	.5
Other computer related services	541519	110.3	.8	.2	.2	([11])	.6
Management, scientific, and technical consulting services[8]	5416	1,090.2	–	.3	.2	.1	–
Environmental consulting services	54162	79.0	.8	.4	.4	([11])	.5
Other scientific and technical consulting services	54169	177.1	.7	.3	.2	.1	.4
Scientific research and development services	5417	628.3	1.1	.5	.3	.2	.7
Advertising and related services	5418	422.1	1.0	.5	.3	.2	.5
Other professional, scientific, and technical services	5419	595.2	5.7	1.5	–	–	4.2
Marketing research and public opinion polling	54191	104.7	.3	.1	–	–	.2
Photographic services	54192	69.8	2.1	.4	.3	–	1.7
Translation and interpretation services	54193	21.7	.4	.3	–	–	–
All other professional, scientific, and technical services	54199	100.0	1.5	.9	.6	.3	.6
Management of companies and enterprises	55	1,919.9	1.4	.6	.4	.2	.8
Administrative and support and waste management and remediation services	56	7,667.6	2.7	1.5	1.0	.5	1.2
Administrative and support services[8]	561	7,303.0	2.5	1.4	1.0	.4	1.2
Facilities support services	5612	135.6	3.7	1.9	1.1	.7	1.8
Employment services[8]	5613	2,863.5	2.0	1.0	.7	.3	1.0
Employment placement agencies and executive search services[8]	56131	263.7	1.2	.5	.3	.1	.7
Temporary help services	56132	2,212.7	1.9	.9	.6	.3	1.0
Business support services	5614	804.5	1.2	.6	.4	–	.5
Telephone call centers	56142	422.0	1.2	.4	.3	.1	.8
Business service centers	56143	83.5	.8	.6	.3	.2	.2
Collection agencies	56144	145.5	.9	.5	.3	.2	.4
Travel arrangement and reservation services	5615	192.8	1.3	.6	.4	.2	.7
Travel agencies	56151	84.9	.4	.2	.1	–	.3
Tour operators	56152	25.1	.9	.5	.4	–	.4
Other travel arrangement and reservation services	56159	82.8	2.4	1.1	.7	.4	1.3
Investigation and security services	5616	814.4	1.9	1.1	.9	.3	.7
Investigation, guard, and armored car services	56161	699.7	1.9	1.2	.9	.3	.7
Investigation services	561611	38.5	2.5	1.9	.9	–	.6
Security guards and patrol services	561612	631.0	1.7	1.0	.8	.2	.7
Armored car services	561613	30.2	5.0	3.3	2.1	1.2	1.7

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Security systems services	56162	114.7	1.7	0.9	0.6	0.3	0.8
Services to buildings and dwellings	5617	1,778.3	4.1	2.3	1.6	.7	1.8
Exterminating and pest control services	56171	95.5	5.1	2.5	2.0	.5	–
Janitorial services	56172	943.5	3.3	2.0	1.4	.6	1.3
Landscaping services	56173	618.1	5.0	2.8	1.8	.9	2.2
Carpet and upholstery cleaning services	56174	42.8	3.5	2.6	1.9	–	1.0
Other services to buildings and dwellings	56179	78.4	–	2.9	2.3	.6	–
Other support services	5619	286.4	2.7	1.4	.9	.6	1.3
Waste management and remediation services	562	364.6	4.9	3.0	2.0	1.0	1.9
Waste collection	5621	143.3	6.3	3.9	2.9	1.1	2.4
Waste collection	56211	143.3	6.3	3.9	2.9	1.1	2.4
Solid waste collection	562111	123.3	6.3	4.1	3.0	1.1	–
Hazardous waste collection	562112	9.2	3.8	1.8	1.4	.4	1.9
Other waste collection	562119	10.9	8.3	3.2	2.5	.7	5.1
Waste treatment and disposal	5622	96.4	3.9	2.6	1.7	.9	1.3
Waste treatment and disposal	56221	96.4	3.9	2.6	1.7	.9	1.3
Hazardous waste treatment and disposal	562211	37.1	3.0	1.4	.8	.5	1.6
Solid waste landfill	562212	38.7	4.8	3.7	2.4	1.3	1.1
Solid waste combustors and incinerators	562213	5.8	2.5	1.4	.4	1.0	1.1
Other nonhazardous waste treatment and disposal	562219	14.8	4.2	2.9	2.1	.8	1.3
Remediation and other waste management services	5629	124.9	4.1	2.3	1.4	1.0	1.8
Remediation services	56291	77.6	–	1.8	1.0	.8	1.9
Materials recovery facilities	56292	13.5	5.4	3.5	1.9	1.7	1.9
All other waste management services	56299	33.9	4.3	2.9	1.9	1.0	1.4
Education and health services		19,065.4	4.7	2.1	1.3	.9	2.5
Educational services	61	2,580.1	2.1	.9	.6	.3	1.2
Educational services	611	2,580.1	2.1	.9	.6	.3	1.2
Elementary and secondary schools	6111	686.7	2.8	1.1	.7	.4	1.8
Junior colleges	6112	55.6	1.2	.4	.3	.1	.8
Colleges, universities, and professional schools	6113	1,191.2	2.1	.9	.6	.3	1.2
Business schools and computer and management training	6114	81.8	.5	.2	.2	([11])	.3
Business and secretarial schools	61141	17.4	.8	.2	.2	–	.6
Computer training	61142	16.5	–	–	–	–	–
Professional and management development training	61143	47.9	.5	.3	.2	([11])	.3
Technical and trade schools	6115	129.0	1.2	.4	.3	.1	.7
Fine arts schools	61161	72.7	.3	.1	.1	–	–
All other schools and instruction	61169	150.9	1.3	.7	.4	.4	.6
Educational support services	6117	112.6	1.1	.5	.4	.1	.5

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Health care and social assistance	62	16,485.3	5.0	2.3	1.4	1.0	2.7
Ambulatory health care services	621	6,116.5	2.7	.9	.7	.3	1.7
Offices of physicians	6211	2,362.8	2.1	.4	.3	.1	1.7
Offices of physicians	62111	2,362.8	2.1	.4	.3	.1	1.7
Offices of physicians (except mental health specialists)	621111	2,315.0	2.1	.4	.3	.1	1.7
Offices of physicians, mental health specialists	621112	47.8	1.3	.4	.4	.1	.8
Offices of dentists	6212	842.0	1.5	.4	.3	([11])	1.2
Offices of other health practitioners	6213	692.1	1.2	.6	.4	.2	.6
Outpatient care centers	6214	611.2	4.0	1.2	.9	.3	2.8
Medical and diagnostic laboratories	6215	235.0	2.1	.7	.4	.3	1.4
Home health care services	6216	1,116.9	3.8	2.0	1.4	.6	1.8
Other ambulatory health care services	6219	256.4	7.4	3.8	2.5	1.4	3.5
Ambulance services	62191	155.1	9.7	5.2	3.7	1.5	4.4
All other ambulatory health care services	62199	101.3	4.3	1.9	.8	1.1	2.3
Hospitals	622	4,689.3	6.8	2.7	1.6	1.1	4.1
General medical and surgical hospitals	6221	4,381.9	6.8	2.7	1.6	1.1	4.1
Psychiatric and substance abuse hospitals	6222	101.3	7.7	3.9	2.3	1.6	3.9
Specialty (except psychiatric and substance abuse) hospitals	6223	206.0	6.3	2.8	1.5	1.3	3.5
Nursing and residential care facilities	623	3,151.9	7.8	4.7	2.5	2.2	3.1
Nursing care facilities	6231	1,662.5	8.2	5.3	2.8	2.6	2.9
Residential mental retardation, mental health and substance abuse facilities	6232	569.9	6.8	3.6	2.1	1.5	3.2
Community care facilities for the elderly	6233	758.9	7.8	4.4	2.2	2.2	3.4
Other residential care facilities	6239	160.7	7.6	3.4	2.0	1.4	4.2
Social assistance	624	2,527.6	3.6	1.9	1.2	.7	1.7
Individual and family services	6241	1,254.8	3.7	1.8	1.3	.5	1.9
Child and youth services	62411	172.9	4.0	1.6	1.2	.4	2.4
Services for the elderly and persons with disabilities	62412	705.0	4.0	2.2	1.6	.6	1.8
Other individual and family services	62419	376.9	3.0	1.2	.8	.3	1.9
Community food and housing, and emergency and other relief services	6242	145.1	4.0	2.0	1.4	.6	2.1
Community food services	62421	29.5	–	3.1	2.7	.4	3.8
Community housing services	62422	88.6	3.6	1.8	1.2	.6	1.8
Emergency and other relief services	62423	27.0	2.9	1.5	.9	.6	1.5
Vocational rehabilitation services	6243	331.8	6.2	3.4	1.7	1.7	2.8
Child day care services	6244	795.8	2.3	1.4	.9	.5	1.0
Leisure and hospitality		13,514.8	4.0	1.6	1.0	.6	2.4
Arts, entertainment, and recreation	71	2,065.6	4.5	2.2	1.2	.9	2.4
Performing arts, spectator sports, and related industries	711	408.5	6.0	2.4	1.4	.9	3.7

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Performing arts companies	7111	110.9	7.7	2.6	1.9	0.7	5.1
Spectator sports	7112	128.8	9.1	4.0	2.2	1.8	–
Spectator sports	71121	128.8	9.1	4.0	2.2	1.8	–
Sports teams and clubs	711211	70.0	–	6.1	2.8	3.3	–
Racetracks	711212	36.9	6.0	2.0	1.5	.5	3.9
Other spectator sports	711219	21.8	3.0	1.6	–	.1	1.4
Promoters of performing arts, sports, and similar events	7113	96.4	3.8	1.4	1.0	.4	2.5
Agents and managers for artists, athletes, entertainers, and other public figures	7114	20.1	.5	.2	.2	–	.3
Independent artists, writers, and performers	7115	52.4	1.0	.3	.2	.1	.7
Museums, historical sites, and similar institutions	712	129.7	4.5	2.3	1.5	.8	2.3
Amusement, gambling, and recreation industries	713	1,527.4	4.1	2.1	1.2	.9	2.1
Amusement parks and arcades	7131	170.3	6.3	4.4	1.2	3.2	1.9
Amusement and theme parks	71311	151.9	6.7	4.7	1.3	3.4	2.0
Amusement arcades	71312	18.4	1.5	.6	.4	–	.9
Gambling industries	7132	256.2	4.5	2.2	1.2	1.0	2.3
Other amusement and recreation industries	7139	1,100.9	3.6	1.6	1.1	.5	2.0
Golf courses and country clubs	71391	337.6	4.5	1.9	1.3	.6	2.6
Skiing facilities	71392	36.2	11.5	6.9	3.6	3.3	4.7
Marinas	71393	30.7	5.3	3.8	3.4	.4	1.5
Fitness and recreational sports centers	71394	493.8	2.3	1.1	.8	.3	1.3
Bowling centers	71395	69.0	2.3	.7	.5	.2	1.6
All other amusement and recreation industries	71399	133.6	–	.8	.6	.3	–
Accommodation and food services	72	11,449.2	3.9	1.5	1.0	.5	2.4
Accommodation	721	1,830.1	5.1	2.8	1.5	1.3	2.3
Traveler accommodation	7211	1,765.5	5.1	2.8	1.5	1.3	2.3
Hotels (except casino hotels) and motels	72111	1,436.0	5.4	3.0	1.7	1.3	2.4
Casino hotels	72112	303.2	4.1	2.3	1.0	1.2	1.8
Other traveler accommodation	72119	26.4	4.7	2.0	1.4	.6	–
RV (recreational vehicle) parks and recreational camps	7212	53.6	5.7	2.9	2.1	.8	2.8
RV (recreational vehicle) parks and recreational camps	72121	53.6	5.7	2.9	2.1	.8	2.8
RV (recreational vehicle) parks and campgrounds	721211	25.6	6.1	4.2	3.7	.5	1.9
Recreational and vacation camps (except campgrounds)	721214	28.1	5.3	1.6	.6	1.0	3.7
Food services and drinking places	722	9,619.1	3.6	1.2	.8	.3	2.4
Full-service restaurants	7221	4,584.1	3.4	1.0	.7	.3	2.4
Limited-service eating places	7222	4,134.7	3.6	1.2	.9	.3	2.4
Limited-service eating places	72221	4,134.7	3.6	1.2	.9	.3	2.4
Limited-service restaurants	722211	3,525.8	3.7	1.2	.9	.4	2.5
Cafeterias, grill buffets, and buffets	722212	134.4	3.2	1.5	.6	.8	1.7
Snack and nonalcoholic beverage bars	722213	474.4	3.0	1.1	.9	.2	1.9

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Special food services	7223	548.6	5.4	2.6	1.6	1.0	–
Drinking places (alcoholic beverages)	7224	351.8	1.8	.7	.6	.1	1.1
Other services		3,803.0	2.6	1.3	.9	.4	1.2
Other services, except public administration	81	3,803.0	2.6	1.3	.9	.4	1.2
Repair and maintenance	811	1,174.2	3.2	1.7	1.3	.4	1.5
Automotive repair and maintenance	8111	821.3	2.9	1.6	1.3	.3	1.3
Electronic and precision equipment repair and maintenance	8112	99.2	1.2	.8	.6	.2	.4
Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	8113	183.4	5.2	2.4	1.7	.7	2.8
Personal and laundry services	812	1,298.4	2.4	1.4	.8	.5	1.0
Death care services	8122	132.9	–	1.3	.8	.5	–
Drycleaning and laundry services	8123	302.2	3.6	2.3	1.1	1.2	1.2
Drycleaning and laundry services (except coin-operated)	81232	146.2	1.9	1.1	.7	.4	.8
Linen and uniform supply	81233	121.3	5.7	4.0	1.7	2.3	1.7
Linen supply	812331	68.9	6.2	4.2	2.0	2.2	2.0
Industrial launderers	812332	52.4	5.0	3.7	1.2	2.6	1.3
Other personal services	8129	247.0	3.1	1.7	1.2	.5	1.3
Pet care (except veterinary) services	81291	66.7	5.2	2.0	1.7	.3	3.2
Photofinishing	81292	14.7	1.8	.7	–	.4	1.0
Parking lots and garages	81293	115.5	2.7	1.8	1.1	.7	.8
All other personal services	81299	50.1	2.1	1.6	–	–	.5
Religious, grantmaking, civic, professional, and similar organizations	813	1,330.4	2.0	.8	.5	.3	1.2
State and local government[6]		18,486.7	5.7	2.5	1.9	.6	3.2
State government[6]		4,807.9	4.6	2.3	1.8	.5	2.3
Goods producing[6]		77.9	3.8	1.9	1.5	.3	1.9
Construction		74.8	3.8	1.9	1.6	.3	1.9
Construction	23	74.8	3.8	1.9	1.6	.3	1.9
Service providing		4,730.0	4.6	2.3	1.8	.5	2.3

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Education and health services		2,670.6	4.4	2.1	1.5	0.5	2.3
Educational services	61	2,055.1	2.6	1.0	.7	.3	1.6
Educational services	611	2,055.1	2.6	1.0	.7	.3	1.6
Colleges, universities, and professional schools	6113	1,693.2	2.6	1.0	.7	.4	1.6
Health care and social assistance	62	615.5	8.7	4.7	3.7	1.0	4.0
Hospitals	622	339.9	9.2	4.8	3.6	1.2	4.4
Nursing and residential care facilities	623	139.6	13.1	7.4	5.9	1.5	5.7
Public administration		1,898.7	4.8	2.4	2.0	–	2.4
Public administration	92	1,898.7	4.8	2.4	2.0	–	2.4
Justice, public order, and safety activities	922	751.7	7.6	4.1	3.4	–	3.5
Justice, public order, and safety activities	9221	751.7	7.6	4.1	3.4	–	3.5
Local government[6]		13,678.9	6.1	2.6	1.9	.7	3.5
Goods producing[6]		107.4	8.7	4.7	3.2	1.5	4.0
Construction		106.4	8.7	4.7	3.2	1.5	4.0
Construction	23	106.4	8.7	4.7	3.2	1.5	4.0
Heavy and civil engineering construction	237	103.8	8.8	4.8	3.2	1.5	4.0
Service providing		13,571.4	6.1	2.6	1.9	.7	3.5
Trade, transportation, and utilities[10]		508.2	6.7	4.0	3.0	1.0	2.7
Transportation and warehousing[10]	48-49	266.0	7.3	4.6	3.9	.7	2.6
Transit and ground passenger transportation	485	215.6	7.4	5.0	4.4	.6	2.5
Utilities	22	238.9	6.2	3.5	2.1	1.4	2.7
Utilities	221	238.9	6.2	3.5	2.1	1.4	2.7
Water, sewage and other systems	2213	161.3	6.1	3.6	2.2	1.4	2.5

See footnotes at end of table.

TABLE 1. **Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2011** — Continued

Industry[2]	NAICS code[3]	2011 Annual average employment[4] (thousands)	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
				Total	Cases with days away from work[5]	Cases with job transfer or restriction	
Education and health services		8,590.8	5.1	1.8	1.3	0.5	3.3
Educational services	61	7,688.2	4.9	1.6	1.2	.4	3.2
Educational services	611	7,688.2	4.9	1.6	1.2	.4	3.2
Elementary and secondary schools	6111	7,126.5	5.0	1.7	1.2	.4	3.3
Health care and social assistance	62	902.6	6.4	2.6	1.7	.9	3.8
Hospitals	622	649.0	6.8	2.4	1.6	.8	4.4
Nursing and residential care facilities	623	77.2	10.2	7.1	3.8	–	3.1
Public administration		3,950.9	7.9	3.8	2.8	1.0	4.0
Public administration	92	3,950.9	7.9	3.8	2.8	1.0	4.0
Justice, public order, and safety activities	922	985.7	10.3	5.6	4.7	.8	4.7
Justice, public order, and safety activities	9221	985.7	10.3	5.6	4.7	.8	4.7
Police protection	92212	439.5	11.3	5.8	4.9	.9	5.4
Fire protection	92216	235.4	13.5	8.6	7.7	.9	4.9

1 The incidence rates represent the number of injuries and illnesses per 100 full-time workers and were calculated as: (N/EH) x 200,000, where

N = number of injuries and illnesses
EH = total hours worked by all employees during the calendar year
200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year)

2 Totals include data for industries not shown separately.
3 *North American Industry Classification System* — United States, 2007
4 Employment is expressed as an annual average and is derived primarily from the BLS-Quarterly Census of Employment and Wages (QCEW) program.
5 Days-away-from-work cases include those that result in days away from work with or without job transfer or restriction.
6 Excludes farms with fewer than 11 employees.
7 Data for Mining (Sector 21 in the *North American Industry Classification System* — United States, 2007) include establishments not governed by the Mine Safety and Health Administration rules and reporting, such as those in Oil and Gas Extraction and related support activities. Data for mining operators in coal, metal, and nonmetal mining are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor. Independent mining contractors are excluded from the coal, metal, and nonmetal mining industries. These data do not reflect the changes the Occupational Safety and Health Administration made to its recordkeeping requirements effective January 1, 2002; therefore, estimates for these industries are not comparable to estimates in other industries.
8 Industry scope changed in 2009.
9 Data for mining operators in this industry are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor. Independent mining contractors are excluded. These data do not reflect the changes the Occupational Safety and Health Administration made to its recordkeeping requirements effective January 1, 2002; therefore, estimates for these industries are not comparable to estimates in other industries.
10 Data for employers in railroad transportation are provided to BLS by the Federal Railroad Administration, U.S. Department of Transportation.
11 Data too small to be displayed.
12 Industry added in 2009.

NOTE: Because of rounding, components may not add to totals. Dash indicates data do not meet publication guidelines.
SOURCE: U.S. Bureau of Labor Statistics, U.S. Department of Labor, October 2012

Reserved

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EMPLOYEE TRAINING

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OSHA COMPLIANCE MANUAL

Employee training

Introduction

An effective training program is one of the most important steps that an employer can take to ensure the safety of all employees, particularly those whose job duties place them in potentially hazardous situations. Providing employees with complete information regarding the processes and equipment they work with, the materials they use, and the protective actions they take are essential for their welfare — and usually required by OSHA. There are currently over 100 regulations that contain specific training provisions.

To help employers achieve effective training, OSHA developed voluntary training guidelines for providing the safety and health information and instruction necessary for employees to work at minimal risk to themselves, to their coworkers, and to the public. The guidelines will help employers to:

- Determine whether a worksite problem can be solved by training;
- Determine what training, if any, is needed;
- Identify goals and objectives for the training;
- Design learning activities;
- Conduct training;
- Determine the training's effectiveness; and
- Revise the program based on feedback from employees, supervisors, and others.

OSHA's model training program is designed so that even the owner of a business with very few employees can use without having to hire a professional trainer or purchase expensive training materials. Using this model, employers or supervisors can develop and administer safety and health training programs that address problems specific to their own business, fulfill the learning needs of their own employees, and strengthen the overall safety and health program of the workplace.

Step 1
Determine if training is needed

The first step in the training process is a basic one — to decide if a problem can be solved by training. Whenever employees are not performing their jobs properly, it is often assumed that training will help them improve their performance. However, it is possible that other actions, such as abating a hazard or implementing engineering controls, would enable employees to perform their job tasks quicker and safer.

Ideally, safety and health training should be provided before problems arise or accidents occur. The training should cover general safety and health topics and specific procedures based on work assignments. This type of training would need to be repeated if an accident or near-miss incident occurred.

Problems that can be addressed effectively by training include those that arise from:

- Lack of knowledge of a work process,
- Unfamiliarity with equipment, or
- Incorrect execution of a task.

Training is less effective for problems arising from an employee's lack of motivation or lack of attention to the job. Whatever its purpose, training is most effective when designed in relation to the goals of the employer's total safety and health program.

Step 2
Identify training needs

If you decide that the problem can be solved, in whole or in part, by training, then the next step is to determine exactly what training is needed. For this, it is necessary to assess the employee's job tasks and the expected goals and outcome. Conducting a job analysis will help you identify the gaps between actual performance and what the employee is expected to do. Also, applicable training requirements in OSHA standards should be used provide direction in developing training content.

When designing a new training program, or preparing to instruct an employee in an unfamiliar procedure or system, develop a job analysis by reviewing engineering data on new equipment or the material safety data sheets (MSDSs) on unfamiliar substances. Another option is to conduct a job hazard analysis. This is a procedure for studying and recording each job task, identifying existing or potential hazards, and using this information to find the best way to reduce or eliminate the risks. Data obtained from a job hazard analysis can be used as content for a training activity.

If an employee's learning needs can be met by revising an existing training program rather than developing a new one, or if the employee already has some knowledge of the process or system to be used, appropriate training content can be developed by:

1. Examining company accident and injury records to identify problem jobs and areas and how accidents occurred.
2. Asking employees to describe, in writing and in their own words, their jobs and their training needs. These should include the tasks performed and the tools, materials and equipment used.
3. Observing employees as they perform job tasks, asking about the work, and recording their answers.
4. Reviewing training programs used by other companies in your industry.

The employees themselves can provide valuable information on the training they need. Safety and health hazards can be identified through the employees' responses to such questions as whether anything about their jobs frightens them, if they have had any near-miss incidents, if they feel they are taking risks, or if they believe that their jobs involve hazardous operations or substances.

Once you determine the kind of training that is needed, it is just as important to determine what kind of training is not needed. Employees should be made aware of all the steps involved in a task or procedure, but training needs to focus on those steps where performance has to be improved. This will avoid unnecessary training and allow the trainer to focus on performance deficiencies.

Step 3
Set goals and objectives

After employees' training needs have been identified, you can then prepare goals and objectives for the training. Instructional goals and objectives map out what you want employees to know and do.

Learning objectives do not necessarily have to be written, but in order for the training to be successful, clear and measurable objectives should be thought-out before the training begins. For an objective to be effective, it should identify as precisely as possible what the individuals will do to demonstrate that they have learned, or that the objective has been reached. They should also describe the important conditions under which the individual will demonstrate competence and define what constitutes acceptable performance.

Use action-oriented language so the objectives describe the desired knowledge, practice, or skill and its observable behavior. For example, rather than using the statement, "The employee will understand how to use a respirator" as an instructional objective, it is better to say: "The employee will be able to describe how a

respirator works and when it should be used." Objectives are most effective when worded in sufficient detail that other qualified persons can recognize when the desired behavior is exhibited.

Step 4

Get management and supervisory support

Training programs take away from production time and can be costly. The better you are in convincing management of the need for the training program, the more likely you will be to receive adequate resources. Tips to use when justifying the training to management include:

- Outline the reasons for conducting the training,
- Identify the employees who need the training,
- Present a timeframe for the training program,
- Provide a cost estimate,
- Explain the training program's objectives and expected benefits, and
- Describe how you will be tracking the training's effectiveness.

Production supervisors can be your training program's best allies. Supervisors can help you:

- Identify training needs,
- Get the employees to the training sessions on time,
- Conduct follow-up evaluations, and
- Provide on-the-job coaching.

Remember to include supervisors on your list of trainees. It is important for supervisors to have the same understanding of safe work practices as their employees.

Step 5

Design learning activities

Once you have stated precisely what the goals and objectives for the training program are, the next task is to design learning activities. These activities will enable employees to demonstrate that they have acquired the desired skills and knowledge. To ensure that trainees transfer the skills or knowledge from the learning activity to the job, the learning situation should simulate the actual job as closely as possible.

If a specific process is to be learned, it's a good idea to arrange the objectives and activities in a sequence that corresponds to the job tasks. For instance, if an employee must learn the beginning processes of using a machine, a feasible sequence would be to:

1. Check that the power source is connected;
2. Ensure that the safety devices are in place and are operative;
3. Know when and how to throw the switch; etc.

The training activity can be group-oriented, with lectures, role play, and demonstration; or designed for the individual as with self-paced instruction. Factors to consider when determining the type of learning activities to use include:

- Training resources: Can a group training program that uses an outside trainer and film be organized, or should the employees be trained on a one-to-one basis?

- Skills or knowledge to be learned: Is the learning oriented toward physical skills (such as the use of special tools) or toward mental processes and attitudes?

No matter which method of instruction you use, the learning activities should be developed in such a way that the trainees can clearly demonstrate that they have acquired the desired skills and knowledge.

Step 6

Prepare for the class

The learning process depends on how the training is prepared and presented. You can use a variety of training methods:

- Lectures,
- Demonstrations,
- Videos,
- Print materials,
- Discussions,
- Case studies,
- Drills/exercises,
- Question and answer periods,
- Computer-based instruction/simulations, and
- Tests/quizzes.

Adult learning

Adults need to relate the material to their experiences and apply what they have learned. Provide an opportunity for trainees to talk about their work-related problems and how the training material can be used to help them find solutions.

Language barriers

If some trainees speak other languages, you may need to set up separate sessions, have interpreters available, and use more demonstrations and visual-aids. Trainees who are not literate will benefit from training that does not rely heavily on written procedures; but if this is not possible, you will need to schedule extra time to read through the materials with them.

Whatever the method of instruction, the learning activities should allow the employees to clearly demonstrate that they have met the training program's objectives.

In an April 28, 2010, policy memorandum, OSHA instructed compliance officers to check during each inspection that not only has required training been provided, but also that the training was provided in a language and vocabulary that the employees being trained could understand. OSHA compliance personnel will look at employer's work instructions — if those are customarily provided in a specific language or vocabulary, then OSHA believes that typically safety training will need to be communicated in that same manner.

Scheduling

Work with supervisors to set up training sessions that will not disrupt production schedules. Frequently, your training groups may be made up of workers from several different departments, so tailor the training contents to the people in the group.

When employees work on second or third shifts, it may be possible to have their hours adjusted so that they are available for training during your regular shift. If not, you will have to provide for training sessions to be held during their hours.

Safety training for new employees can take anywhere from a few hours to all day, or even longer. Try to break up the training over a few days if you can. For example, your new mechanic may not need training on welding safety his first day. You can also break up a long day by having Human Resources schedule in some of their orientation training along with your safety training.

Temporary employees, and contractors, have usually been hired because there is a pressing need for them, but remember to schedule time to cover the safety basics of your facility before they are allowed to start working.

After you have a good idea of how many individual sessions you will need to schedule, who will be in each session, and how long each session will take, you should decide on the time and place for the classes. If the training involves hands-on demonstrations, you may want to hold the class on the shop floor, but make sure that the supervisor in the area is agreeable. Usually, quieter locations make better classrooms. If the training is being held off-site, make sure that detailed arrangements have been confirmed a few days in advance.

Notify the trainees, and their supervisors, of their scheduled classes. You can do this by posting rosters, giving each department its own schedule, or handing out an invitation to each trainee. The notice needs to include the topic, date, time, and place. Include a map if the training is off-site. Be prepared to make some changes for employees who will not be able to attend at their scheduled time. Scheduling make-up sessions is inevitable.

Consider the practical issues of the class. For example:

- Check to be sure the VCR, overhead projector, or other equipment works properly.
- Have your handouts, overheads, and videos ready.
- Change activities frequently (about every 20 minutes). Break up long periods of lecture with group discussions or exercises.
- Allow for breaks.
- If your training session lasts all day, make the morning session longer than the afternoon session.
- Start and finish on time.

Step 7
Conduct the training

Now that you have completed the ground work, you are ready to conduct the training. To the extent possible, present the material so that its organization and meaning are clear by:

- Providing overviews of the material;
- Relating the new information or skills to the employees' goals, interests, or experience;
- Explaining the material in sufficient detail;
- Pointing out practical benefits of the training material; and
- Summarizing the program's objectives and key points to reinforce learning.

In addition to organizing the content, you need to develop the structure and format of the training. The content developed for the program, the nature of the workplace or other training site, and the resources available for training will help determine the frequency of training activities, the length of the sessions, the instructional techniques, and the individual(s) best qualified to present the information.

In order to be motivated to pay attention and learn the material that is being presented, trainees must be convinced that the material is important and relevant. Some ways to develop motivation are:

- Explaining the goals and objectives of instruction;
- Relating the training to the interests, skills, and experiences of the employees;
- Outlining the main points to be presented during the training session(s); and
- Pointing out the benefits of training (e.g., the employee will be better informed, more skilled, and thus more valuable both on the job and on the labor market; or the employee will, if he or she applies the skills and knowledge learned, be able to work at reduced risk).

An effective training program allows employees to participate in the training process and to practice their skills or knowledge. This will help to ensure that they are learning the required knowledge or skills and permit correction if necessary. Employees can become involved in the training process by participating in discussions, asking questions, contributing their knowledge and expertise, learning through hands-on experiences, and through role-playing exercises.

Step 8
Document the training

Training documentation is required in some OSHA standards, so make sure your training records meet OSHA's requirements. Additionally, training documentation may be needed as part of an internal quality system; and these records will help keep track of your efforts.

Typically, training documentation includes the:

- Training topic,
- Instructor's name,
- Training date, and
- Trainee's name.

You can pass around a sign-in sheet at the training session or keep a separate safety training file for each employee. It may be best to have trainees sign or initial their own training documentation.

Useful documents

Training records can be used during performance reviews. Supervisors can review training records before assigning workers to tasks that require specialized safety training. Also, the records can be used to identify the need for refresher training.

Training documentation needs to be kept up to date and should be revised following each training session.

Step 9
Evaluate the program's effectiveness

Evaluation is an important part of education. To make sure that the training is accomplishing its goals, don't overlook incorporating a periodic evaluation into the program. You need to know if the training program is meeting its objectives.

A plan for evaluating the training program's effectiveness should be developed right in the beginning — along with the course objectives and content. Evaluations can be started at the end of the class, and they should be repeated a few weeks later to see if the trainees have retained what they have learned.

You can evaluate training by:

- Reviewing quizzes (pre-tests and post-tests);
- Observing employees as they work;
- Having employees demonstrate specific skills;
- Asking employees follow-up questions;
- Asking supervisors if safety performance has improved; and
- Reviewing first aid, OSHA 300 Log, near-miss, and workers' compensation reports.

However it is conducted, a training evaluation can give you the information necessary to decide whether or not the trainees achieved the desired results, and whether the training session should be offered again at some future date.

Step 10
Improve the program

If your evaluations show that the employees' knowledge and skill levels have not improved sufficiently, retraining, with a revised training program, is in order. Another chance to improve your training program comes when it is time for OSHA-required refresher training. As you review your training program, ask former trainees for their comments:

- What material was confusing or distracting?
- Was any of the content too elementary or repetitive?
- Was anything missing from the program?
- Was too much covered at one time?
- What did the employees learn, and what did they fail to learn?

Trace your steps through the training process, take an objective look at the course, and ask:

- Was the job analysis accurate?
- Was any critical feature of the job overlooked?
- Did the program address the gaps in employees' knowledge and skill levels?
- Were the instructional objectives presented clearly?
- Did the objectives state the acceptable performance level?
- Were the employees motivated to learn?
- Did the program offer active employee participation?
- Did the learning activities simulate the actual job?
- Was the training material organized and presented clearly?
- Was the training program evaluated thoroughly?

Follow-up training

Refresher training needs to highlight and summarize the important parts of the topic, report on the group's progress toward meeting the training goals, and emphasize any changes that have occurred since the previous training was held. Refresher training also offers an opportunity to introduce the group to more advanced material.

One size doesn't fit all: Match training to individuals

While all employees are entitled to know as much as possible about the safety and health hazards to which they are exposed, the resources for such an effort aren't always available. In such a situation, an employer may be faced with the problem of deciding who has the greatest need of information and instruction. One way to differentiate between employees who have priority needs for training and those who do not is to identify employee populations which are at higher levels of risk. The nature of the job provides an indication that certain groups should have priority training on work-related safety and health hazards.

How to identify at-risk employees

One method of identifying employee populations at high levels of occupational risk, and thus in greater need of safety and health training, is to pinpoint hazardous jobs. Even within industries that are hazardous in general, there are some employees whose jobs place them at greater risk than their coworkers. In other cases, the hazardousness of an occupation is influenced by the conditions under which it is performed, such as noise, heat or cold, or safety or health hazards in the surrounding area. In these situations, employees should be trained not only on how to perform their job safely, but also on how to work within a hazardous environment.

Another method of identifying employee populations at high risk is to examine the incidence of injuries, illnesses, and accidents — both within the company and the industry segment. If employees in certain occupational categories are experiencing higher accident and injury rates than other employees, training may be one way to reduce that rate. In addition, reviewing accident investigation reports can help to identify not only specific employees who could benefit from refresher training, but also identify company-wide training needs.

Research has identified five variables as being related to a disproportionate share of employee work-related injuries and illnesses.

1. Age of the employee (younger employees have higher incidence rates).
2. Length of time on the job (new employees have higher incidence rates).
3. Size of the firm (in general terms, medium-size firms have higher incidence rates than smaller or larger firms).
4. Type of work performed (incidence and severity rates vary significantly by SIC).
5. Use of hazardous substances (by SIC).

Consider these variables when identifying employee groups for safety and health training.

How to train at-risk employees

Deciding the training content for high-risk employee populations is similar to determining what any employee needs to know, but more emphasis is placed on the requirements of the job and the possibility of injury. A job hazard analysis is a useful tool for determining what the training content should encompass.

This procedure examines each step of a job, identifies existing or potential hazards, and determines the best way to perform the job in order to reduce or eliminate the hazards. Its key elements are:

- Job description;
- Job location;
- Key steps (in the order in which they are performed);
- Tools, machines, and materials used;
- Actual and potential safety and health hazards associated with the key job steps; and

- Safe and healthful practices, apparel, and equipment required for each job step.

SDSs/MSDSs

Safety Data Sheets (SDSs) (formerly Material Safety Data Sheets (MSDSs)) provide information for training employees in the safe use of hazardous substances. An SDS/MSDS is supplied with each substance and describes the ingredients of the product, its hazards, appropriate protective equipment, safe handling and storage procedures, and emergency first aid responses.

The information contained in these sheets can be used to identify those employees who use the substances and provide training in the safe use of the materials. Safety Data Sheets are available from suppliers, manufacturers of the substance, large employers who use the substance on a regular basis, or they can be developed by employers or trade associations. SDSs are particularly useful if you need to develop a training program for chemical use as required by OSHA's Hazard Communication Standard.

Training forms

The following forms may be used to plan and develop an effective training program. They provide a checklist of items that are necessary when developing your program, a thought-provoking list of how and why the training is needed, and a planner with topics that you may need to cover. These templates may be used for almost all training that you need to do. Customize the forms by inserting the appropriate material to create a training program specific to your company.

GUIDE TO AN EFFECTIVE TRAINING PROGRAM

1. **Training topic:**

2. **What regulations are involved:**

3. **What company policies or programs are involved:**

4. **Who will be trained:**

5. **What are the performance objectives and goals of the training:**

6. **When and where is the training session:**

7. **What information and elements of the regulation will the training cover:**

8. **How will the material be presented (lecture, video, overheads, written handouts, demonstrations):**

9. **How will trainees participate (discussions, case studies, drills, quizzes):**

10. **How will the training be documented:**

11. **How will the training be evaluated:**

SAFETY TRAINING PLANNER

Subject	Training date	Retraining cycle	Retraining dates				
Confined space entry							
Electrical safety							
Emergency response							
Ergonomics							
Fire prevention							
First aid/CPR							
Forklift safety							
Hand tools							
Hazard communication							
Lifting techniques							
Lockout/Tagout							
Machine guarding							
Protective equipment:							
• Eye							
• Fall							
• Foot							
• Hand							
• Head							
• Hearing conservation							
• Respiratory protection							
Slips, trips, and falls							
Workplace violence							
Welding, cutting, and brazing							

SAFETY TRAINING CHECKLIST

Training session: _____

Group/Department: _____

Requested dates: _____ **Estimated length:** _____

Actual date: _____ **Start time:** _____ **End time:** _____

Activity	Planned date	Actual date	Comments
Preparation 1. Schedule room 2. Request equipment ❍ Video cassette recorder ❍ Overhead projector ❍ Other 3. Notify attendees 4. Order employee handbooks ❍ Date ordered ❍ Date received 5. Order certificates ❍ Date ordered ❍ Date received 6. Review training materials ❍ Trainer's guide ❍ Employee handbook ❍ Videos ❍ Exercises ❍ Demonstrations ❍ Other 7. Gather activity supplies ❍ Tools ❍ PPE ❍ Posters and charts ❍ Overheads ❍ Written materials ❍ Other			

Activity	Planned date	Actual date	Comments
DAY OF THE SESSION **Before the session:** 1. Set up room 2. Check video ❍ Screen visibility ❍ Machine operation ❍ Color/Contrast/Volume ❍ Set start point 3. Check overhead ❍ Screen visibility ❍ Machine operation ❍ Focus 4. Hang posters and charts 5. Organize activities and materials 6. Set out handouts 7. Set out attendance sheet 8. Provide extra pencils and paper			
After the session: 1. Review attendance sheet and reschedule non-attendees 2. Correct tests 3. Complete recordkeeping 4. Send certificates 5. Set make-up sessions			

TRAINING LOG

Employer name			
Street	**City**	**State**	**Zip**
Instructor	**Date of training**	**Subject**	

The employees listed have satisfactorily participated and been tested per Regulation/Company training requirements.

Employee name	Employee no.	Department	Employee signature

Part 1904 - Recording and reporting occupational injuries and illnesses: Employee training requirements

Subpart D - Other OSHA injury and illness recordkeeping requirements

Employee involvement in work-related injury and illness reporting

§1904.35(a) and (b)(1)

To involve employees in the recordkeeping system, employers must:

- Inform each employee of how he or she is to report an injury or illness to you.
- Provide limited access to your injury and illness records for your employees and their representatives.

Employers must make sure that employees report work-related injuries and illnesses by:

- Setting up a way for employees to promptly report injuries and illnesses, and
- Telling each employee how to report injuries and illnesses.

Part 1910 - Training requirements for General Industry

The following two sections present training requirements compiled from 29 CFR Part 1910. OSHA has increased its emphasis on training by issuing regulations that contain specific training requirements, citing topics that must be covered, the level of detail to be transmitted, and how often retraining must be conducted. This chapter pulls together training requirements for General Industry for easy reference. Citations that require actual instruction have been included here and, generally, requirements for persons "designated" by the employer or those who have certain "competencies" needed to perform a function are excluded. **Note**: OSHA requires that employers train *each* affected employee in the manner required by the particular standard; each failure to train an employee may be considered a separate violation.

The first section provides an "at-a-glance" look at OSHA training requirements. Following that is a more detailed look at the individual training requirements.

Required General Industry OSHA Training At-A-Glance

*** Indicates annual training is required.**

Injury and illness recordkeeping — Employee involvement (1904.35)

Who:	Train employees on how to report a work-related injury or illness
When:	Initially
What records:	Specific training documentation is not required

Emergency Action Plans (1910.38)

Who:	Train employees who need to evacuate the facility in an emergency
When:	• Initially • When the employee's responsibilities change • When the plan is changed
What records:	Keep written plan in the workplace

Fire prevention plans (1910.39)

Who:	Train employees who are exposed to fire hazards
When:	Initially
What records:	Keep written plan in the workplace

Powered platforms (1910.66)

Who:	Train employees who operate powered platforms
When:	Initially
What records:	• Keep a training certificate that includes: – employee's name – signature of the employer or trainer – date of the training • Keep training records for the duration of employment

Occupational noise exposure (1910.95)*

Who:	Train employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels
When:	• Initially, preceding exposure to noise level • Repeat annually
What records:	Specific training documentation is not required

Flammable liquids (1910.106)

Who:	• Train storage tank station operators • Train emergency responders for storage tanks in flood-prone areas
When:	Initially, or prior to taking part in emergency operations
What records:	Specific training documentation is not required

Explosives and blasting agents (1910.109)

Who:	Train motor vehicle operators who transport explosives
When:	Initially, or prior to transporting any quantity of explosives
What records:	Drivers must have a valid motor vehicle operator's license. Specific training documentation is not required

Storage and handling of liquefied petroleum gases (1910.110)

Who:	• Train employees who install, remove, operate, and maintain LP gas systems • Train employees who perform a standard watch service for an area that includes an LP gas installation
When:	Initially, or prior to assignment
What records:	Specific training documentation is not required

Storage and handling of anhydrous ammonia (1910.111)

Who:	Train employees responsible for tank car unloading operations
When:	Initially, or prior to assignment
What records:	Specific training documentation is not required

Process safety management of highly hazardous chemicals (1910.119)

Who:	• Train employees who operate a process • Inform contract employees of known potential fire, explosion, or toxic release hazards related to the contractor's work and process
When:	• Initially • Repeat at least every three years
What records:	• Keep a training certificate that includes: – employee's name – date of the training – method used to verify that training was understood • Written operating procedures are required

Hazardous waste operations and emergency response – HAZWOPER (1910.120)*

Who:	• Train employees who work at a hazardous waste site under 1910.120(e) • Train managers or supervisors at a hazardous waste site under 1910.120(e) • Train employees who work at Treatment, Storage, and Disposal (TSD) facilities under 1910.120(p) • Train employees who will participate in emergency response to hazardous substance releases under 1910.120(q)
When:	• Hazardous waste site employees: – initially before they participate in field activities – repeat annually • TSD facility employees: – initially – repeat annually • Emergency responders to hazardous substance releases: – initially, or prior to taking part in actual emergency operations – repeat annually
What records:	Training certification is required under: • General training 1910.120(e) • Operations conducted under RCRA 1910.120(p) • Emergency response to hazardous substance releases 1910.120(q)

Dipping and coating operations (1910.122-.126)

Who:	Train employees who work in and around open-surface tank operations in appropriate first aid procedures
When:	Initially
What records:	Specific training documentation is not required

Personal Protective Equipment (1910.132)

Who:	Train employees who will use personal protective equipment
When:	• Initially • Retrain as necessary
What records:	Specific training documentation is not required

Respiratory protection (1910.134)*

Who:	Train employees who will use a respirator
When:	• Initially, or before using a respirator • Repeat annually • Repeat whenever necessary to ensure safe use
What records:	• Specific training documentation is not required • Documentation is required for medical evaluations and fit testing

Temporary labor camps (1910.142)

Who:	Train emergency first aid providers
When:	Initially, or prior to responding to any emergency situation
What records:	• Specific training documentation is not required • First aid facilities must be approved by a health authority

Specifications for accident prevention signs and tags (1910.145)

Who:	Train employees who work in areas where warnings are used to communicate hazards
When:	Initially, or prior to working in areas where signage is used
What records:	Specific training documentation is not required

Permit-required confined spaces (1910.146)*

Who:	Train employees who have roles in permit space entries
When:	• Employee rescue service personnel have to perform practice rescues at least annually • All employees who have permit-required confined space duties have to be trained: – initially – when an employee's duties change – when hazards in the space change – when there are deviations from the permit space entry procedures – when the employee's knowledge of entry procedures are inadequate
What records:	• Entry supervisors must fill out and sign an entry permit • Keep canceled entry permits at least one year • Keep training certificates that include: – employee's name – signature or initials of the trainer – date of training

Lockout/tagout (1910.147)

Who:	Train employees: • Who perform service or maintenance on equipment that must be locked out or tagged • Who operate equipment that is locked out (affected employees)
When:	• Initially, or prior to performing service or maintenance on equipment or a system • As needed for employee proficiency • When there are new or revised procedures
What records:	Keep a training certificate that includes: • Employee's name • Date of training

Medical services and first aid (1910.151)

Who:	Train employees designated as first aid providers
When:	Initially, or prior to responding to first aid emergencies
What records:	Specific training documentation is not required

Fire brigades (1910.156)*

Who:	Train fire brigade members
When:	• Initially, or prior to performing emergency activities • Repeat at least annually • Quarterly educational session for brigade members expected to fight interior structural fires
What records:	• Keep written procedures, including training and education program information • Keep a copy of the workplace emergency action plan • Document previous training received as part of the community

Portable fire extinguishers (1910.157)*

Who:	• Train employees when there are portable fire extinguishers for employee use • Train employees who are designated to use fire fighting equipment as part of an emergency action plan
When:	• Initially • Repeat at least annually
What records:	Specific training documentation is not required

Standpipe and hose systems (1910.158)

Who:	Train employees who will conduct inspections on standpipe and hose systems
When:	Initially, or prior to assignment
What records:	Specific training documentation is not required

Fixed extinguishing systems, general (1910.160)*

Who:	Train employees who will inspect, maintain, operate, or repair fixed extinguishing systems
When:	• Initially, or prior to assignment • Review annually to keep employees' performance up-to-date
What records:	Specific training documentation is not required

Fire detection systems (1910.164)

Who:	Train employees who will service, maintain, test, clean, and make sensitivity adjustments to automatic fire detection systems.
When:	Initially, or prior to assignment
What records:	Specific training documentation is not required

Employee alarm systems (1910.165)

Who:	• Train employees who service, maintain, and test alarm systems • Train employees on how to report emergencies
When:	Initially, or prior to assignment
What records:	Specific training documentation is not required

Servicing single piece and multi-piece rim wheels (1910.177)

Who:	Train employees who service multi-piece rim wheels on the hazards involved and safe practice to follow
When:	• Initially, or prior to assignment • Repeat whenever necessary to ensure employee proficiency
What records:	Specific training documentation is not required

Powered industrial trucks (1910.178)

Who:	Train and evaluate employees who operate powered industrial trucks
When:	• Initially, or prior to operating a vehicle without direct supervision • Refresher training is required when: – the vehicle is operated unsafely – after an accident or near-miss – when an evaluation shows retraining is needed – when assigned to a different type of vehicle – when changes in the workplace affect safe truck operation • Evaluate at least every three years
What records:	• Certify that the operator has been trained and evaluated • Training documentation must include: – operator's name – dates of the training and evaluation – name of the trainer/evaluator

Overhead and gantry cranes (1910.179)

Who:	• Train crane operators to use portable fire extinguishers • A qualified person must be responsible for operations when two or more cranes are used to lift a load
When:	Initially, or prior to assignment
What records:	Specific training documentation is not required

Crawler locomotive and truck cranes (1910.180)

Who:	Train operating and maintenance employees to use portable fire extinguishers
When:	Initially, or prior to assignment
What records:	Specific training documentation is not required

Mechanical power presses (1910.217)*

Who:	Train employees: • Who operate power presses • Who are assigned to care for, inspect, and maintain power presses
When:	• Operators of part revolution power presses used in the PSDI mode: – initially, or prior to operating the equipment – at least annually thereafter • Power press operators prior to initial assignment • Maintenance employees: – initially or prior to assignment – periodically thereafter
What records:	• Training certificate required for operators of part revolution power presses used in the PSDI mode that includes: – name of the employee – signature of the employer or the person conducting the training – date of the training – keep certification record for the duration of employment • Specific training documentation is not required for: operators of other types of power presses power press maintenance personnel

Forging machines (1910.218)

Who:	Train employees assigned to inspection and maintenance activities
When:	Initially, or prior to assignment
What records:	• No specific training documentation is required • Certification is required for inspections

Welding, cutting, and brazing (1910.252)

Who:	• Train cutters, welders, and their supervisors in safe equipment operation • Train fire watchers to use fire extinguishing equipment
When:	Initially, or prior to assignment
What records:	No specific training documentation is required

Oxygen-fuel gas welding and cutting (1910.253)

Who:	Train employees in charge of the oxygen or fuel–gas supply equipment
When:	Initially, and judged competent prior to assignment
What records:	No specific training documentation is required

Arc welding and cutting (1910.254)

Who:	Train employees who will operate arc welding equipment
When:	Initially, or prior to assignment
What records:	No specific training documentation is required

Resistance welding (1910.255)

Who:	Train employees who will operate resistance welding equipment
When:	Initially, or prior to assignment
What records:	No specific training documentation is required

Pulp, paper, and paperboard mills (1910.261)

Who:	Train employees exposed to chlorine gas during bleaching operations • Industry consensus standards have additional training requirements
When:	Initially, or prior to assignment • Industry consensus standards have refresher training requirements
What records:	No specific training documentation is required • Industry consensus standards may have documentation requirements

Laundry machinery and operations (1910.264)

Who:	Train employees exposed to laundry operations and machinery hazards
When:	Initially, or prior to assignment
What records:	No specific training documentation is required

Sawmills (1910.265)

Who:	Train employees exposed to sawmill operations, excluding those involving the manufacture of plywood, cooperage, and veneer • Industry consensus standards and applicable OSHA regulations may have additional training requirements
When:	Initially, or prior to assignment • Industry consensus standards and applicable OSHA regulations may require refresher training
What records:	No specific training documentation is required • Industry consensus standards and applicable OSHA regulations may require documentation

Logging operations (1910.266)

Who:	Train employees and supervisors exposed to logging operations
When:	• Initially, or prior to assignment • When assigned new tasks, tools, equipment, machines, or vehicles • When demonstrating unsafe job performance • Current certification in first aid and CPR is required • New employees who have been previously trained do not need to be retrained in those elements prior to initial assignment
What records:	• Training certification record must include: – name of employee – date of training – signature of trainer – signature of employer – date of acceptance of applicable prior training • Retain the most recent certification record

Telecommunications (1910.268)

Who:	Train employees exposed to hazards involving telecommunication work
When:	Prior to participating in telecommunications activities
What records:	• A written description of the training program • Document employee training • Retain training certification record for each employee during the period of employment

Electric power generation, transmission, and distribution (1910.269)

Who:	• Train qualified employees of electric utility installations • Train qualified employees of equivalent installations in industrial establishments • Train employees who participate in line-clearance tree-trimming operations
When:	• No specific time frame is required • Additional or refresher training as necessary
What records:	Certification of training and retraining is required for employees who service or maintain a machine or equipment where unexpected energizing, start up, or release of stored energy could occur

Grain handling facilities (1910.272)*

Who:	Train employees involved in grain handling operations
When:	• Initially, or prior to assignment • When new job assignments expose the employee to different hazards • At least annually
What records:	No specific training documentation is required

Electrical training (1910.332)

Who :	Train employees: • Exposed to electric shock • Who work on or near exposed energized parts
When:	Prior to exposure (classroom or on-the-job)
What records:	No specific training documentation is required

Commercial diving (1910.410)

Who:	Train employees who are commercial dive team members
When:	Prior to conducting any tasks on the dive team
What records:	No specific training documentation is required

Asbestos (1910.1001)*

Who:	Train employees who are exposed to airborne concentrations of asbestos at or above the action level
When:	• Initially, or prior to assignment • At least annually thereafter
What records:	• Document employee training • Keep training certification record for one year beyond the employee's last day of employment

13 Carcinogens (1910.1003 through 1910.1016)*

Who:	• Train authorized employees (those assigned to work where a regulated carcinogen is manufactured, processed, used, repackaged, released, handled, or stored) • Train employees who wear respirators according to 1910.134
When:	• Prior to being authorized to enter a regulated area • At least annually thereafter
What records:	No specific training documentation is required

Vinyl chloride (1910.1017)*

Who:	• Train employees: • Who work in covered vinyl chloride or polyvinyl chloride operations • Who wear respirators according to 1910.134
When:	• Initially, or prior to assignment • At least annually thereafter
What records:	No specific training documentation is required

Inorganic arsenic (1910.1018)*

Who:	• Train employees exposed to inorganic arsenic: – above the action level (without regard to respirator use) – when the possibility of skin or eye irritation exists in covered operations • Train employees who clean or launder contaminated protective clothing
When:	• Initially • At least annually thereafter • Within five working days after receiving exposure results, notify each employee in writing of those results
What records:	• Provide specific information to physicians who conduct medical surveillance • Provide each employee with a copy of the physician's written opinion • Provide all materials relating to the employee information and training program to OSHA and NIOSH • Provide a copy of 1910.1018 and its appendices to covered employees • Retain exposure monitoring and medical surveillance records for at least 40 years or the duration of employment plus 20 years, whichever is longer

Access to employee exposure and medical records (1910.1020)*

Who:	Train all employees
When:	• Initially, at the time of hire • At least annually thereafter
What records:	• No specific training documentation is required • Provide copies of 1910.1020 and its appendices to all employees

Lead (1910.1025)*

Who:	Train employees: • With potential exposure to airborne lead • Exposed to airborne lead at or above the action level • Who are at risk of skin or eye irritation • Who use respirators according to 1910.134 • Who clean or launder contaminated protective clothing
When:	• Initially, or prior to assignment • At least annually thereafter • Within five working days after receiving exposure results, notify each employee in writing of his or her exposure level
What records:	• Provide specific information to physicians who conduct medical examinations • Provide each employee with a copy of the physician's written opinion • Provide all materials relating to the employee information and training program to OSHA and NIOSH upon request • Provide a copy of §1910.1025 and its appendices to covered employees • Retain exposure monitoring and medical surveillance records for at least 40 years or the duration of employment plus 20 years, whichever is longer

Chromium (VI) (1910.1026)

Who:	Train employees who are exposed to chromium (VI)
When:	In addition to the requirements of the Hazard Communication standard at 1910.1200(h), the employer has to: • Ensure that each employee can demonstrate knowledge of at least the contents of the 1910.1026 Chromium (VI) standard, and the purpose and a description of the medical surveillance program. • Provide respiratory protection when engineering and work practice controls do not reduce chromium exposures at or below the PEL and for emergency situations. Where respirators are required, employees need to be trained to use the equipment properly according to 1910.134(k). Additionally, when employees have to wear protective clothing and equipment to protect them from skin and eye contact with chromium (VI), training in the proper use must be provided according to 1910.132(f).
What records:	A copy of the Chromium (VI) standard has to be made available at no cost to all affected employees.

Cadmium (1910.1027)*

Who:	Train employees: • With potential exposure to cadmium • Who use respirators according to 1910.134 • With exposure to hazardous substances according to 1910.1200 • Who clean or launder contaminated protective clothing about exposure hazards
When:	• Initially, or prior to assignment • At least annually thereafter • Within 15 working days after receiving exposure results, notify each employee in writing of his or her exposure level and post the results • Within 30 days of an employee request, provide the information that was given to the physician • Within two weeks of receipt, provide each employee with a copy of the physician's written opinion
What records:	• Provide specific information to physicians who conduct medical examinations • Provide all materials relating to the employee information and training program to OSHA upon request • Make a copy of 1910.1027 and its appendices available to affected employees • Retain exposure monitoring for at least 30 years, and retain medical surveillance records for at least the duration of employment plus 30 years

Benzene (1910.1028)*

Who:	Train employees who are exposed to airborne concentrations of benzene at or above the action level.
When:	• Initially, or prior to assignment • At least annually thereafter
What records:	No specific training documentation is required

Coke oven emissions (1910.1029)*

Who:	Train employees: • Assigned to work in a regulated area • Who use respirators according to 1910.134 • Who refuse to participate in the medical surveillance program of the possible health consequences
When:	• Initially, or prior to assignment • At least annually thereafter • Within five working days after receiving exposure results, notify each employee in writing of his or her exposure level
What records:	• Provide specific information to physicians who conduct medical examinations • Provide each employee with a copy of the physician's written opinion • Obtain signed statements from employees who refuse to participate in the medical surveillance program that they understand the risks involved • Maintain records of the training program content • Provide all materials relating to the employee information and training program to OSHA and NIOSH upon request • Post appropriate procedures and schedules in the regulated area • Make a copy of 1910.1029 and its appendices available to covered employees • Retain exposure monitoring and medical surveillance records for the duration of employment plus 30 years

Bloodborne pathogens (1910.1030)*

Who:	Train employees with occupational exposure to bloodborne pathogens
When:	• Prior to initial exposure to bloodborne pathogens • At least annually thereafter
What records:	Maintain for three years specific training records including: • dates • training content • names and qualifications of trainers • names and job titles of those trained

Cotton dust (1910.1043)*

Who:	Train employees: • Exposed to cotton dust in covered operations • Who use respirators according to 1910.134
When:	• Initially, or prior to assignment • At least annually thereafter • When job assignments or work processes change • When performance indicates a need for retraining • Within 20 working days after receiving exposure results, notify each employee in writing of his or her exposure level
What records:	• Provide specific information to physicians who conduct medical examinations • Provide each employee with a copy of the physician's written opinion • Post a copy of 1910.1043 and its appendices, and make copies available to employees upon request • Maintain a record of the training program contents • Provide all materials relating to the employee information and training program to OSHA and NIOSH upon request • Retain exposure monitoring and medical surveillance records for the duration of employment plus 30 years

1,2-dibromo-3-chloropropane (1910.1044)*

Who:	Train employees: • Who are occupationally exposed to 1,2-dibromo-3-chloropropane (DBCP) • Who use respirators according to 1910.134 • Who clean or launder contaminated protective clothing about exposure hazards
When:	• Annually inform employees of the information in Appendix A of 1910.1044 • Within five working days after receiving monitoring results, notify each employee in writing of his or her exposure level
What records:	• Provide specific information to physicians who conduct medical examinations • Provide each employee with a copy of the physician's written opinion • Maintain a record of the training program contents • Provide all materials relating to the employee information and training program to OSHA and NIOSH upon request • Make a copy of 1910.1044 and its appendices available to affected employees • Retain exposure monitoring and medical surveillance records for the duration of employment plus 30 years

Acrylonitrile (1910.1045)*

Who:	Train employees: • Who are occupationally exposed to acrylonitrile (AN) • Who use personal protective equipment according to 1910.132 • Who use respirators according to 1910.134 • Who clean or launder contaminated protective clothing of the hazards of exposure
When:	• At the time of initial assignment • At least annually thereafter • Within five working days after receiving monitoring results, notify each employee in writing of his or her exposure level
What records:	• Provide specific information to physicians who conduct medical examinations • Provide each employee with a copy of the physician's written opinion • Maintain a record of the training program contents, including a certificate under 1910.132 • Provide all materials relating to the employee information and training program to OSHA and NIOSH upon request • Make a copy of 1910.1045 and its appendices available to affected employees • Retain exposure monitoring and medical surveillance records for the duration of employment plus 30 years

Ethylene oxide (1910.1047)*

Who:	Train employees: • Who have potential exposure to Ethylene oxide (EtO) at or above the action level, or above the excursion limit • Who use personal protective equipment according to 1910.132 • Who use respirators according to 1910.134 • In emergency action procedures according to 1910.38
When:	• At the time of initial assignment • At least annually thereafter • Within 15 working days after receiving monitoring results, notify each employee of his or her exposure level either individually in writing or by posting the results • Within 15 days of receipt, provide each employee with a copy of the physician's written opinion
What records:	• Provide specific information to physicians who conduct medical examinations • Make a copy of 1910.1047 and its appendices available to employees • Maintain a training certificate according to 1910.132 • Retain exposure monitoring and medical surveillance records for the duration of employment plus 30 years

Formaldehyde (1910.1048)*

Who:	Train employees: • Assigned to workplaces with exposure to formaldehyde at or above 0.1 ppm • Who use personal protective equipment according to 1910.132 • Who use respirators according to 1910.134 • Who clean or launder contaminated protective clothing about exposure hazards
When:	• At the time of initial assignment • At least annual thereafter • Whenever a new exposure to formaldehyde is introduced • Within 15 days of receipt, provide each employee with a copy of the physician's written opinion • Within 15 working days after receiving monitoring results, notify each employee of his or her exposure level either individually in writing or by posting the results
What records:	• Provide specific information to physicians who conduct medical examinations • Maintain a record of the training program contents, including records under 1910.132 and 1910.134 • Provide all materials relating to the program to employees and to OSHA upon request • Retain exposure monitoring and medical surveillance records for the duration of employment plus 30 years

Methylenedianiline (1910.1050)*

Who:	Train employees: • Who may be exposed to airborne Methylenedianiline (MDA) at or above its action level or where dermal exposure to MDA can occur • Who use personal protective equipment according to 1910.132 • Who use respirators according to 1910.134 • In emergency action procedures according to 1910.38 • Who clean or launder contaminated protective clothing about exposure hazards
When:	• At the time of initial assignment • At least annually thereafter • Within 15 working days after receiving monitoring results, notify each employee of his or her exposure level either individually in writing or by posting the results. • Within 15 days of receipt, provide each employee with a copy of the physician's written opinion
What records:	• Maintain a record of the training program contents • Provide specific information physicians who conduct medical surveillance • Provide all materials relating to the program to employees and to OSHA and NIOSH upon request • Make a copy of 1910.1050 and its appendices available to employees. • Retain exposure monitoring and medical surveillance records for the duration of employment plus 30 years

1,3-butadiene (BD) (1910.1051)*

Who:	Train employees with occupational exposure to 1,3-butadiene
When:	• At or before the time of initial assignment • At least annually thereafter when employees are exposed over the action level or STEL
What records:	• Maintain records according to 1910.1200 • Establish and maintain objective data records relevant to BD exemption

Methylene chloride (MC) (1910.1052)

Who:	Train employees potentially exposed to methylene chloride
When:	• Initially, or prior to assignment • Retrain on an as-needed basis
What records:	No recordkeeping requirements are specified

Ionizing radiation (1910.1096)*

Who:	Train employees working in or frequenting any portion of a covered radiation area
When:	• Annually inform employees of individual exposure monitoring results • Following a reportable exposure incident, provide written notification of exposure to the exposed employee
What records:	• Post a copy of the regulation along with copies of operating procedures, or keep them available for employees upon request • Retain exposure monitoring and medical surveillance records for the duration of employment plus 30 years

Hazard communication (1910.1200)

Who:	Train employees with exposure or potential exposure to hazardous chemicals
When:	• Prior to initial exposure • When a new chemical hazard is introduced • **Note**: Employees must also be trained on the March 26, 2012, changes to the Hazcom standard. These changes incorporate the GHS system of classification and labeling of chemicals. In particular, employees must be trained on the new pictograms, labels, and safety data sheets, by Dec. 1, 2013.
What records:	No specific training documentation is required

Occupational exposure to hazardous chemicals in laboratories (1910.1450)

Who:	Train employees of laboratory facilities where hazardous chemicals, or those which cause health problems in exposed employees, are used
When:	• At the time of initial assignment to a covered work area • Before assignment to new exposure situations • Refresher training as determined by employer
What records:	No specific training documentation is required

Subpart E - Exit routes and emergency planning

Emergency action plans §1910.38

An emergency action plan has to be in writing, kept in the workplace, and available to employees for review. However, an employer with 10 or fewer employees may communicate the plan orally to employees.

An emergency action plan must include at a minimum:

- Procedures for reporting a fire or other emergency;
- Procedures for emergency evacuation, including type of evacuation and exit route assignments;
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate;
- Procedures to account for all employees after evacuation;
- Procedures to be followed by employees performing rescue or medical duties; and
- The name or job title of every employee who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan.

The employer has to designate and train employees to assist in a safe and orderly evacuation and review the emergency action plan with each employee covered by the plan:

- When the plan is developed or the employee is assigned initially to a job;
- When the employee's responsibilities under the plan change; and

- When the plan is changed.

Fire prevention plans
§1910.39

A fire prevention plan has to be in writing, be kept in the workplace, and made available to employees for review. However, an employer with 10 or fewer employees may communicate the plan orally to employees.

The fire prevention plan must include:

- A list of all major fire hazards, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard;
- Procedures to control accumulations of flammable and combustible waste materials;
- Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials;
- The name or job title of employees responsible for maintaining equipment to prevent or control sources of ignition or fires; and
- The name or job title of employees responsible for the control of fuel source hazards.

The employer needs to inform employees of the fire hazards to which they are exposed upon initial job assignment and review with each employee those parts of the fire prevention plan necessary for self-protection.

Subpart F - Powered platforms, manlifts, and vehicle-mounted work platforms

Powered platforms for building maintenance
§1910.66(i)(1)

Working platforms may be operated only by persons who are proficient in the operation, safe use, and inspection of the particular working platform to be operated.

All employees who operate working platforms are to be trained in the following:

- Recognition of, and preventive measures for, the safety hazards associated with their individual work tasks.
- General recognition and prevention of safety hazards associated with the use of working platforms, including the provisions relating to the particular working platform to be operated.
- Emergency action plan procedures required in §1910.66(e)(9).
- Work procedures required in §1910.66(i)(1)(iv) of this section.
- Personal fall arrest system inspection, care, use, and system performance.

Training has to be done by a competent person.

Written work procedures for the operation, safe use, and inspection of working platforms must be provided for employee training. Pictorial methods of instruction may be used in lieu of written work procedures if employee communication is improved using this method. The operating manuals supplied by manufacturers for platform system components can serve as the basis for these procedures.

The employer must certify that employees have been trained. The certification record has to include the identity of the person trained, the signature of the employer or the person who conducted the training, and the date that training was completed. The certification record must be maintained for the duration of the employee's employment.

Appendix C, Section I to Section 1910.66, personal fall arrest system (Section I - Mandatory; Sections II and III - Non-Mandatory)

Section I of Appendix C sets out the mandatory criteria for personal fall arrest systems used by all employees using powered platforms, as required by §1910.66(j)(1). Section II sets out nonmandatory test procedures which may be used to determine compliance with applicable requirements contained in Section I, and Section III provides nonmandatory guidelines which are intended to assist employers in complying with these provisions.

Section I establishes the application of and performance criteria for personal fall arrest systems. Before using a personal fall arrest system, and after any component or system is changed, employees must be trained in accordance with the requirements of §1910.66(i)(1), in the safe use of the system.

Section III includes additional guidelines for a personal fall arrest system. Thorough employee training in the selection and use of personal fall arrest systems is imperative. As stated in the standard, before the equipment is used, employees must be trained in the safe use of the system. This should include the following:

- Application limits.
- Proper anchoring and tie-off techniques.
- Estimation of free fall distance, including determination of deceleration distance, and total fall distance to prevent striking a lower level.
- Methods of use.
- Inspection and storage of the system.

Careless or improper use of the equipment can result in serious injury or death. Employers and employees should become familiar with the material in this appendix, as well as manufacturer's recommendations, before a system is used. Of uppermost importance is the reduction in strength caused by certain tie-offs (such as using knots, tying around sharp edges, etc.) and maximum permitted free fall distance. Also, to be stressed are the importance of inspections prior to use, the limitations of the equipment, and unique conditions at the worksite which may be important in determining the type of system to use.

Employers should obtain comprehensive instructions from the supplier as to the system's proper use and application, including where applicable:

- The force measured during the sample force test.
- The maximum elongation measured for lanyards during the force test.
- The deceleration distance measured for deceleration devices during the force test.
- Caution statements on critical use limitations.
- Application limits.
- Proper hook-ups, anchoring and tie-off techniques, including the proper dee-ring or other attachments point to use on the body belt and harness for fall arrest.
- Proper climbing techniques.
- Methods of inspection, use, cleaning, and storage.
- Specific lifelines which may be used.

This information should be provided to employees during training.

Subpart G - Occupational health and environmental control

Ventilation
§1910.94(d)(9)(i) and (d)(11)(v)

All employees working in and around open-surface tank operations have to be instructed as to the hazards of their jobs, and in the personal protection and first aid procedures applicable to these hazards.

In emergencies, where it is necessary to enter a tank which may contain a hazardous atmosphere, at least one trained standby employee, with suitable respirator, must be present in the nearest uncontaminated area.

Occupational noise exposure
§1910.95(i)(4)

The employer must provide training in the use and care of all hearing protectors provided to employees.

§1910.95(k)

The employer has to institute a training program for all employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels, and must ensure employee participation in the program.

The training program is to be repeated annually for each employee included in the hearing conservation program. Information provided in the training program must be updated to be consistent with changes in protective equipment and work processes.

Each employee must be informed of the following:

- Effects of noise on hearing.
- Purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care.
- Purpose of audiometric testing and an explanation of the test procedures.

§1910.95(l)

The employer has to make copies of the noise standard available to affected employees or their representatives and also post a copy in the workplace.

Additionally, the employer is to provide to affected employees any information materials pertaining to the standard that are supplied to the employer by OSHA.

All materials related to the employer's training and education program have to be provided to OSHA and NIOSH upon request.

§1910.95(m)

Employers are required to maintain two main types of records relating to occupational noise exposure:

- Noise exposure measuring records: These records have to be kept for two years in accordance with §1910.95(d).
- Audiometric test records: These records have to be kept for the duration of the affected employee's employment in accordance with §1910.95(g).

Subpart H - Hazardous materials

Hydrogen
§1910.103(c)(4)(ii)

A qualified person has to be in attendance at all times while the mobile hydrogen supply unit is being unloaded.

Flammable liquids
§1910.106(b)(5)(vi)

When the employer has tank storage in flood areas, detailed printed instructions of what to do in flood emergencies must be properly posted. That station operators and other employees depended upon to carry out the instructions are to be thoroughly informed as to the location and operation of such valves and other equipment necessary to effect these requirements.

Explosives and blasting agents
§1910.109(d)(3)(i) and (d)(3)(iii)

Vehicles transporting explosives must only be driven by and be in the charge of a driver who is familiar with the traffic regulations, State laws, and the provisions of §1910.109.

Every motor vehicle transporting any quantity of Class A or Class B explosives must, at all times, be attended by a driver or other attendant of the motor carrier. This attendant is to have been made aware of the class of the explosive material in the vehicle and of its inherent dangers, and is to have been instructed in the measures and procedures to be followed in order to protect the public from those dangers. He is to have been made familiar with the vehicle he is assigned, and is to have been trained, supplied with the necessary means, and authorized to move the vehicle when required.

§1910.109(g)(3)(iii) and (g)(6)(ii)

The operator of bulk delivery and mixing vehicles is to be trained in the safe operation of the vehicle together with its mixing, conveying, and related equipment. The employer shall assure that the operator is familiar with the commodities being delivered and the general procedure for handling emergency situations.

Vehicles transporting blasting agents must only be driven by and be in charge of a driver in possession of a valid motor vehicle operator's license. This person must also be familiar with the State's vehicle and traffic laws.

§1910.109(h)(4)(i)

Vehicles used over public highways for the bulk transportation of water gels or of ingredients classified as dangerous commodities must meet the requirements of the Department of Transportation and must meet the requirements of §1910.109(d) and (g)(6).

Storage and handling of liquefied petroleum gases
§1910.110(b)(16)

Personnel performing installation, removal, operation, and maintenance work are to be properly trained in these functions.

§1910.110(d)(12)(i)

For systems utilizing containers other than DOT containers, when standard watch service is provided to systems in industrial plants (of 2,000 gallons water capacity and more) and to bulk filling plants, the watch service is to be extended to the LP-Gas installation, and personnel must be properly trained.

Storage and handling of anhydrous ammonia
§1910.111(b)(13)(ii)

The employer has to ensure that tank car unloading operations are performed by reliable persons properly instructed and given the authority to monitor careful compliance with all applicable procedures.

Process safety management of highly hazardous chemicals
§1910.119

Training is required for all employees (including maintenance and contractor employees) involved in operating a process which includes:

- A chemical at or above the specified threshold quantities;
- Pressure vessels and storage tanks;
- Piping systems (including components such as valves);
- Relief and vent systems and devices;
- Emergency shutdown systems;
- Controls; and
- Pumps.

The following is a summary of the training requirements found in §1910.119.

Initial training — (g)(1) through (g)(3), (j)(3), and (l)(3)

Contractors — (h)

Training for process maintenance activities — (i)

§1910.119(g)(1)(i) and (ii), (g)(2), and (g)(3)

Each employee presently involved in operating a process, and each employee before being involved in operating a newly assigned process, is to be trained in an overview of the process and in the operating procedures as specified in §1910.119(f). The training must include emphasis on the specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee's job tasks.

Refresher training must be provided at least every three years, and more often if necessary, to assure that the employee understands and adheres to the current operating procedures of the process. The employer, in consultation with the employees involved in operating the process, shall determine the appropriate frequency of refresher training.

The employer must ascertain that each employee has received and understood the required training. The employer is to prepare a record which contains the identity of the employee, the date of training, and the means used to verify that the employee understood the training.

§1910.119(h)(1) through (h)(3)

The requirements at §1910.119(h) apply to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process. These requirements do not apply to contractors providing incidental services which do not influence process safety, such as janitorial work, food and drink services, laundry, delivery, or other supply services.

The employer, when selecting a contractor, is to obtain and evaluate information regarding the contract employer's safety performance and programs.

The employer has to inform contract employers of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process. The employer is to explain to contract employers the applicable provisions of the emergency action plan required by §1910.119(n). The employer is to develop and implement safe work practices to control the entrance, presence, and exit of contract employers and contract employees in covered process areas.

The employer must periodically evaluate the performance of contract employers in fulfilling their obligations as specified in §1910.119(h)(3). The employer is to maintain a contract employee injury and illness log related to the contractor's work in process areas.

The contract employer has to assure that each contract employee is trained in the work practices necessary to safely perform his/her job and that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to his/her job and the process, and the applicable provisions of the emergency action plan.

The contract employer has to document that each contract employee has received and understood the training required by §1910.119(h); has to prepare a record which contains the identity of the contract employee, the date of training, and the means used to verify that the employee understood the training; and ensure that each contract employee follows the safety rules of the facility including the safe work practices required by §1910.119(f)(4).

The contract employer also has to advise the employer of any unique hazards presented by the contract employer's work, or of any hazards found by the contract employer's work.

§1910.119(i)(1) and (i)(2)(i) through (i)(2)(iv)

The employer must perform a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information. The pre-startup safety review needs to confirm that, prior to the introduction of highly hazardous chemicals to a process:

- Construction and equipment is in accordance with design specifications;
- Safety, operating, maintenance, and emergency procedures are in place and are adequate;
- For new facilities, a process hazard analysis has been performed and recommendations have been resolved or implemented before startup; and modified facilities meet the requirements for management of change outlined at §1910.119(l);
- Employee training has been completed.

§1910.119(j)(3)

The employer has to train each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.

§1910.119(l)(3)

Employees involved in operating a process and maintenance and contract employees whose job tasks will be affected by a change in the process are to be informed of, and trained in, the change prior to start-up of the process or affected part of the process.

Hazardous waste operations and emergency response (HAZWOPER) §1910.120

Following is a summary of the training requirements found in §1910.120.

General training	(e)(1) through (e)(9)
Initial training - General site workers	(e)(3)(i)
Initial training - Occasional workers on site	(e)(3)(ii)
Initial training - Workers regularly on site	(e)(3)(iii)
Workers with 24 hours training who need respirators	(e)(3)(iv)
Management/Supervisor training	(e)(4)
Qualifications for trainers	(e)(5)
Training certifications	(e)(6)
Treatment, storage and disposal (TSD) facilities - New employee	(p)(7)(i)
Emergency response program - Training	(p)(8)(iii)
Skilled support personnel	(q)(4)
Specialist employees	(q)(5)
ERT - First responder awareness level	(q)(6)(i)
ERT - First responder operations level	(q)(6)(ii)
ERT - Hazardous materials technician	(q)(6)(iii)
ERT - Hazardous materials specialist	(q)(6)(iv)
ERT - On-scene incident commander	(q)(6)(v)

§1910.120(e)(1) through (e)(9)

The training programs for employees subject to the requirements of §1910.120(e) have to address:

- The safety and health hazards employees should expect to find on hazardous waste clean-up sites.
- What control measure or techniques are effective for those hazards.
- What monitoring procedures are effective in characterizing exposure levels.
- What makes an effective employer's safety and health program.
- What a site safety and health plan should include.
- Hands on training with personal protective equipment and clothing they may be expected to use.
- The contents of the OSHA standard relevant to the employee's duties and function.
- Employee's responsibilities under OSHA and other regulations.

All employees working on site (such as but not limited to equipment operators, general laborers, and others) exposed to hazardous substances, health hazards, or safety hazards — and their supervisors and management responsible for the site — are to receive training meeting the requirements of §1910.120(e) before they are permitted to engage in hazardous waste operations that could expose them to hazardous substances, safety hazards, or health hazards, and they must receive review training as specified in §1910.120(e).

Employees may not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility.

The training has to thoroughly cover the following:

- Names of personnel and alternates responsible for site safety and health;
- Safety, health and other hazards present on the site;
- Use of personal protective equipment;
- Work practices by which the employee can minimize risks from hazards;
- Safe use of engineering controls and equipment on the site;
- Medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards; and
- The contents of paragraphs (G) through (J) of the site safety and health plan set forth in §1910.120(b)(4)(ii).

Workers

General site workers (such as equipment operators, general laborers, and supervisory personnel) engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards are to receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor.

Workers on site only occasionally for a specific limited task (such as, but not limited to, groundwater monitoring, land surveying, or geo-physical surveying) and who are unlikely to be exposed over permissible exposure limits and published exposure limits are to receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

Workers regularly on site who work in areas which have been monitored and fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, are to receive a minimum of 24 hours of instruction off the site and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

Workers with 24 hours of training who are covered by §1910.120(e)(3)(ii) and (e)(3)(iii), and who become general site workers or who are required to wear respirators, must have the additional 16 hours and two days of training necessary to total the training specified in §1910.120(e)(3)(i).

Managers and supervisors

Supervisors will need training in their responsibilities under the safety and health program and its subject areas such as:

- The spill containment program.
- The personal protective equipment program.
- The medical surveillance program.
- The emergency response plan.
- Other areas.

On-site management and supervisors directly responsible for, or who supervise employees engaged in, hazardous waste operations are to receive 40 hours initial training, and three days of supervised field experience (the training may be reduced to 24 hours and one day if the only area of their responsibility is employees covered by §1910.120(e)(3)(ii) and (e)(3)(iii)) and at least eight additional hours of specialized training at the time of job assignment on such topics as, but not limited to, the employer's safety and health program and the

associated employee training program, personal protective equipment program, spill containment program, and health hazard monitoring procedure and techniques.

Trainers

Trainers are to be qualified to instruct employees about the subject matter that is being presented in training. Such trainers must have satisfactorily completed a training program for teaching the subjects they are expected to teach, or they must have the academic credentials and instructional experience necessary for teaching the subjects. Instructors are to demonstrate competent instructional skills and knowledge of the applicable subject matter.

Training certification

Employees and supervisors that have received and successfully completed the training and field experience specified in §1910.120(e)(1) through (e)(4) are to be certified by their instructor or the head instructor and trained supervisor as having successfully completed the necessary training. A written certificate is to be given to each person so certified. Any person who has not been so certified or who does not meet the requirements of §1910.120(e)(9) must be prohibited from engaging in hazardous waste operations.

Emergency response

Employees who are engaged in responding to hazardous emergency situations at hazardous waste clean-up sites that may expose them to hazardous substances must be trained in how to respond to such expected emergencies.

Refresher and equivalent training

Employees specified in §1910.120(e)(1) of this section, and managers and supervisors specified in §1910.120(e)(4) of this section, are to receive eight hours of refresher training annually on the items specified in §1910.120(e)(2) and/or (e)(4), any critique of incidents that have occurred in the past year that can serve as training examples of related work, and other relevant topics.

Employers who can show by documentation or certification that an employee's work experience and/or training has resulted in training equivalent to that training required in §1910.120(e)(1) through (e)(4) are not required to provide the initial training requirements of those paragraphs to such employees. The employers are to provide a copy of the certification or documentation to the employee upon request. However, certified employees or employees with equivalent training new to a site are to receive appropriate, site specific training before site entry and have appropriate supervised field experience at the new site. Equivalent training includes any academic training or the training that existing employees might have already received from actual hazardous waste site work experience.

§1910.120(i)

Employers are to develop and implement a program, which is part of the employer's safety and health program required in §1910.120(b), to inform employees, contractors, and subcontractors (or their representative) actually engaged in hazardous waste operations of the nature, level, and degree of exposure likely as a result of participation in such hazardous waste operations. Employees, contractors, and subcontractors working outside of the operations part of a site are not covered by this requirement.

§1910.120(p)(7) and (p)(8)(iii)

The training programs for employees subject to the requirements of §1910.120(p), operations conducted under RCRA, are to address:

- The employer's safety and health program elements affecting employees.
- The hazard communication program.
- The medical surveillance program.
- The hazards and the controls for such hazards that employees need to know for their job duties and functions.
- All require annual refresher training.

Workers

Employers conducting operations at treatment, storage, and disposal (TSD) facilities specified in §1910.120(a)(1)(iv) — certain operations conducted under the Resource Conservation and Recovery Act of 1976 (RCRA) — are to provide and implement the programs specified in §1910.120(p).

The employer must develop and implement a training program, which is part of the employer's safety and health program, for employees exposed to health hazards or hazardous substances at TSD operations to enable employees to perform their assigned duties and functions in a safe and healthful manner so as not to endanger themselves or other employees.

The initial training is to be for 24 hours and refresher training is to be for eight hours annually. Employees who have received the initial training are to be given a written certificate attesting that they have successfully completed the necessary training.

Employers who can show by an employee's previous work experience and/or training that the employee has had training equivalent to the required initial training, are to be considered as meeting the initial training requirements. Equivalent training includes the training that existing employees might have already received from actual site work experience. Current employees are to receive eight hours of refresher training annually.

Trainers

Trainers who teach initial training must have satisfactorily completed a training course for teaching the subjects they are expected to teach or they are to have the academic credentials and instruction experience necessary to demonstrate a good command of the subject matter of the courses and competent instructional skills.

Emergency response

Training for emergency response employees must be completed before they are called upon to perform in real emergencies. Such training it to include the elements of the emergency response plan, standard operating procedures the employer has established for the job, the personal protective equipment to be worn, and procedures for handling emergency incidents.

Exception #1 : An employer need not train all employees to the degree specified if the employer divides the work force in a manner such that a sufficient number of employees who have responsibility to control emergencies have the training specified, and all other employees, who may first respond to an emergency incident, have sufficient awareness training to recognize that an emergency response situation exists and that they are instructed in that case to summon the fully trained employees and not attempt control activities for which they are not trained.

Exception #2 : An employer need not train all employees to the degree specified if arrangements have been made in advance for an outside fully-trained emergency response team to respond in a reasonable period and all employees, who may come to the incident first, have sufficient awareness training to recognize that an emergency response situation exists and they have been instructed to call the designated outside fully-trained emergency response team for assistance.

Employee members of TSD facility emergency response organizations are to be trained to a level of competence in the recognition of health and safety hazards to protect themselves and other employees. This would include training in the methods used to minimize the risk from safety and health hazards; in the safe use of control equipment; in the selection and use of appropriate personal protective equipment; in the safe operating procedures to be used at the incident scene; in the techniques of coordination with other employees to minimize risks; in the appropriate response to over exposure from health hazards or injury to themselves and other employees; and in the recognition of subsequent symptoms which may result from over exposures.

The employer is to certify that each covered employee has attended and successfully completed the training required in §1910.120(p)(8)(iii), or is to certify the employee's competency at least yearly. The method used to demonstrate competency for certification of training is to be recorded and maintained by the employer.

§1910.120(q)(4) through (q)(8)

The training programs for employees covered by the requirements of paragraph (q) of this standard, emergency response to hazardous substance releases, are to address those competencies required for the various levels of response such as:

- The hazards associated with hazardous substances.
- Hazard identification and awareness.
- Notification of appropriate persons.
- The need for and use of personal protective equipment including respirators.
- The decontamination procedures to be used.
- Preplanning activities for hazardous substance incidents including the emergency response plan.
- Company standard operating procedures for hazardous substance emergency responses.
- The use of the incident command system and other subjects.

Hands-on training should be stressed whenever possible. Critiques done after an incident which include an evaluation of what worked and what did not and how could the incident be better handled the next time may be counted as training time.

The requirements at §1910.120(q) cover employers whose employees are engaged in emergency response no matter where it occurs — except that §1910.120(q) does not cover employees engaged in operations specified in §1910.120(a)(1)(i) through (a)(1)(iv).

Those emergency response organizations who have developed and implemented programs equivalent to §1910.120(q) for handling releases of hazardous substances pursuant to section 303 of the Superfund Amendments and Reauthorization Act of 1986 (Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. 11003) are deemed to have met the requirements of §1910.120(q).

Skilled support personnel

Support personnel, not necessarily an employer's own employees, are those who are skilled in the operation of certain equipment, such as mechanized earth moving or digging equipment or crane and hoisting equipment, and who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a timely fashion by an employer's own employees. These persons, who will be or may be exposed to the hazards at an emergency response scene, are not required to meet the training required for the employer's regular employees.

However, these personnel must be given an initial briefing at the site prior to their participation in any emergency response. The initial briefing is to include instruction in the wearing of appropriate personal protective equipment, what chemical hazards are involved, and what duties are to be performed. All other appropriate safety and health precautions provided to the employer's own employees are to be used to assure the safety and health of these personnel.

Specialist employees

Specialist employees are technical experts, medical experts, or environmental experts who work with hazardous materials in their regular jobs. These specialists may be sent to the incident scene by the shipper, manufacturer, or governmental agency to advise and assist the person in charge of the incident.

Specialist employees are to receive training or demonstrate competency in the area of their specialization annually.

Employee emergency response training

Training for employees is to be based on their duties and functions. New responders must receive training so that they have the requisite skills and knowledge before they are permitted to take part in actual emergency operations. Employees who participate, or are expected to participate, in emergency response, must receive applicable training in accordance with the requirements for the following response levels:

- First response awareness level.
- First response operations level.
- Hazardous materials technician.
- Hazardous materials specialist.
- On-scene incident commander.

First responder awareness level

First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release. First responders at the awareness level must have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

- An understanding of what hazardous substances are, and the risks associated with them in an incident.
- An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.
- The ability to recognize the presence of hazardous substances in an emergency.
- The ability to identify the hazardous substances, if possible.

- An understanding of the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.
- The ability to realize the need for additional resources, and to make appropriate notifications to the communication center.

First responder operations level

First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release.

Their function is to contain the release from safe distance, keep it from spreading, and prevent exposures. The employer must certify that first responders at the operational level have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level:

- Knowledge of the basic hazard and risk assessment techniques.
- Know how to select and use proper personal protective equipment provided to the first responder operational level.
- An understanding of basic hazardous materials terms.
- Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.
- Know how to implement basic decontamination procedures.
- An understanding of the relevant standard operating procedures and termination procedures.

Hazardous materials technician

Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance.

The employer must certify that hazardous materials technicians have received at least 24 hours of training equal to the first responder operations level and that they are competent in the following areas:

- Know how to implement the employer's emergency response plan.
- Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment.
- Be able to function within an assigned role in the incident command system.
- Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.
- Understand and implement decontamination procedures.

- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.

Hazardous materials specialist

Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain.

The hazardous materials specialist would also act as the site liaison with federal, state, local and other government authorities in regards to site activities. The employer must certify that hazardous materials specialists have received at least 24 hours of training equal to the technician level and that they are competent in the following areas:

- Know how to implement the local emergency response plan.
- Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.
- Know of the state emergency response plan.
- Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.
- Understand in-depth hazard and risk assessment techniques.
- Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.
- Be able to determine and implement decontamination procedures.
- Have the ability to develop a site safety and control plan.
- Understand chemical, radiological and toxicological terminology and behavior.

On-scene incident commander

On-scene incident commanders assume control of the incident scene beyond the first responder awareness level. Employers must certify that on-scene incident commanders have received at least 24 hours of training equal to the first responder operations level and that they are competent in the following areas:

- Know and be able to implement the employer's incident command system.
- Know how to implement the employer's emergency response plan.
- Know and understand the hazards and risks associated with employees working in chemical protective clothing.
- Know how to implement the local emergency response plan.
- Know of the state emergency response plan and of the Federal Regional Response Team.
- Know and understand the importance of decontamination procedures.

Trainers

Trainers who teach any of the previous training subjects are to have satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses offered by the U.S. National Fire Academy, or they must have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach.

There are two National Fire Protection Association standards, NFPA 472 *Standard for Professional Competence of Responders to Hazardous Material Incidents* and NFPA 471 *Recommended Practice for Responding to Hazardous Material Incidents*, which are excellent resource documents to aid fire departments and other emergency response organizations in developing their training program materials.

NFPA 472 provides guidance on the skills and knowledge needed for first responder awareness level, first responder operations level, hazmat technicians, and hazmat specialist. It also offers guidance for the officer corp who will be in charge of hazardous substance incidents.

Refresher training

Those employees who are trained under §1910.120(q)(6) must receive annual refresher training of sufficient content and duration to maintain their competencies, or they are to demonstrate competency in those areas at least yearly.

The employer has to make a statement of the training or competency. If the employer makes a statement of competency, he or she must keep a record of the methodology used to demonstrate competency.

General requirements for dipping and coating operations
§1910.124(e), (f), and (j)(4)

When an employee enters a dip tank, the employer must meet the entry requirements of §1910.146, OSHA's standard for Permit-Required Confined Spaces, as applicable.

Employees must know the first-aid procedures that are appropriate to the dipping or coating hazards to which they are exposed.

Employers have to take steps to inspect and maintain dipping or coating operations. The employer must provide mechanical ventilation or respirators (selected and used as specified in §1910.134, OSHA's Respiratory Protection standard) to protect employees in the vapor area from exposure to toxic substances released during welding, burning, or open-flame work.

Additional requirements for dipping and coating operations that use flammable liquids or liquids with flashpoints greater than 199.4 °F (93 °C)
§1910.125(f)(2)(i)

For every vapor area, the employer must provide manual fire extinguishers that are suitable for flammable and combustible liquid fires and that conform to the requirements of §1910.157. (Employees who are expected to use fire extinguishers need training in their use.)

Subpart I - Personal protective equipment

General requirements
§1910.132(f)

Employers have to assess their workplaces for hazards present that necessitate personal protective equipment (PPE) and then select appropriate equipment to protect workers against the hazards found.

The employer is required to train each employee who has to use PPE. These employees have to be trained in at least the following areas:

- When PPE is necessary.
- What PPE is necessary.
- How to properly put on, take off, adjust, and wear PPE.
- PPE limitations.
- Proper care, maintenance, useful life, and disposal of PPE.

Each affected employee has to demonstrate understanding of the training and the ability to use PPE properly before being allowed to perform work requiring its use.

When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required to use PPE properly, the employer must retrain the employee. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete; or
- Changes in the types of PPE to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

A written training certification must contain each employee's name, the date(s) of training, and the training subject.

Respiratory protection
§1910.134(k)(1) through (k)(6)

Employees need to be trained:

- If they use a respirator.
- If they wear respirators when not required by §1910.134 or by the employer to do so.

Retraining has to be conducted annually, and:

- When changes in the workplace or the type of respirator render previous training obsolete.
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the information from the training.
- Any other situation where retraining is necessary to ensure safe respirator use.

The training needs to cover the following information:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
- Limitations and capabilities of the respirator.
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.

- How to inspect, put on, take off, use, and check the respirator seals.
- Procedures for respirator maintenance and storage.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- For employees who are not required by the employer or the standard to wear a respirator, the basic requirements of Appendix D of §1910.134 must be given in a written or oral format.

Other training items to consider:

- The training has to be comprehensive and understandable. If you have employees who speak another language besides English, you will need to take steps to ensure that they receive and understand the training.
- Previous training not repeated initially by the employer must be provided no later than 12 months from the date of the previous training.
- Training is not necessary for new employees who were previously trained if they can demonstrate they thoroughly understand the provisions of §1910.134(k)(1)(i) through (vii).

Subpart J - General environmental controls

Temporary labor camps
§1910.142(k)(1) and (k)(2)

A person trained to administer first aid must be in charge of adequate first aid facilities approved by a health authority that are maintained and made available in every labor camp.

Specifications for accident prevention signs and tags
§1910.145(c)(1)(ii) and (c)(2)(ii)

All employees are to be instructed that danger signs indicate immediate danger and that special precautions are necessary. All employees must be instructed that caution signs indicate a possible hazard against which proper precautions should be taken.

Permit-required confined spaces
§1910.146(c)(5)(ii)(C) and (c)(5)(ii)(F)

Before an employee enters the space, the internal atmosphere must be tested, with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Employees who enter the space must have an opportunity to observe the pre-entry testing. Entrants must also have an opportunity to observe periodic testing performed as needed.

§1910.146(d)(3)(vi)

Each authorized entrant must have the opportunity to observe permit space monitoring.

§1910.146(d)(5)(iv) through (d)(5)(vi)

Each authorized entrant must an opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces. Authorized entrants can request a reevaluation of the permit space to be done in their presence, and they must be provided with test results.

§1910.146(d)(8)

Employers must designate the persons who are to have active roles (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each employee, and provide each employee with training.

§1910.146(e)(3)

The completed permit is to be made available at the time of entry to all authorized entrants or their authorized representatives, by posting it at the entry portal or by any other equally effective means.

§1910.146(g)

Training has to be provided to each affected employee:

- Before the employee is first assigned duties under this section.
- Before there is a change in assigned duties.
- Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained.
- Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.

The training certification must contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification has to be available for inspection by employees and their authorized representatives.

§1910.146(h)

The employer has to ensure that all authorized entrants:

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Properly use equipment.
- Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to alert entrants of any need to evacuate.
- Alert the attendant whenever they recognize any warning signs or symptoms of exposure to a dangerous situation or they detect a prohibited condition.
- Exit from the permit space as quickly as possible whenever they receive an order to evacuate, they recognize a warning sign or symptom, they detect a prohibited condition, or an evacuation alarm is sounded.

§1910.146(i)

The employer has to ensure that each attendant:

- Knows the hazards that may be faced during entry.
- Is aware of possible behavioral effects of hazard exposure in authorized entrants.
- Continuously maintains an accurate count of authorized entrants in the permit space and can identify the entrants.
- Remains outside the permit space during entry operations until relieved by another attendant.

Note: When the employer's program allows attendant entry for rescue, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations and if they have been relieved by another attendant.

- Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of any need to evacuate.

- Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space. Orders the authorized entrants to evacuate immediately if he or she cannot perform all his or her duties, or if he or she detects a prohibited condition, symptoms of hazard exposure, or a dangerous situation outside the space.
- Summons rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance.
- Takes appropriate actions if unauthorized persons approach or enter a permit space.
- Performs non-entry rescues as specified by the employer's rescue procedure.
- Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

§1910.146(j)

The employer has to ensure that each entry supervisor:

- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
- Terminates the entry and cancels the permit as necessary.
- Verifies that rescue services are available and able to be summoned.
- Removes unauthorized persons who enter or who attempt to enter the permit space.
- Determines that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

§1910.146(k)

An employer who designates rescue and emergency services must:

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

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

- Evaluate a prospective rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants.
- Select a rescue team or service that has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified and is equipped for and proficient in performing the needed rescue services.
- Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site.
- Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

Note: The standard's non-mandatory Appendix F contains examples of criteria which employers can use in evaluating prospective rescuers.

An employer whose employees have been designated to provide permit space rescue and emergency services must take the following measures:

- Provide affected employees with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train affected employees so they are proficient in the use of that PPE, at no cost to those employees.
- Train affected employees to perform assigned rescue duties and to be authorized entrants.
- Train affected employees in basic first aid and cardiopulmonary resuscitation (CPR). At least one member of the available rescue team or service must hold a current certification in first aid and CPR.
- Ensure that affected employees practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces.

To facilitate non-entry rescue, retrieval systems or methods must be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue.

If an injured entrant is exposed to a hazardous substance, the material safety data sheet (MSDS) or other similar written information is to be made available to the medical facility treating the exposed entrant.

§1910.146(l)

Employers are to consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program. All required information must be available to the employees.

Control of hazardous energy (lockout/tagout)
§1910.147(a)(3)(ii)

When other OSHA standards require the use of lockout or tagout, they are to be supplemented by the procedural and training requirements of §1910.147.

§1910.147(c)(6)(i)(D) and (c)(7)(i) through (c)(7)(iv)

The employer has to conduct a periodic inspection of the energy control procedures at least annually. The inspection has to include a review with the authorized employees who use the procedures.

Where tagout is used for energy control, the periodic inspection must include a review between the inspector and each authorized and affected employee of that employee's responsibilities under the procedure being inspected.

Employee training has to include the following:

- Each authorized employee has to receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
- Each affected employee has to be instructed in the purpose and use of the energy control procedure.
- All other employees whose work operations are or may be in an area where energy control procedures may be utilized are to be instructed about the procedure and about the prohibition on attempting to restart or reenergize locked or tagged out machines or equipment.

When tagout systems are used, employees must be trained in the limitations of tags:

- Tags are essentially warning devices. They do not provide the physical restraint that is provided by a lock.
- A tag is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.
- Tags have to be legible and understandable.
- Tags and their means of attachment need to withstand the environmental conditions encountered in the workplace.
- Tags may evoke a false sense of security.
- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

Retraining has to be provided for all authorized and affected employees whenever there is a change in their job assignments; a change in machines, equipment, or processes that present a new hazard; or when there is a change in the energy control procedures.

Additional retraining must also be conducted whenever a periodic inspection or other evidence reveals that there are inadequacies in the employee's knowledge or use of the energy control procedures. The training certification is to contain each employee's name and dates of training.

Subpart K - Medical and first aid

Medical services and first aid
§1910.151(b)

In the absence of an infirmary, clinic, or hospital in near proximity to the workplace, a person or persons must be adequately trained to provide first aid. Adequate first aid supplies must be readily available.

Subpart L - Fire protection

Scope, application, and definitions applicable to Subpart L
§1910.155(c)(41)

"Training" means the process of making proficient through instruction and hands-on practice in the operation of equipment, including respiratory protection equipment, that is expected to be used and in the performance of assigned duties.

Fire brigades
§1910.156(c)

The employer must provide appropriate training and education for all fire brigade members. Training and education is to be provided before fire brigade members perform emergency activities. Fire brigade leaders and training instructors must be provided with training and education which is more comprehensive than that provided to the general membership of the fire brigade.

Training and education must be conducted frequently enough to assure that each fire brigade member is able to satisfactorily perform his or her assigned duties. Training must be provided at least annually. In addition, fire brigade members who are expected to perform interior structural fire fighting are to be provided with an education session or training at least quarterly.

The quality of the training and education program for fire brigade members must be similar to those conducted by such fire training schools as the Maryland Fire and Rescue Institute; Iowa Fire Service Extension; West Virginia Fire Service Extension; Georgia Fire Academy, New York State Department, Fire Prevention and Control; Louisiana State University Firemen Training Program, or Washington State's Fire Service Training Commission for Vocational Education. (For example, for the oil refinery industry, with its unique hazards, the training and education program for those fire brigade members shall be similar to those conducted by Texas A & M University, Lamar University, Reno Fire School, and the Delaware State Fire School.)

The employer has to inform fire brigade members about special hazards such as storage and use of flammable liquids and gases, toxic chemicals, radioactive sources, and water reactive substances, to which they may be exposed during fire and other emergencies. The fire brigade members must also be advised of any changes that occur in relation to the special hazards. The training and education program is to include written procedures that describe the actions to be taken in situations involving the special hazards.

Paragraph 5 of Appendix A to Subpart L - Fire protection

The paragraph on training and education does not contain specific training and education requirements because the type, amount, and frequency of training and education will be as varied as are the purposes for which fire brigades are organized.

Hands-on training required

At a minimum, hands-on training is required to be conducted annually for all fire brigade members. However, for those fire brigade members who are expected to perform interior structural fire fighting, some type of training or education session must be provided at least quarterly.

In addition to the required hands-on training, it is strongly recommended that fire brigade members receive other types of training and education such as: classroom instruction, review of emergency action procedures, pre-fire planning, review of special hazards in the workplace, and practice in the use of self-contained breathing apparatus.

Refresher training

It is not necessary for the employer to duplicate the same training or education that a fire brigade member receives as a member of a community volunteer fire department, rescue squad, or similar organization. However, such training or education must have been provided to the fire brigade member within the past year and it must be documented that the fire brigade member has received the training or education.

Instructor qualifications

Fire brigade training instructors must receive a higher level of training and education than the fire brigade members they will be teaching. This includes being more knowledgeable about the functions to be performed by the fire brigade and the hazards involved.

For recommended qualifications of fire brigade training instructors, consult the following:

- International Fire Service Training Association.
- National Fire Protection Association (NFPA-1041).
- International Society of Fire Service Instructors.
- Other fire training resources.

Fire brigade leaders

It is important for those who supervise the fire brigade, e.g., fire brigade chiefs, leaders, etc., to receive the necessary training and education. Fire service training resources should be consulted to determine the kinds of training and education that are necessary for individuals with fire brigade leadership responsibilities.

It is suggested that fire brigade leaders and fire brigade instructors receive more formalized training and education on a continuing basis by attending classes provided by such training sources as universities and university fire extension services.

Training program elements

The following recommendations should not be considered to be all of the necessary elements of a complete comprehensive training program, but the information can be used as a guide in developing a fire brigade training program.

All fire brigade members should be familiar with:

- Exit facilities and their location.
- Emergency escape routes for handicapped workers.
- Workplace "emergency action plan."

In addition, fire brigade members who are expected to control and extinguish incipient stage fires should, at a minimum, be trained on fire equipment they are assigned to use:

- Fire extinguishers.
- Standpipes.
- Other fire equipment.

They need to be aware of:

- First aid medical procedures.
- Procedures for dealing with special hazards to which they may be exposed.

Training and education needs to include both classroom instruction and actual operation of the equipment under simulated emergency conditions. Hands-on type training must be conducted at least annually, but some functions should be reviewed more often.

In addition to the above training, fire brigade members who are expected to perform emergency rescue and interior structural fire fighting should, at a minimum, be familiar with the proper techniques in rescue and fire suppression procedures.

Special hazards training

There must be written procedures that describe the actions to be taken in situations involving special hazards. Fire brigade members must be trained in handling these special hazards as well as keeping abreast of any changes that occur in relation to these special hazards.

Training resources

There are many excellent sources of training and education that the employer may want to use in developing a training program for the workplace fire brigade. These sources include publications, seminars, and courses offered by universities.

There are also excellent fire school courses by such facilities as Texas A & M University, Delaware State Fire School, Lamar University, and Reno Fire School, that deal with those unique hazards which may be encountered by fire brigades in the oil and chemical industry. These schools, and others, also offer excellent training courses which would be beneficial to fire brigades in other types of industries. These courses should be a continuing part of the training program, and employers are strongly encouraged to take advantage of these excellent resources.

Portable fire extinguishers
§1910.157(g)

Where the employer has provided portable fire extinguishers for employee use in the workplace, the employer has to provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting. The employer has to provide the education upon initial employment and at least annually thereafter.

The employer must provide employees who have been designated to use fire fighting equipment as part of an emergency action plan with training in the use of the appropriate equipment upon initial assignment and at least annually thereafter.

Standpipe and hose systems
§1910.158(e)(2)(vi)

The employer has to designate trained persons to conduct all required inspections.

Fixed extinguishing systems
§1910.160(b)(2) and (b)(10)

If for any reason a fixed extinguishing system becomes inoperable, the employer must notify employees and take the necessary temporary precautions to assure their safety until the system is restored to operating order. Any defects or impairments are to be properly corrected by trained personnel.

The employer has to train employees designated to inspect, maintain, operate, or repair fixed extinguishing systems and review their training annually.

Fire detection systems
§1910.164(c)(4)

The employer must assure that the servicing, maintenance, and testing of fire detection systems, including cleaning and necessary sensitivity adjustments, are performed by adequately trained persons.

Employee alarm systems
§1910.165(b)(4) and (b)(5)

The employer has to explain to each employee the preferred means of reporting emergencies, such as manual pull box alarms, public address systems, radio, or telephones. The employer is to post emergency telephone numbers near telephones, or employee notice boards, and other conspicuous locations when telephones serve as a means of reporting emergencies.

For those employers with 10 or fewer employees in a particular workplace, direct voice communication is an acceptable procedure for sounding the alarm provided all employees can hear the alarm. Such workplaces need not have a back-up system.

§1910.165(d)(5)

The employer must assure that the servicing, maintenance, and testing of employee alarms are done by adequately trained persons.

Subpart N - Materials handling and storage

Servicing of single piece and multi-piece rim wheels
§1910.177(c)(1), (c)(2) and (c)(3)

Employers have to provide training to all employees who service multi-piece rim wheels.

- No employee may service any multi-piece rim wheel unless he or she has been trained and instructed in the correct procedures of mounting, demounting, and all related services, activities, and correct safety precautions and the safe operating procedures for the rim type being serviced.
- Information to be used in the training program has to include at a minimum, the data contained on the charts and the contents of §1910.177. **Note**: OSHA recently revised the charts that must be available to employees performing servicing under 1910.177. The charts are very detailed and contain graphics to assist employees. To download the charts, visit http://1.usa.gov/TireCharts.
- Where an employer knows or has reason to believe that an employee is unable to read and understand the charts or rim manual, the employee has to receive instruction concerning the contents of the charts and rim manual in a manner which the employee is able to understand.

The employer has to ensure that each employee demonstrates and maintains his ability to service multi-piece rims wheels safely, including performance of the following tasks:

- Demounting of tires (including deflation);
- Inspection of wheel components;
- Mounting of tires (including inflation within a restraining device);
- Use of the restraining device;
- Handling of wheels;
- Inflation of tires when a wheel is mounted on the vehicle; and
- An understanding of the necessity of standing outside the trajectory both during inflation of the tire and during inspection of the rim wheel following inflation; and
- Installation and removal of rim wheels.

The employer must evaluate each employee's ability to perform these tasks and is to provide additional training as necessary.

§1910.177(f)

The employer has to establish a safe operating procedure for servicing *multi-piece rim wheels* and ensure that employees are instructed in and follow that procedure. The procedure must include at least the following elements:

- Tires must be completely deflated before demounting by removal of the valve core.
- Tires are to be completely deflated by removing the valve core before a rim wheel is removed from the axle when the tire has been driven underinflated or when there is obvious or suspected damage.
- Rubber lubricant is to be applied to bead and rim mating surfaces during assembly of the wheel and inflation of the tire, unless the tire or wheel manufacturer recommends against it.
- If a tire on a vehicle is underinflated but has more than 80 percent of the recommended pressure, the tire may be inflated while the rim wheel is on the vehicle provided remote control inflation equipment is used, and no employees remain in the trajectory during inflation.
- Tires are to be inflated outside a restraining device only to a pressure sufficient to force the tire bead onto the rim ledge and create an airtight seal with tire and bead.

- Whenever a rim wheel is in a restraining device the employee must not rest or lean any part of his body or equipment on or against the restraining device.
- After tire inflation, the tire and wheel component are to be inspected while still within the restraining device to make sure that they are properly seated and locked.
- No attempt is to be made to correct the seating of side and lock rings by hammering, striking or forcing the components while the tire is pressurized.
- Cracked, broken, bent, or otherwise damaged rim components must not be reworked, welded, brazed, or otherwise heated.
- Whenever multi-piece rim wheels are being handled, employees must stay out of the trajectory unless the employer can demonstrate that performance of the servicing makes the employee's presence in the trajectory necessary.
- No heat is to be applied to a multi-piece wheel or wheel component.

§1910.177(g)

The employer must establish a safe operating procedure for servicing *single piece rim wheels* and ensure that employees are instructed in and follow that procedure. The procedure shall include at least the following elements:

- Completely deflate tires by removing the valve core before demounting.
- Mounting and demounting of the tire must be done only from the narrow ledge side of the wheel. Care must be taken to avoid damaging the tire beads while mounting tires on wheels. Tires are to be mounted only on compatible wheels of matching bead diameter and width.
- Nonflammable rubber lubricant is to be applied to bead and wheel mating surfaces before assembly of the rim wheel, unless the tire or wheel manufacturer recommends against the use of any rubber lubricant.
- If a tire changing machine is used, the tire is to be inflated only to the minimum pressure necessary to force the tire bead onto the rim ledge while on the tire changing machine.
- If a bead expander is used, it must be removed before the valve core is installed and as soon as the rim wheel becomes airtight (the tire bead slips onto the bead seat).
- Tires may be inflated only when contained within a restraining device, positioned behind a barrier or bolted on the vehicle with the lug nuts fully tightened.
- Tires must not be inflated when any flat, solid surface is in the trajectory and within one foot of the sidewall.
- Employees must stay out of the trajectory when inflating a tire.
- Tires must not be inflated to more than the inflation pressure stamped in the sidewall unless a higher pressure is recommended by the manufacturer.
- Tires are not to be inflated above the maximum pressure recommended by the manufacturer to seat the tire bead firmly against the rim flange.
- No heat is to be applied to a single piece wheel.
- Cracked, broken, bent, or otherwise damaged wheels must not be reworked, welded, brazed, or otherwise heated.

Powered industrial trucks
§1910.178(l)

The employer must ensure that each powered industrial truck operator is competent to operate the vehicle safely, as demonstrated by the successful completion of training and evaluation.

Trainees may operate a powered industrial truck only under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence, and where such operation does not endanger the trainee or other employees.

Training has to consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material); practical training (demonstrations performed by the trainer and practical exercises performed by the trainee); and evaluation of the operator's performance in the workplace.

All operator training and evaluation has to be conducted by persons who have the knowledge, training, and experience to train powered industrial truck operators and evaluate their competence.

Powered industrial truck operators are to receive initial training in the following topics:

Truck-related topics

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate.
- Differences between the truck and the automobile.
- Truck controls and instrumentation: where they are located, what they do, and how they work.
- Engine or motor operation.
- Steering and maneuvering.
- Visibility (including restrictions due to loading).
- Fork and/or attachment adoption, operation, and use limitations.
- Vehicle capacity.
- Vehicle stability.
- Any vehicle inspection and maintenance that the operator will be required to perform.
- Refueling and/or charging and recharging of batteries.
- Operating limitations.
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.

Workplace-related topics

- Surface conditions where the vehicle will be operated.
- Composition of loads to be carried and load stability.
- Load manipulation, stacking, unstacking.
- Pedestrian traffic in areas where the vehicle will be operated.
- Narrow aisles and other restricted places where the vehicle will be operated.
- Hazardous (classified) locations where the vehicle will be operated.
- Ramps and other sloped surfaces that could affect the vehicle's stability.

- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust.
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.
- And, the requirements of §1910.178.

Refresher training, including an evaluation, is to be conducted when:

- The operator has been observed to operate the vehicle in an unsafe manner.
- The operator has been involved in an accident or near-miss incident.
- The operator has received an evaluation that reveals that the operator is not operating the truck safely.
- The operator is assigned to drive a different type of truck.
- A condition in the workplace changes in a manner that could affect safe operation of the truck.

An evaluation of each powered industrial truck operator's performance must be conducted at least once every three years.

If an operator has previously received appropriate training, additional training in that topic is not required if the evaluation finds the operator competent to operate the truck safely.

The training certification has to include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation.

Elements of a forklift operator training program

Employers must implement a forklift training program and allow only successfully trained and evaluated operators to drive forklifts (except during supervised training). Training has to include both classroom and practical information, and be conducted by a knowledgeable person who evaluates each trainee's competency. For example, practical training could include:

- Pre-operational inspection.
- Picking up a load.
- Traveling with a load.
- Setting down or stacking a load.
- Operation of various hand trucks, tuggers, and powered pallet jacks.

The forklift operator training program is to be based on the type of vehicles an employee will actually operate. Training is to emphasize features of the workplace that affect operation and include general safety rules for all forklifts, as well as requirements of the regulation.

Vehicle maintenance

Explain these points to trainees:

- Procedures for operators to report needed repairs.
- Verification of repairs.
- The obligation to refuse to work with unsafe equipment.
- Refueling procedures.

A model safety check starts with this walk-around inspection. Check:

- Fork pins and stops to make sure they are in place.
- All cowling and body parts.
- Wheels and tires.
- Broken or loosened parts.
- Fuel level, crankcase oil level, radiator water level (if applicable), engine air cleaner, fan belt, hydraulic fluid level, battery water level and other points required by the particular model.
- Operation of the hour meter and record it.
- Head lights, tail lights, warning lights, and other lights.
- Oil pressure gauge, water temperature gauge, ammeter, clutch, hydraulics, and other controls.
- Brakes.

Forklift rules of the road

Forklift accidents can be prevented. The following "rules of the road" provide general guidelines for safe forklift operation.

- Watch where you are going.
- Keep to the right.
- Obey speed limits.
- Keep three vehicle lengths away from other vehicles.
- Slow down at all intersections.
- The pedestrian always has the right of way.
- No horse play is allowed.
- No riders are allowed — not on the forks, not on the seat, not on the back.
- Always keep arms and legs inside the vehicle.
- Face the direction of travel.
- When you leave the forklift but remain within twenty-five feet of the truck, completely lower the load engaging means, put controls in neutral, and set the brakes.
- When you leave a vehicle unattended, shut off the power, set the brakes, bring the mast to the vertical position, completely lower the load engaging means, and put controls in neutral. When you leave the vehicle on an incline, chock the wheels.
- Keep loads within the maximum load capacity on the forklift nameplate.
- Do not move a loaded forklift until the load is safe and secure.
- Carry the load low enough to avoid hitting overhead obstructions such as doorways, pipes, electrical conduits, or sprinklers.
- Do not operate a forklift with a leak in the fuel system.
- Know the position of your forks at all times.
- Stop completely before raising or lowering a load.
- Never travel with a load raised high.

Overhead and gantry cranes
§1910.179(o)(3)

Operators must be familiar with the operation and care of provided fire extinguishers.

Crawler locomotive and truck cranes
§1910.180(h)(3)(xii)

When two or more cranes are used to lift one load, one designated person is to be responsible for the operation. This individual is required to analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

§1910.180(i)(5)(ii)

Operating and maintenance personnel must be familiar with the use and care of provided fire extinguishers.

Derricks
§1910.181(j)(3)(ii)

Operating and maintenance personnel must be familiar with the use and care of provided fire extinguishers.

Subpart O - Machinery and machine guarding

Mechanical power presses
§1910.217(e)(3)

The employer must ensure the competence of personnel caring for, inspecting, and maintaining power presses.

§1910.217(f)(2)

The employer has to train and instruct the press operator in safe methods before starting work and ensure that correct operating procedures are being followed.

§1910.217(h)(13)

Operator training has to be provided to the employee before the employee initially operates the press and as needed to maintain competence, but not less than annually thereafter.

Forging machines
§1910.218(a)(2)(iii)

The employer is required to train personnel for the proper inspection and maintenance of forging machinery and equipment.

Woodworking machinery requirements
§1910.213(s)(5)

(5) Sharpening or tensioning of saw blades or cutters shall be done only by persons of demonstrated skill in this kind of work.

Subpart Q - Welding, cutting and brazing

Welding, cutting, and brazing
§1910.252(a)(2)(iii)(B), (a)(2)(xiii)(C), and (c)(1)(iv)

Fire watchers need to have fire extinguishing equipment readily available and be trained in its use. They have to be familiar with facilities for sounding an alarm in the event of a fire. They must watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm. A fire watch is to be maintained for at least a half hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires.

Management must insist that cutters or welders and their supervisors are suitably trained.

The employer must include the potentially hazardous materials employed in fluxes, coatings, coverings, and filler metals, all of which are potentially used in welding and cutting, or are released to the atmosphere during

welding and cutting, in the program established to comply with the Hazard Communication Standard (HCS) (§1910.1200). The employer shall ensure that each employee has access to labels on containers of such materials and safety data sheets, and is trained in accordance with the provisions of §1910.1200.

Oxygen-fuel gas welding and cutting
§1910.253(a)(4)

Workmen in charge of the oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems must be properly instructed and judged competent by their employers. Rules and instructions covering the operation and maintenance of the equipment are to be readily available.

§1910.253(e)(6)(ii)

When regulators or parts of regulators, including gages, need repair, the work must be performed by skilled mechanics who have been properly instructed.

Arc welding and cutting
§1910.254(a)(3)

Only properly instructed and qualified workers may operate arc welding equipment.

§1910.254(d)(1)

Workers assigned to operate or maintain arc welding equipment must be acquainted with the requirements of §1910.254 and with §1910.252(a), (b), and (c).

Resistance welding
§1910.255(a)(3)

Only properly instructed and qualified workers may operate resistance welding equipment.

§1910.255(e)

Qualified maintenance personnel have to conduct periodic inspections and maintain a certification record. The certification record is to include the date of inspection, the signature of the person who performed the inspection, and the serial number, or other identifier, of the equipment inspected. The operator must report any equipment defects to the supervisor and the use of the equipment must be discontinued until safety repairs have been completed.

Subpart R - Special industries

Pulp, paper, and paperboard mills
§1910.261(h)(3)(ii)

Gas masks capable of absorbing chlorine must be supplied, conveniently placed, and regularly inspected. Workers who may be exposed to chlorine have to be instructed in their use.

Laundry machinery and operations
§1910.264(d)(1)(v)

Employees must be properly instructed in the hazards of their work and safe practices by bulletins, printed rules, and verbal instructions.

Sawmills
§1910.265(c)(3)(x)

Lift trucks must be designed, constructed, maintained, and operated according to the requirements in the Powered Industrial Truck standard at §1910.178.

Logging operations
§1910.266(c)

A "designated person" is an employee who has the requisite knowledge, training, and experience to perform specific duties.

§1910.266(d)(7)(iii) and (d)(10)(ii)

Only a designated person is to give signals, except in an emergency, and handle or use explosives and blasting agents.

§1910.266(f)(2)(i)

The machine is to be started and operated only by a designated person.

§1910.266(i)

The employer must provide training for each employee, including supervisors, at no cost to the employee.

Provide the training:

- Prior to initial assignment.
- Whenever the employee is assigned new work tasks, tools, equipment, machines or vehicles.
- Whenever an employee demonstrates unsafe job performance.

At a minimum, training has to include the following elements:

- Safe performance of assigned work tasks.
- Safe use, operation, and maintenance of tools, machines and vehicles the employee uses or operates, including emphasis on understanding and following the manufacturer's operating and maintenance instructions, warnings, and precautions.
- Recognition of safety and health hazards associated with the employee's specific work tasks, including the use of measures and work practices to prevent or control those hazards.
- Recognition, prevention and control of other safety and health hazards in the logging industry.
- Procedures, practices and requirements of the employer's work site.
- The requirements of §1910.266.

Training due to unsafe job performance or assignment of new work tasks, tools, equipment, machines, or vehicles may be limited to relevant elements. Each new employee who has received training in the particular required elements is not to be required to be retrained in those elements prior to initial assignment.

The employer is responsible to ensure that each current and new employee can properly and safely perform the work tasks and operate the tools, equipment, machines, and vehicles used in the job. Employees must work under the close supervision of a designated person until they demonstrate the ability to safely perform their new duties independently.

The employer must ensure that each employee, including supervisors, receives or has received first aid and CPR training meeting at least the requirements specified in Appendix B of §1910.266, and that the certifications remain current. All training must be conducted by a designated person.

The employer must ensure that all training is presented in a manner that the employee is able to understand. All training materials used must be appropriate in content and vocabulary to the educational level, literacy, and language skills of the employees being trained.

The written training certification record has to contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted prior to the employee's hiring, the certification record is to indicate the date the employer determined the prior training was adequate. Maintain the most recent certification.

The employer is required to hold safety and health meetings as necessary, and at least each month for each employee. Safety and health meetings may be conducted individually, in crew meetings, in larger groups, or as part of other staff meetings.

§1910.266, Appendix B - First aid and CPR training (Mandatory)

First aid and CPR training must be conducted using the conventional methods of training such as lecture, demonstration, practical exercise, and examination (both written and practical). The length of training must be sufficient to assure that trainees understand the concepts and can demonstrate their ability to perform.

At a minimum, first aid and CPR training is to consist of the following:

1. The definition of first aid.
2. Legal issues of applying first aid (Good Samaritan Laws).
3. Basic anatomy.
4. Patient assessment and first aid for the following:
    - Respiratory arrest.
    - Cardiac arrest.
    - Hemorrhage.
    - Lacerations/abrasions.
    - Amputations.
    - Musculoskeletal injuries.
    - Shock.
    - Eye injuries.
    - Burns.
    - Loss of consciousness.
    - Extreme temperature exposure (hypothermia/hyperthermia).
    - Paralysis.
    - Poisoning.

- Loss of mental functioning (psychosis/hallucinations, etc.).
- Artificial ventilation.
- Drug overdose.

5. CPR.
6. Application of dressings and slings.
7. Treatment of strains, sprains, and fractures.
8. Immobilization of injured persons.
9. Handling and transporting injured persons.
10. Treatment of bites, stings, or contact with poisonous plants or animals.

Telecommunications
§1910.268(b)

Employees assigned to work with storage batteries must be instructed in emergency procedures such as dealing with accidental acid spills.

§1910.268(c)

Employers must provide training before employees engage in covered activities. However, where the employer can demonstrate that an employee is already trained prior to his employment, training need not be provided to that employee.

Training has to consist of on-the-job training, classroom-type training, or a combination of both. The training program must include a list of the subject courses and the types of personnel required to receive such instruction. A written description of the training program and a record of employees who have received such training has to be maintained for the duration of the employee's employment. Training must include the following subjects:

- Recognition and avoidance of dangers relating to encounters with harmful substances, and animal, insect, or plant life.
- Procedures to be followed in emergency situations.
- First aid training, including instruction in artificial respiration.

§1910.268(j)(4)(iv)(D)

Only persons trained in the operation of the derrick are permitted to operate the derrick.

§1910.268(l)(1)

Employees involved in using high voltages to locate trouble or test cables must be instructed in appropriate safety precautions.

§1910.268(o)(1)(ii) and (o)(3)

While work is being performed in the manhole, a person with basic first aid training must be immediately available to render assistance if other provisions do not adequately protect employees.

While work is being performed in a manhole occupied jointly by an electric utility and a telecommunication utility, an employee with basic first aid training has to be available in the immediate vicinity to render emergency assistance. The employee may occasionally enter a manhole to provide assistance other than in an

emergency. These requirements do not preclude a qualified employee from working alone or from entering, for brief periods of time, a manhole where energized cables or equipment are in service.

§1910.268(q)(1)(ii)(A) through (q)(1)(ii)(D) and (q)(2)(ii) through (q)(2)(iv)

Employees engaged in line-clearing operations must be instructed that:

- A direct contact is made when any part of the body touches or contacts an energized conductor, or other energized electrical fixture or apparatus.
- An indirect contact is made when any part of the body touches any object in contact with an energized electrical conductor, or other energized fixture or apparatus.
- An indirect contact can be made through conductive tools, tree branches, trucks, equipment, or other objects, or as a result of communications wires, cables, fences, or guy wires being accidentally energized.
- Electric shock will occur when an employee, by either direct or indirect contact with an energized conductor, energized tree limb, tools, equipment, or other object, provides a path for the flow of electricity to a grounded object or to the ground itself. Simultaneous contact with two energized conductors will also cause electric shock which may result in serious or fatal injury.

Only qualified employees or trainees, familiar with the special techniques and hazards involved in line clearance, are to be permitted to perform the work if it is found that an electrical hazard exists.

During all tree working operations aloft where an electrical hazard of more than 750V exists, there must be a second qualified employee within normal voice communication.

The clearances from energized conductors given in Table R-3 of §1910.268 are to apply.

Electric power generation, transmission, and distribution
§1910.269

Employers have to train employees in safety-related work practices, safety procedures, and other applicable safety requirements. Employees must also be trained in and familiar with any other safety practices, including applicable emergency procedures (such as pole top and manhole rescue), that are related to their work and are necessary for their safety.

This standard requires training in specific competencies:

- Skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment;
- Skills and techniques necessary to determine the nominal voltage of exposed live parts;
- Minimum approach distances specified in this section corresponding to the voltages to which the qualified employee will be exposed;
- Proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment.

The standard also requires:

- Monitoring to ensure continued employee compliance with safe work practices.
- Additional training if necessary.
- Establishing proficiency measures.
- Certification of employee proficiency in safety-related work practices.

Paragraph (d), the hazardous energy control regulations of §1910.269, requires certification of training and retraining for employees who service or maintain a machine or equipment where unexpected energizing, start up, or release of stored energy could occur and cause injury.

The enclosed spaces rule, §1910.269(e), mandates training in enclosed space entry and rescue procedures.

The standard includes other training requirements for cardiopulmonary resuscitation and first aid, personal protective equipment for flame or electrical arc hazards, safe work practices for high-voltage and high-power testing, and live-line bare-hand techniques for overhead line work.

[**Note:** §1910.269(g)(2) references Subpart E under 1926. As of February 6, 1995, fall protection specifications were moved from Subpart E to Subpart M (§1926.503).]

Grain handling facilities
§1910.272(e)(1) and (e)(2)

The employer must provide training at least annually, and when changes in job assignments will expose employees to new hazards. Current employees and new employees prior to starting work have to be trained in at least:

- General safety precautions associated with the facility, including recognition and preventive measures for the hazards related to dust accumulations and common ignition sources such as smoking; and,
- Specific procedures and safety practices applicable to their job tasks including but not limited to: cleaning procedures for grinding equipment, clearing procedures for choked legs, housekeeping procedures, hot work procedures, preventive maintenance procedures, and lock-out/tag-out procedures.

Employees assigned special tasks, such as bin entry and handling of flammable or toxic substances, must be provided training to perform these tasks safely.

§1910.272(g)(5)

The employee acting as observer must be trained in rescue procedures, including notification methods for obtaining additional assistance.

§1910.272(h)(1) and (h)(2)

The employer has to inform contractors performing work at the grain handling facility of known potential fire and explosion hazards related to the contractor's work and work area. The host employer must also inform contractors of the applicable safety rules of the facility, including the applicable provisions of the emergency action plan.

Subpart S - Electrical

Electrical training
§1910.332(a)

Employees who face a risk of electric shock that is not reduced to a safe level by the electrical installation requirements of §§1910.303 through 1910.308 have to be trained in electrical safety.

Note: Employees in occupations listed in Table S-4 face such a risk and are required to be trained. Other employees who also may reasonably be expected to face a comparable risk of injury due to electric shock or other electrical hazards must also be trained.

§1910.332(b)

Employees are to be trained in and familiar with the safety-related work practices required by §§1910.331 through 1910.335 that pertain to their respective job assignments.

Covered employees who are not qualified persons must also be trained in and familiar with any electrical-related safety practices not specifically addressed by §§1910.331 through 1910.335 but which are necessary for their safety.

Qualified persons (i.e., those permitted to work on or near exposed energized parts) must, at a minimum, be trained in and familiar with the following:

- The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
- The skills and techniques necessary to determine the nominal voltage of exposed live parts.
- The clearance distances specified in §1910.333(c) and the corresponding voltages to which the qualified person will be exposed.

Note 1: For the purposes of §§1910.331 through 1910.335, a person must have the training required by paragraph (b)(3) of this section in order to be considered a qualified person.

Note 2: Qualified persons whose work on energized equipment involves either direct contact or contact by means of tools or materials must also have the training needed to meet §1910.333(c)(2).

§1910.332(c)

Training is to be of the classroom or on-the-job type. The degree of training is determined by the risk to the employee.

Table S-4 Typical occupational categories or employees facing a higher than normal risk of electrical accidents

Occupation
Blue collar supervisors[1]
Electrical and electronic engineers[1]
Electrical and electronic equipment assembler[1]
Electrical and electronic technicians[1]
Electricians
Industrial machine operators[1]
Material handling equipment operators[1]
Mechanics and repairers[1]
Painters[1]
Riggers and roustabouts[1]
Stationary engineers[1]
Welders

[1]Workers in these groups do not need to be trained, if their work or the work of those they supervise does not bring them or the employees they supervise close enough to exposed parts of electric circuits operating at 50 volts or more ground for a hazard to exist.

Subpart T - Commercial diving operations

Qualifications of dive team
§1910.410(a)(1) through (a)(4)

Each dive team member must have experience or training in the following:

- The use of tools, equipment, and systems relevant to assigned tasks.
- Techniques of the assigned diving mode.
- Diving operations and emergency procedures.

All dive team members must be trained in cardiopulmonary resuscitation and first aid (American Red Cross standard course or equivalent). Dive team members who are exposed to or control the exposure of others to hyperbaric conditions must be trained in diving-related physics and physiology.

§1910.410(b)(1)

Each dive team member is to be assigned tasks according to his or her experience or training, except that limited additional tasks may be assigned to an employee undergoing training, provided that these tasks are performed under the direct supervision of an experienced dive team member.

§1910.410(c)(2)

The designated person-in-charge must have experience and training in the conduct of the assigned diving operation.

Subpart Z - Toxic and hazardous substances

Asbestos
§1910.1001(j)(1)(iii), (j)(7)

The employer must institute a training program for all employees who are exposed to airborne concentrations of asbestos at or above the PEL and/or excursion limit and ensure their participation in the program. Training has to be provided prior to or at the time of initial assignment, and at least annually thereafter.

The training program must be conducted in a manner which the employee is able to understand. Each employee must be informed of:

- The health effects associated with asbestos exposure.
- Relationship between smoking and exposure to asbestos producing lung cancer.
- The quantity, location, manner of use, release, and storage of asbestos, and the specific nature of operations which could result in exposure to asbestos.
- Engineering controls and work practices associated with the employee's job.
- The specific procedures implemented to protect employees from exposure to asbestos, such as appropriate work practices, emergency and clean-up procedures, and personal protective equipment to be used.
- The purpose, proper use, and limitations of respirators and protective clothing.
- The purpose and a description of the medical surveillance program required.
- The content of the asbestos standard, including appendices.
- The names, addresses, and phone numbers of public health organizations which provide information, materials, and/or conduct programs concerning smoking cessation.
- The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels.

At least once a year, the employer has to also provide, at no cost to employees who perform housekeeping operations in an area which contains ACM or PACM, an asbestos awareness training course, which must contain at least the following elements: health effects of asbestos, locations of ACM and PACM in the building/facility, recognition of ACM and PACM damage and deterioration, requirements in the standard relating to housekeeping, and proper response to fiber release episodes.

A copy of the asbestos standard and its appendices has to be readily available, and at no cost, to all affected employees.

The employer must provide, upon request, all materials relating to the employee information and training program to OSHA and the training program to OSHA and NIOSH representatives.

The employer must inform all employees concerning the availability of self-help smoking cessation program material. Upon employee request, the employer is required to distribute such material, consisting of NIH Publication No. 89-1647, or equivalent self-help material.

Employers must include asbestos in the hazard communication program established to comply with the HCS (§1910.1200).

13 Carcinogens
§1910.1003(e)

The following training requirements found at (e)(5)(i)-(iii) apply to the 13 carcinogens listed below:

- 4-Nitrobiphenyl
- alpha-Naphthylamine
- Methyl chloromethyl ether
- 3,3'-Dichlorobenzidine (and its salts)
- bis-Chloromethyl ether
- beta-Naphthylamine
- Benzidine
- 4-Aminodiphenyl
- Ethyleneimine
- beta-Propiolactone
- 2-Acetylaminofluorene
- 4-Dimethylaminoazobenzene
- N-Nitrosodimethylamine

Each employee, prior to being authorized to enter a regulated area, has to receive a training program including:

- The nature of the carcinogenic hazards, including local and systemic toxicity.
- The specific nature of the operation involving a carcinogen that could result in exposure.
- The purpose for and application of the medical surveillance program, including, as appropriate, methods of self-examination.
- The purpose for and application of decontamination practices and purposes.
- The purpose for and significance of emergency practices and procedures.
- The employee's specific role in emergency procedures.
- Specific information to aid the employee in the recognition and evaluation of conditions and situations which may result in the release of a carcinogen.
- Specific first aid procedures and practices.

Training is to be conducted annually. Specific emergency procedures must be posted, and employees must practice the procedures.

Employers must include the 13 carcinogens in the hazard communication program established to comply with the HCS (§1910.1200).

Vinyl chloride
§1910.1017(j)(1)(i) through (j)(1)(ix), (l)(1)(iii)

Each employee engaged in vinyl chloride or polyvinyl operations must be provided with initial and annual training to include the:

- Nature of the health hazard from chronic exposure to vinyl chloride including specifically the carcinogenic hazard.
- Specific nature of operations which could result in exposure to vinyl chloride in excess of the permissible limit and necessary protective steps.
- Purpose for, proper use, and limitations of respiratory protective devices.
- Fire hazard and acute toxicity of vinyl chloride, and the necessary protective steps.
- Purpose for and a description of the monitoring program.
- Purpose for, and a description of, the medical surveillance program.
- Emergency procedures.
- Specific information to aid the employee in recognition of conditions which may result in the release of vinyl chloride.
- A review of the standard.

Employers must include vinyl chloride in the hazard communication program established to comply with the HCS (§1910.1200).

Inorganic arsenic
§1910.1018(o)(1) and (o)(2), (p)

The employer is required to institute a training program for all employees who are subject to exposure to inorganic arsenic above the action level without regard to respirator use, or for whom there is a possibility of skin or eye irritation from inorganic arsenic, and ensure that those employees participate in the training program.

Initial and annual training must be provided, and each employee has to be informed of:

- A review of the arsenic standard and the information contained in Appendix A.
- The purpose, proper use, and limitation of respirators.
- The quantity, location, manner of use, storage, sources of exposure, and the specific nature of operations which could result in exposure to inorganic arsenic as well as any necessary protective steps.
- The purpose and a description of the medical surveillance program.
- The engineering controls and work practices associated with the employee's job assignment.

Employees must have access to a copy of the standard and its appendices.

The employer has to provide, upon request, all materials relating to the employee information and training program to OSHA and NIOSH representatives.

Employers must include inorganic arsenic in the hazard communication program established to comply with the HCS (§1910.1200).

Access to employee exposure and medical records
§1910.1020(g)

Upon an employee's first entering into employment, and at least annually thereafter, the employer must inform covered employees of the following:

- The existence, location, and availability of any records covered by the rule.

- The person responsible for maintaining and providing access to records.
- Each employee's rights of access to the records.

Copies of the rule and its appendices have to be available to employees. If OSHA provides the employer with relevant informational materials, the materials must also be distributed to current employees.

Lead
§1910.1025(l)(1) and (l)(2), (m)

Where there is the potential for employees to be exposed to airborne lead at any level, the employer must inform those employees of the content in Appendices A and B of the lead standard.

The employer has to provide initial and annual training, and assure the participation of all employees who are subject to lead exposure at or above the action level, or for whom the possibility of skin or eye irritation exists. Employees must be informed of the following:

- The content of the lead standard and its appendices.
- The specific nature of the operations which could result in exposure to lead above the action level.
- The purpose, proper selection, fitting, use, and limitations of respirators.
- The purpose and a description of the medical surveillance program, and the medical removal protection program including information concerning the adverse health effects associated with excessive exposure to lead (with particular attention to the adverse reproductive effects on both males and females).
- The engineering controls and work practices associated with the employee's job assignment.
- The contents of any compliance plan in effect.
- Instructions to employees that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician.

Copies of the lead standard and its appendices must be available to affected employees. If OSHA provides the employer with relevant informational materials, the materials must also be distributed to employees.

The employer must provide, upon request, all materials relating to the employee information and training program to OSHA and NIOSH representatives.

Employers must include lead in the hazard communication program established to comply with the HCS (§1910.1200).

Chromium (VI)
§1910.1026(l)

In addition to the requirements of the Hazard Communication standard at 1910.1200(h), the employer has to ensure that each employee can demonstrate knowledge of at least the following:

- Contents of the 1910.1026 Chromium (VI) standard; and the
- Purpose and a description of the medical surveillance program.

A copy of the Chromium (VI) standard has to be made available at no cost to all affected employees.

The employer has to provide respiratory protection when engineering and work practice controls do not reduce chromium exposures at or below the PEL and for emergency situations. Where respirators are required, employees need to be trained to use the equipment properly according to 1910.134(k).

When employees have to wear protective clothing and equipment to protect them from skin and eye contact with chromium (VI), training in the proper use must be provided according to 1910.132(f).

Employers must include chromium (VI) in the hazard communication program established to comply with the HCS (§1910.1200).

Cadmium
§1910.1027(m)

The employer must provide initial and annual training to employees who are potentially exposed to cadmium, assure employee participation in the program, and maintain a record of the contents of the training program.

The training program must be understandable to the employee and is to include:

- The health hazards associated with cadmium exposure, with special attention to the information incorporated in Appendix A of the cadmium standard.
- The quantity, location, manner of use, release, and storage of cadmium in the workplace and the specific nature of operations that could result in exposure to cadmium, especially exposures above the PEL.
- The engineering controls and work practices associated with the employee's job assignment.
- The measures employees can take to protect themselves from exposure to cadmium, including modification of habits such as smoking and personal hygiene; and specific procedures the employer has implemented to protect employees from exposure to cadmium such as appropriate work practices, emergency procedures, and the provision of personal protective equipment.
- The purpose, proper selection, fitting, proper use, and limitations of respirators and protective clothing.
- The purpose and a description of the medical surveillance program.
- The contents of the cadmium standard and its appendices.
- The employee's rights of access to records under §1910.1020(e) and (g).

Copies of the standard and its appendices must be readily available, without cost, to affected employees. The employer must provide to OSHA and NIOSH representatives, upon request, all materials relating to the employee information and the training program.

The employer must certify that employees have been trained by preparing a certification record which includes the identity of the person trained, the signature of the employer or the person who conducted the training, and the date the training was completed. The certification records have to be kept on file for one year beyond the training date.

Employers must include cadmium in the hazard communication program established to comply with the HCS (§1910.1200).

Benzene
§1910.1028(g)(2)(i) and (j)

The employer has to establish a respiratory protection program according to §1910.134(b) through (d) (except (d)(1)(iii), (d)(3)(iii)(B)*(1)* and *(2)*), and (f) through (m).

The employer must provide employees with information and training at the time of their initial assignment to a work area where benzene is present. If exposures are above the action level, employees are to be provided with information and training at least annually.

The training program has to meet the requirements of §1910.1200(h)(1) and (2), and is to include specific information on benzene.

In addition the employer must:

- Provide employees with an explanation of the contents of the standard, including Substance Safety Data Sheet, Benzene (Appendix A), and Substance Technical Guidelines, Benzene (Appendix B), and indicate where the standard is available.
- Describe the medical surveillance program and explain the information contained in the standard's Appendix C (Medical Surveillance, Guidelines for Benzene).

Employers must include benzene in the hazard communication program established to comply with the HCS (§1910.1200).

Coke oven emissions
§1910.1029(k)(1) and (2), (l)

Employees have to be trained at the time of their initial assignment. Training must cover:

- The information contained in the substance information sheet for coke oven emissions (the standard's Appendix A).
- The purpose, proper use, and limitations of respiratory protective devices.
- The purpose for and a description of the medical surveillance program including information on the occupational safety and health hazards associated with exposure to coke oven emissions;
- A review of all required written procedures and schedules.
- A review of the standard.

A copy of the standard and its appendices must be readily available to all employees who work in the regulated area. The employer must provide, upon request, all materials relating to the employee information and training program to OSHA and NIOSH representatives.

Employers must include coke oven emissions in the hazard communication program established to comply with the HCS (§1910.1200).

Bloodborne pathogens
§1910.1030 (c)(1)(v); (d)(2)(xiv)(B); (e)(2)(ii); (e)(5); (g)(2); (h)(2) and (h)(3)

An employer, who is required to establish an Exposure Control Plan must solicit input from non-managerial employees responsible for direct patient care who are potentially exposed to injuries from contaminated sharps in the identification, evaluation, and selection of effective engineering and work practice controls. The employer is required to document the solicitation in the Exposure Control Plan.

The employer has to ensure that information regarding equipment contaminated with blood or other potentially infectious materials is conveyed to all affected employees, the servicing representative, and/or the manufacturer as appropriate, prior to handling servicing, or shipping so that appropriate precautions will be taken.

In HIV and HBV research laboratories and production facilities, all spills must be immediately contained and cleaned up by appropriate professional staff or others properly trained and equipped to work with potentially concentrated infectious materials. A biosafety manual must be prepared or adopted and periodically reviewed and updated at least annually or more often if necessary. Personnel must be advised of the potential hazards and must be required to read and follow instructions on practices and procedures. Additional training requirements for employees in HIV and HBV research laboratories and production facilities are specified in paragraph (g)(2)(ix).

Employers must ensure that all employees with occupational exposure to bloodborne pathogens, hepatitis B, or other potentially infectious materials participate in a training program which must be provided at no cost to the employee and during working hours.

Initial and annual training (within one year of the previous training) is required. Additional training must be provided when changes such as modification of tasks or procedures or institution of new tasks or procedures affect the employee's occupational exposure. The additional training may be limited to addressing the new exposures created.

The training program has to use material appropriate in content and vocabulary to the employees' educational level, literacy, and language; and is to contain at a minimum:

- An accessible copy of the bloodborne pathogens regulation and an explanation of its contents.
- A general explanation of the epidemiology and symptoms of bloodborne diseases.

- An explanation of the modes of transmission of bloodborne pathogens.
- An explanation of the employer's exposure control plan and the means by which the employee can obtain a copy of the written plan.
- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials.
- An explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and personal protective equipment.
- Information on the types, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment.
- An explanation of the basis for selection of personal protective equipment.
- Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine and vaccination will be offered free of charge.
- Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials.
- An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available.
- Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident.
- An explanation of the signs and labels and/or color coding.
- An opportunity for interactive questions and answers with the person conducting the training session.

The person conducting the training must be knowledgeable in the subject matter covered in the training program as it relates to the workplace.

Employees in HIV or HBV research laboratories and production facilities have to receive the following initial training in addition to the previous training requirements. The employer must:

- Ensure that employees demonstrate proficiency in standard microbiological practices and techniques and in the practices and operations specific to the facility before being allowed to work with HIV or HBV.
- Ensure that employees have prior experience in the handling of human pathogens or tissue cultures before working with HIV or HBV.
- Provide a training program to employees who have no prior experience in handling human pathogens. Initial work activities must not include the handling of infectious agents. A progression of work activities is to be assigned as techniques are learned and proficiency is developed.
- Ensure that employees participate in work activities involving infectious agents only after proficiency has been demonstrated.

Training records have to be kept for three years from the training date. Training records must include the following information:

- Dates of the training sessions.
- Contents or a summary of the training sessions.
- Names and qualifications of persons conducting the training.
- Names and job titles of all persons attending the training sessions.

Employee training records have to be provided upon request for examination and copying to employees, to employee representatives, and to OSHA and NIOSH representatives according to §1910.1020.

All required training and medical records must be made available upon request to OSHA and NIOSH representatives.

Cotton dust
§1910.1043(i)(1) and (i)(2)

The employer is required to provide initial and annual training for employees in all workplaces where cotton dust is present.

Retraining is also required when job assignments or work processes change and when employee performance indicates a need for retraining. Each employee must be informed of the following:

- Acute and long term health hazards associated with exposure to cotton dust.
- The names and descriptions of jobs and processes which could result in exposure to cotton dust at or above the permissible exposure limit (PEL).
- The measures, including work practices, necessary to protect the employee from exposures in excess of the PEL.
- The purpose, proper use, and limitations of respirators.
- The purpose for and a description of the medical surveillance program and other information which will aid exposed employees in understanding the hazards of cotton dust exposure.
- The contents of the cotton dust standard and its appendices.

Each employer has to post a copy of the standard with its appendices in a public location at the workplace, and must, upon request, make copies available to employees. The employer also must provide, upon request, all materials relating to the employee training and information program to OSHA and NIOSH representatives.

1, 2-Dibromo-3-chloropropane
§1910.1044(n)(1) and (n)(2), (o)

The employer has to institute a training program for all employees who may be exposed to DBCP and is to ensure their participation in the program. Employees must be informed of the following:

- Information contained in the 1, 2-Dibromo-3-chloropropane standard's Appendix A.
- Quantity, location, and manner of use, release, or storage of DBCP.
- Specific nature of operations which could result in exposure to DBCP as well as any necessary protective steps.
- Purpose, proper use, and limitations of respirators.
- Purpose and description of the medical surveillance program.
- A review of the standard and its appendices.

Copies of the standard and its appendices must be readily available to all affected employees. The employer must provide, upon request, all materials relating to the employee information and training program to OSHA and NIOSH representatives.

Employers must include DBCP in the hazard communication program established to comply with the HCS (§1910.1200).

Acrylonitrile
§1910.1045(o)(1) and (o)(2), (p)

Initial and annual training is required for all employees exposed to acrylonitrile (AN) above the action level, all employees whose exposures are maintained below the action level by engineering and work practice controls, and all employees subject to potential skin or eye contact with liquid AN.

Each employee must be informed of:

- Information contained in the AN standard's Appendices A and B.
- Quantity, location, manner of use, release, or storage of AN, and the specific nature of operations which could result in exposure to AN, as well as any necessary protective steps.
- Purpose, proper use, and limitations of respirators and protective clothing.
- Purpose and a description of the medical surveillance program.
- Emergency procedures.
- Engineering and work practice controls, their function, and the employee's relationship to these controls.
- A review of the standard.

A copy of the AN standard and its appendices must be readily available to affected employees. The employer has to provide, upon request, all training program materials to OSHA and NIOSH representatives.

Employers must include acrylonitrile in the hazard communication program established to comply with the HCS (§1910.1200).

Ethylene oxide
§1910.1047(j)

Initial and annual training is required for employees who are potentially exposed to ethylene oxide (EtO) at or above the action level or above the excursion limit.

Employees have to be informed of:

- Requirements of the standard with an explanation of its contents, including Appendices A and B.
- Any operations in their work area where EtO is present.
- Location and availability of the written EtO final rule.
- Medical surveillance program with an explanation of the information in the EtO standard's Appendix C.

The training program must include at least:

- Methods and observations that may be used to detect the presence or release of EtO in the work area (such as monitoring conducted by the employer, continuous monitoring devices, etc.).
- The physical and health hazards of EtO.
- The measures employees can take to protect themselves from hazards associated with EtO exposure, including specific procedures the employer has implemented to protect employees from exposure to EtO, such as work practices, emergency procedures, and personal protective equipment to be used.
- Details of the hazard communication program developed by the employer, including an explanation of the labeling system and how employees can obtain and use the appropriate hazard information.

Employers must include ethylene oxide in the hazard communication program established to comply with the HCS (§1910.1200).

Formaldehyde
§1910.1048(n), (m)

Initial and annual training is required for all employees who are assigned to workplaces where there is exposure to formaldehyde. Except that where the employer can show, using objective data, that employees are not exposed to formaldehyde at or above 0.1 ppm, the employer is not required to provide training. Training is also required whenever a new exposure to formaldehyde is introduced into the work area.

The training program must be understandable to the employee and has to include:

- A discussion of the contents of the regulation and the material safety data sheet.
- The medical surveillance program, including a description of the potential health hazards associated with exposure to formaldehyde and a description of the signs and symptoms of exposure to formaldehyde; and instructions to immediately report to the employer the development of any adverse signs or symptoms that the employee suspects is attributable to formaldehyde exposure.
- A description of operations in the work area where formaldehyde is present and an explanation of the appropriate safe work practices.
- The purpose for, proper use of, and limitations of personal protective clothing and equipment.
- Instructions for the handling of spills, emergencies, and clean-up procedures.
- An explanation of the importance of engineering and work practice controls for employee protection and any necessary instruction in the use of these controls.
- A review of emergency procedures including the specific duties or assignments of each employee in the event of an emergency.

Affected employees have to be informed of the location of written training materials, which must be readily available, without cost, to the employees. The employer must provide training program materials, upon request, to OSHA and NIOSH representatives.

Employers must include formaldehyde in the hazard communication program established to comply with the HCS (§1910.1200).

Methylenedianiline
§1910.1050(k)

The employer must provide information and training on MDA according to §1910.1200(h) at the time of initial assignment and at least annually thereafter. Additionally, the employer has to:

- Provide an explanation of the contents of the methylenedianiline standard, including Appendices A and B, and tell employees where a copy is available.
- Describe the medical surveillance program and explain the information contained in the standard's Appendix C.
- Describe the standard's medical removal provision.

All written training materials, including a copy of the regulation, must be readily available, without cost, to the affected employees. The employer must provide training program materials, upon request, to OSHA and NIOSH representatives.

Employers must include methylenedianiline in the hazard communication program established to comply with the HCS (§1910.1200).

1,3-butadiene (BD)
§1910.1051(l)

Initial and annual training according to the requirements in §1910.1200(h) is required for employees exposed over the action level or STEL.

Training for employees exposed to BD over the action level or STEL must cover:

- Health hazards associated with BD exposure, and the purpose and a description of the medical screening and surveillance program.
- The quantity, location, manner of use, release, and storage of BD and the specific operations that could result in exposure to BD, especially exposures above the PEL or STEL.
- Engineering controls and work practices associated with the employee's job assignment and emergency procedures and personal protective equipment.
- Measures employees can take to protect themselves from exposure to BD.
- Contents of the BD standard and appendices.
- The right of each affected employee to obtain no cost medical examinations, medical records, and applicable air monitoring results.

Employers must include 1,3-butadiene in the hazard communication program established to comply with the HCS (§1910.1200).

Methylene chloride
§1910.1052(k), (l)(1) through (l)(5)

Initial training is required according to §1910.1200(h). Employers must inform and train employees in an understandable way of the following:

- The standard's requirements, the information in the appendices, and how to access a copy of the standard in the workplace.
- The quantity, location, manner of use, release, and storage of methylene chloride and the specific nature of operations that could result in methylene chloride exposure, especially for exposures above the PEL or STEL, when the exposure exceeds or can be expected to exceed the action level.

The employer has to retrain employees exposed at or above the action level or STEL as needed to ensure that each employee maintains a good understanding. Training is required when workplace changes could increase employee exposures.

Employers must include methylene chloride in the hazard communication program established to comply with the HCS (§1910.1200).

Ionizing radiation
§1910.1096(f)(3)(viii) and (i)(2)

All employees whose work may necessitate their presence in an area requiring an immediate evacuation warning signal must be familiar with the actual sound of the signal — preferably as it sounds at their work location. A demonstration of the signal is required before placing the system into operation.

Employees working in or frequenting any portion of a radiation area are to be instructed in the hazards and precautions to minimize exposure, the applicable provisions of the standard, and the contents of radiation exposure reports. Employees may request radiation exposure reports.

Hazard communication
§1910.1200(h)(1) through (h)(3)

At a minimum, a hazard communication training program must include the following topics:

- The contents of the standard.
- Operations in the work area where hazardous chemicals are present.
- The purpose of and information found in safety data sheets (SDS). Employees have to know where they can access SDSs in their work areas.
- How to understand and interpret label information.

- The contents of the employer's written hazard communication program. Employees must be able to review the written program at any time.
- Chemical hazards, how to detect the presence or release of the chemical, and the physical and health hazards of the chemicals in the work area. Instruction can be chemical-specific or by groups of chemicals with similar hazards.
- Protective measures, including appropriate work practices, emergency procedures, and personal protective equipment.

Note: Employers must train employees on the revised Hazcom standard (which incorporates elements of GHS) by Dec. 1, 2013.

Occupational exposure to hazardous chemicals in laboratories
§1910.1450(f)(1) through (f)(4)

The employer must provide employees with information and training to ensure that they understand the hazards of chemicals present in their work areas. Training is required on initial assignment and before assignments involving new exposure situations. The frequency of refresher information and training may be determined by the employer.

Employees have to be informed of:

- The contents of the standard and its appendices, which must be made available to employees.
- The location and availability of the employer's Chemical Hygiene Plan.
- The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard.
- Signs and symptoms associated with exposures.
- The location and availability of material safety data sheets or other known reference materials on the hazards, safe handling, storage, and disposal of hazardous chemicals found in the laboratory.

Employee training has to include:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical.
- The physical and health hazards of chemicals in the work area.
- The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.
- The applicable details of the employer's written Chemical Hygiene Plan.

Q&As - Training

Powered Industrial Trucks/Forklifts

Q: Is annual forklift training required?

A: No. Refresher training only needs to be conducted when operators are found to be operating unsafely, have been in an accident or near miss, receive a poor evaluation, or when there are changes in the workplace or type of truck. OSHA does, however, require an **evaluation** of each powered industrial truck operator's performance at least once every three years.

Q: Does OSHA require powered industrial truck operators to have a valid driver's license?

A: Federal OSHA has no requirement that a forklift operator have a valid driver's license. OSHA does require that every forklift operator be trained and certified to operate the powered industrial truck in the workplace, and that the operator's performance be evaluated on the provisions of 1910.178(l)(3) every three years. The employer must have a record documenting that the driver has successfully completed the training. That is the only operating "license" required by OSHA.

Q: Is a vision/hearing test required before an employee may operate a forklift?

A: Federal OSHA's powered industrial truck standard does not specifically address vision/hearing requirements for operators. However, even though Federal OSHA doesn't specifically address it in the regulation, there are obviously some potential concerns and safety issues and these need to be evaluated in light of the specific operations.

In fact, OSHA has issued a letter of interpretation stating that an employer must determine if full vision is mandatory for the operations and advises that appropriate medical personnel be consulted. (Reference: October 20, 1976 OSHA Letter of Interpretation, which was edited in 2000.)

And, OSHA has issued other interpretations addressing both visual and hearing impaired potential forklift operators. In general, OSHA states that it considers physical impairments on a case-by-case basis. If the employer can show that a physically impaired employee would be a danger to himself and other employees when operating equipment such as a forklift, the employer has the right to not allow that employee to become a forklift operator. If the employer knew this fact, but allowed the employee to operate the vehicle, OSHA could cite under the General Duty Clause which guarantees all employees a safe and healthful workplace—free of known hazards.

Additionally, the ANSI/ITSDF B56.1 safety standard for low lift and high lift trucks states that operators must be qualified as to visual, auditory, physical, and mental ability to operate the equipment safely.

So, it is ultimately up to each employer (with a physician's guidance, if you choose) to determine if an employee can operate the forklift in a safe manner, both for himself and his coworkers.

Please note that, aside from OSHA, the Americans with Disabilities Act (ADA) may be involved as it prohibits employers from discriminating against individuals with disabilities in employment. ADA-related situations must be handled on a case-by-case basis. Employers may require as a qualification standard that an individual not pose a "direct threat," if this standard is applied to all applicants/employees. However, employers must meet very specific and stringent requirements under the ADA to establish that such a "direct threat" exists.

Like OSHA, the ADA requires that, when determining whether an employee can, with or without reasonable accommodation, perform the essential functions of the job, it is to be done in regard to a particular individual employee, and not require all employees who operate a forklift to undergo such. Such a blanket application may not be job-related and consistent with business necessity, which is an important consideration in evaluating ADA-related situations.

Q: Who can train, evaluate and certify forklift operators? Is a certification needed?

A: In terms of who can conduct operator training and evaluation, OSHA requires in 1910.178(l)(2)(iii) that the trainers have the "knowledge, training, and experience" to train operators and evaluate their competence. The OSHA standard does not further define this requirement or set any specific certifications.

However, OSHA discusses trainer qualifications in the preamble to the December 1998 final rule:

- "OSHA has concluded that the final rule should adopt a performance-oriented approach to the qualifications of trainers and evaluators. As discussed above under issue 1, OSHA does not have the resources to evaluate and certify trainers and does not consider it necessary to do so. Trainers and evaluators with different backgrounds can achieve the level of ability necessary to teach and evaluate trainees. To meet these commenters' concerns, OSHA has eliminated the term "designated person" from the final rule and has instead described the knowledge, skills, or experience any trainer or evaluator must have under the standard."

OSHA also provides additional information in Appendix A of the Compliance Directive on the forklift training requirements, saying:

- **"How could an employer determine the qualifications of trainers?** An example of a qualified trainer would be a person who, by possession of a recognized degree, certificate, or professional standing, or who by knowledge, training and experience, has demonstrated the ability to train and evaluate powered industrial truck operators."
- **"Can the person providing the training come from outside the company?** Yes, the employer may authorize a trainer from outside the company to conduct the training, such as a training consultant or a manufacturer's representative. Nonetheless, the employer must have evidence that the operators have been trained in the required program topics. Some employers believe they must use an outside training consultant. However, an employer may utilize an employee who has the knowledge, training, and experience to provide training and evaluation."

And, in training and reference materials on the OSHA website, OSHA says:

- **"4. Who should conduct the training?** All training and evaluation must be conducted by persons with the necessary knowledge, training, and experience to train powered industrial truck operators and evaluate their competence. An example of a qualified trainer would be a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has demonstrated the ability to train and evaluate powered industrial truck operators...."

In addition, there is an OSHA Letter of Interpretation that addresses the "experience" aspect of the trainer requirements:

- "A trainer must have the "knowledge, training, and experience" to train others how to safely operate the powered industrial truck in the employer's workplace. In general, the trainer will only have sufficient "experience" if he has the practical skills and judgment to be able to himself operate the equipment safely under the conditions prevailing in the employer's workplace. For example, if the employer uses certain truck attachments and the trainer has never operated a truck with those attachments, the trainer would not have the experience necessary to train and evaluate others adequately on the safe use of those attachments. However, the standard does not require that the trainers operate a PIT regularly (i.e., outside of their operator training duties) as part of their job function or responsibility."

Q: Do powered industrial truck training requirements cover powered hand trucks?

A: Yes, the use of powered hand trucks presents numerous hazards to employees who operate them and those working in the area where they are used. Therefore, training is required for powered hand trucks. The OSHA regulation at 29 CFR 1910.178(a)(1) indicates that the requirements, including those for training, cover motorized hand trucks.

Q: Are skid loaders covered under 1910.178?

A: In terms of the 1910.178 powered industrial truck standard, it depends on whether the equipment was designed primarily as earthmoving equipment. If it is primarily earthmoving equipment, then 1910.178 does not apply. See the following two OSHA Letters of Interpretation for additional information:

- 0/21/1999 - Earthmoving equipment is not covered by 1910.178; skid-steer equipment may be covered

- 03/07/2000 - Applicability of 1910.178 to earth moving equipment and skid steer loaders

Q: OSHA requires that operators receive training on every type of truck they will operate. How does OSHA define "type of truck?"

A: If an operator is assigned to operate a sit-down counterbalanced rider truck, then the operator must be trained and evaluated in the safe operation for that type of truck. If assigned to operate an operator-up counterbalanced front/side loader truck, or a rough terrain forklift, then training must be done for those types of trucks.

A sit-down counterbalanced rider truck, an operator-up counterbalanced front/side loader truck, and a rough terrain forklift are different types of trucks. Operators who have successfully completed training and evaluation as specified in §1910.178(l) (in a specific type of truck) would not normally need additional training when they are assigned to operate the same type of truck made by a different manufacturer—however, operators would need additional training if the applicable truck-related and workplace-related topics listed in §1910.178(l are different for that truck.

When an attachment is used on the truck, then the operator training must include instruction on the safe conduct of those operations so that the operator knows and understands the restrictions or limitations created by each vehicle's use.

Lockout/Tagout

Q: Do authorized employees have to be trained to do all of the machine-specific procedures for all the machines in a facility, or can they just be trained on the procedures they do for the job?

A: OSHA's lockout/tagout standard includes no requirement for authorized employees to know how to perform all of the facility's machine-specific lockout/tagout procedures.

The training program under this standard will need to cover at least four areas:

- The employer's energy control program,
- The elements of the energy control procedures which are relevant to the employee's duties, and
- The restrictions of the program applicable to each employee, and the requirements of the standard.

The details will necessarily vary from workplace to workplace, and even from employee to employee within a single workplace, depending upon the complexity of the equipment and the procedure, as well as the employee's duties and their responsibilities under the energy control program.

Q: Who is responsible for providing temp workers their training, for example on lockout/tagout? How much lockout/tagout training do temp workers need?

A: It really depends on what the workers are doing and what their exposures are (and how much of it is site-specific) as to the extent of the training, as well as whether a specific OSHA standard applies that has specific requirements for host/contractor work.

Generally speaking temporary agencies are responsible for general training and host employers are responsible for site-specific training.

With specific regard to lockout/tagout, there are several layers of training in that standard depending on whether the workers are "authorized," "affected," or "other"—see 1910.147(c)(7). Also, that standard has a few specific requirements for host/contractor interaction.

Q: Does lockout/tagout have to be hands-on?

A: OSHA's lockout/tagout training and communication requirements are outlined at 1910.147(c)(7).

Unlike the training requirements in other standards such as those for operators of powered industrial trucks (at 1910.178(l)(2)(ii)) OSHA's lockout/tagout standard does not go into any detail as to how the training is to be conducted. However, at 1910.147(c)(7)(i), the rule states: "The employer shall provide training to ensure that the purpose and function of the energy control program are understood by

employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees."

Classroom instruction, demonstrations, practical exercises, and evaluations would all help to ensure employees develop and practice the necessary skills and knowledge, but OSHA does not specifically require hands-on training on each piece of equipment that an authorized employee is to lock out. On the other hand, training program content that is limited to a review of the requirements of the lockout/tagout standard itself would not give the level of detail and practical information necessary for an authorized employee to know how to lock out equipment in the workplace.

Confined spaces

Q: Who can conduct permit-required confined space training?

A: OSHA's permit-required confined space standard does not specify instructor qualifications. It would be the employer's responsibility to ensure that employees are properly trained for their assigned duties. As a good practice, the person who provides the training should have sufficient knowledge and experience to teach the trainees to properly use the necessary equipment and efficiently perform the anticipated procedures. The training program should include demonstrations and practice so that employees develop the skills they need to properly use the equipment and follow the procedures. The standard has first aid/CPR training requirements for in-house rescue teams (if you use an in-house rescue team instead of contracting with an outside rescue service provider). It would be our understanding that the trainer would need to be qualified to certify the trainees in first aid and CPR -- as noted at 1910.146(k)(2)(iii), "The employer shall ensure that at least one member of the rescue team or service holding a current certification in first aid and CPR is available ..." Many employers hire a trainer who is certified by the American Red Cross or the American Heart Association to come in to conduct this portion of the training.

OSHA's general industry standards do not have any overall requirements for trainers that would apply to every situation. If OSHA has specific requirements for trainers, they are found in the applicable standard itself. And, even when OSHA does specify requirements for trainers, they generally do not include any type of formal certification or completion of a certain training program.

10- and 30-hour voluntary outreach training

Q: Does OSHA require the 10- and 30-hour outreach courses?

A: No, they are voluntary. OSHA recommends outreach courses as an orientation to occupational safety and health for workers. However, some states have enacted laws mandating the training. Also, some employers, unions, organizations or other jurisdictions may also require this training.

Q: Who should take a 10-or 30-hour courses?

A: The 10-hour course is intended for entry level workers. The 30-hour program is for supervisors or workers with some safety responsibility.

Q: Does outreach training meet any OSHA training requirements?

A: No. Employers are responsible for training their workers on specific hazards of their job, as noted in many OSHA standards.

Q: How do I select a 10- or 30-hour trainer?

A: OSHA authorized outreach trainers are not OSHA personnel. Trainers are authorized (not certified) through this program to deliver Outreach training classes. Trainers are independent service providers and their schedules and fees may vary. OSHA recommends contacting multiple trainers to find one that best meets the student's needs. This includes questioning trainers about their accommodations for students with a learning disability. Students may verify the status of an authorized outreach trainer. All trainers should possess a trainer card which includes an expiration date along with the name of the authorizing OTI Education Center.

Q: How do I become an authorized OSHA Outreach Trainer?

A: OSHA authorizes trainers to conduct occupational safety and health training through the OSHA Outreach Training Program. Through this program, individuals who complete a one-week OSHA trainer course receive a certificate of completion and an authorized outreach trainer card. Trainer courses are based on one of the following subject areas: disaster site workers (second responders), construction, general industry, or maritime. Upon successful completion of the trainer course, trainers are authorized to teach students courses based on the trainer course subject area. These include two-day courses for disaster site workers (second responders), as well as 10-hour and 30-hour courses in construction, general industry, or maritime safety and health hazards. Authorized trainers can receive OSHA course completion cards for their students. The OSHA Outreach Training Program is voluntary. OSHA does not require participation in this program.

To become an authorized OSHA Outreach Trainer, you must complete a required OSHA trainer course and complete/meet the necessary prerequisite requirements:

- For Construction Industry: OSHA #500 Trainer Course in Occupational Safety and Health Standards for Construction. Prerequisites are: five (5) years of construction safety experience (a college degree in occupational safety and health, a Certified Safety Professional (CSP), or Certified Industrial Hygienist (CIH) designation, in the applicable training area may be substituted for two years of experience) and completion of OSHA #510 Occupational Safety and Health Standards for the Construction Industry.
- For General Industry: OSHA #501 Trainer Course in OSHA Standards for General Industry. Prerequisites are: five years of general industry safety experience (a college degree in occupational safety and health, a Certified Safety Professional (CSP), or Certified Industrial Hygienist (CIH) designation, in the applicable training area may be substituted for two years of experience) and completion of OSHA #511, Occupational Safety and Health Standards for General Industry.
- For Maritime Industry: Course #5400 Trainer Course in OSHA Standards for the Maritime Industry. The prerequisites for Course #5400 are as follows: Three years maritime industry experience and at least one of the following: Two years of occupational safety and health experience (with a broad focus) in any industry; a degree in occupational safety and health from an accredited college or university; or certification as an Associate Safety Professional (ASP), Certified Safety Professional (CSP) designation; Certified Industrial Hygienist (CIH); designation; Certified Marine Chemist (CMC) designation; or Certified Safety Health Manager (CSHM) designation.
- For Disaster Site Workers: Course #5600 Disaster Site Worker Train-the-Trainer Course. The prerequisites for Course #5600 are as follows: OSHA Course #500 or #501, three years safety training experience and completion of the 40-hour HAZWOPER training.

The OSHA courses listed above are only offered by authorized OSHA Training Institute (OTI) Education Centers located throughout the United States.

General

Q: What training requirements call for employee access to standards?

A: Many OSHA regulations require employers to provide workers access to the regulation (or to inform workers of the contents, without actual distribution) during training sessions, including:

- Occupational Noise Exposure (29 CFR 1910.95(l)) [Note: Must also be posted.]
- HAZWOPER (29 CFR 1910.120(e)(2)(vii)) [informed of contents only]
- Servicing multi-piece and single piece rim wheels (29 CFR 1910.177(c)(1)(ii)) [informed of contents only]
- Arc welding and cutting (29 CFR 1910.254(d)(1)) [informed of contents only]
- Logging operations (29 CFR 1910.266(l)(3)(vi)) [informed of contents only]

- Commercial diving operations Safe practices manual (29 CFR 1910.420(a) & (b))

In addition, most of the chemical-specific regulations in Subpart Z require some sort of employee access to standards.

Q: What standards require employees' signatures that training is complete? Can the signatures be electronic?

A: OSHA training standards generally require the employer and trainers to sign a certification record which includes the identity of the person(s) trained; signatures of the employees are generally not required. If you mean that every time the person (trainer) signs, his or her signature will be electronically stored, then OSHA has said they would have no objection to the use of an electronic signature pad to satisfy the certification requirements.

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SCREENING AND SURVEILLANCE

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OSHA COMPLIANCE MANUAL

Reserved

Screening and surveillance

Many of OSHA's standards require medical screening and surveillance. Although the terms are often used interchangeably, they are quite distinct concepts.

Medical screening is one component of a comprehensive medical surveillance program. It is a method for detecting disease or body dysfunction before an individual would normally seek medical care. Screening tests are usually administered to individuals without current symptoms, but who may be at high risk for certain adverse health outcomes. The fundamental purpose of screening is early diagnosis and treatment of the individual and thus has a clinical focus.

Medical surveillance is a fundamental strategy for optimizing employee health. It is defined by OSHA as the analysis of health information to look for problems that may be occurring in the workplace, and that require targeted prevention, thereby serving as a feedback loop to the employer. Surveillance may be based on a single case or sentinel event, but more typically uses screening results from the group of employees being evaluated to look for abnormal trends in health status. Surveillance can also be conducted on a single employee over time. Review of group results helps to identify potential problem areas and the effectiveness of existing worksite preventive strategies. The fundamental purpose of surveillance is to detect and eliminate the underlying causes (i.e., hazards/exposures) of any discovered trends and, therefore, has a prevention focus.

The following tables are intended to provide a quick reference to help you locate and implement the screening and surveillance requirements in OSHA's General Industry standards. The tables are organized alphabetically by topic. Each table highlights the OSHA screening and surveillance requirements for that topic.

Acrylonitrile 1910.1045(n)

Standard Requirements	
Pre-placement exam	Yes[1]
Periodic exam	Yes – annual[1]
Emergency/exposure examination and tests	Yes
Termination exam	Yes – if no exam within 6 months of termination
Examination includes special emphasis on these body systems	Respiratory, gastrointestinal[1], thyroid, skin, neurological (peripheral and central)
Work and medical history	Required for all exams[2]
Chest x-ray	Yes
Pulmonary function test (PFT)	No
Other required tests	Fecal occult blood[1]
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician
Medical removal plan	No

Arsenic (Inorganic) 1910.1018(n)

Standard Requirements	
Pre-placement exam	Yes[1]
Periodic exam	Yes[1]
Emergency/exposure examination and tests	Yes
Termination exam	Yes – if no exam within 6 months of termination
Examination includes special emphasis on these body systems	Skin, nasal
Work and medical history	Required for all exams[2] with focus on respiratory symptoms; includes smoking history
Chest x-ray	Yes
Pulmonary function test (PFT)	No
Other required tests	No
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician
Medical removal plan	No

Asbestos 1910.1001(l)

Standard Requirements	
Pre-placement exam	Yes[1, 3]
Periodic exam	Yes – annual[1]
Emergency/exposure examination and tests	No
Termination exam	Yes – within ± 30 days of termination
Examination includes special emphasis on these body systems	Respiratory, cardiovascular, gastrointestinal
Work and medical history	Required for all exams[2] standardized form required; see standard, Appendix D
Chest x-ray	Yes[1] – B reader, board eligible/certified radiologist or physician with expertise in pneumoconioses required; see standard, Appendix E for x-ray interpretation and classification requirements
Pulmonary function test (PFT)	FVC, FEV_1
Other required tests	No
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician; includes informing employee of increased risk of lung cancer from combined effects of smoking and asbestos exposure
Medical removal plan	No

Benzene 1910.1028(i)

Standard Requirements	
Pre-placement exam	Yes[1, 3, 4]
Periodic exam	Yes – annual[1, 4]
Emergency/exposure examination and tests	Yes[1, 4] – includes urinary phenol test
Termination exam	No
Examination includes special emphasis on these body systems	Hemopoietic; add cardiopulmonary if respiratory protection used at least 30 days/year, (initially, then every 3 years)
Work and medical history	Required for initial and periodic exams (pre-placement exam requires special history)[2]
Chest x-ray	No
Pulmonary function test (PFT)	Initially and every 3 years if respiratory protection used 30 days/year; specific tester requirements
Other required tests	CBC, differential, other specific blood tests; repeated as required; see standard
Evaluation of ability to wear a respirator	Yes – if respirators are used
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physiciann
Medical removal plan	Yes

Bloodborne Pathogens 1910.1030(f)

Standard Requirements	
Pre-placement exam	No – must offer Hepatitis B (HBV) vaccine unless already immune or vaccine contraindicated
Periodic exam	No
Emergency/exposure examination and tests	Specific post-exposure monitoring for employee and source; HBV vaccine; see standard
Termination exam	No
Examination includes special emphasis on these body systems	No
Work and medical history	No
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	Yes – post-exposure incident; follow U.S. Public Health Service (USPHS) post-exposure protocols
Evaluation of ability to wear a respirator	No
Additional tests if deemed necessary	Yes – for post-exposure incident; follow USPHS post-exposure protocols
Written medical opinion	Yes – licensed healthcare professional to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by licensed healthcare professional; counseling re: HBV vaccine and post-exposure follow-up; see standard
Medical removal plan	No

1,3-Butadiene 1910.1051(k)

Standard Requirements	
Pre-placement exam	Yes[1, 3, 4]
Periodic exam	Yes[1, 4]
Emergency/exposure examination and tests	Yes[1, 4] – within 48 hours of exposure
Termination exam	Yes[4] – if 12 months have elapsed since last exam
Examination includes special emphasis on these body systems	Liver, spleen, lymph nodes, and skin
Work and medical history	Required annually and for all examinations[2]; standardized form or equivalent; includes comprehensive occupational and health history; see standard, Appendices F and C
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	Annually, CBC with differential and platelet count; also within 48 hrs. after exposure in an emergency situation and repeated monthly for 3 more months
Evaluation of ability to wear a respirator	Yes – if respirators are used
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician or other licensed healthcare professional to employer and employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician or other licensed healthcare professional
Medical removal plan	No

Cadmium 1910.1027(l)

Standard Requirements	
Pre-placement exam	Yes[1, 3, 4]
Periodic exam	Yes[1, 4]
Emergency/exposure examination and tests	Yes[1, 4]
Termination exam	Yes[3] – see standard for time frame and other specifics
Examination includes special emphasis on these body systems	Respiratory, cardiovascular (BP), urinary, and for males over 40 – prostate palpation[1]
Work and medical history	Required for preplacement and periodic exams[2]; standardized form required
Chest x-ray	Yes
Pulmonary function test (PFT)	FVC, FEV_1
Other required tests	Annually[1], cadmiumin urine, beta-2 microglobulin in urine, cadmium in blood, CBC, BUN, serum creatinine, urinalysis; see standard
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician; includes explanation of results, treatment, and diet, and discussion of decisions re: medical removal; see standard for details
Medical removal plan	Yes

Carcinogens (Suspect) 1910.1003-1016(g)

Standard Requirements	
Pre-placement exam	Yes
Periodic exam	Yes – annual
Emergency/exposure examination and tests	Yes[1] – special medical surveillance begins within 24 hours
Termination exam	No
Examination includes special emphasis on these body systems	Exam includes determination for increased risk (e.g., treatment with steroids or cytotoxic agents, reduced immunological competence, pregnancy or cigarette smoking)
Work and medical history	Required for all examinations; includes family and occupational history, genetic and environmental factors
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	No
Evaluation of ability to wear a respirator	Yes – as specified in the Respiratory Protection standard, 1910.134(e), if respirators are used
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer
Employee counseling re: exam results, conditions of increased risk	No
Medical removal plan	No

Chromium(VI), Hexavalent 1910.1026(k)

Standard Requirements	
Pre-placement exam	Yes[1]
Periodic exam	Yes[1]
Emergency/exposure examination and tests	Yes[1]
Termination exam	Yes[3] – unless last exam was less than 6 months prior to date of termination
Examination includes special emphasis on these body systems	Skin and respiratory tract
Work and medical history	Required for all exams[2]; includes past, present and anticipated future exposure; any history of respiratory system dysfunction, asthma, dermatitis, skin ulceration or nasal septum perforation; smoking status and history
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	No
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician or other licensed healthcare professional (PLHCP) to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by PLHCP
Medical removal plan	No

Coke Oven Emissions 1910.1029(j)

Standard Requirements	
Pre-placement exam	Yes[1]
Periodic exam	Yes[1]
Emergency/exposure examination and tests	No
Termination exam	Yes – if no exam within 6 months of termination
Examination includes special emphasis on these body systems	Skin
Work and medical history	Required for all exams[2]; includes smoking history and presence and degree of respiratory symptoms
Chest x-ray	Yes
Pulmonary function test (PFT)	FVC, FEV_1
Other required tests	Weight, urine cytology, urinalysis for sugar, albumin, hematuria
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes – see standard, Appendix B
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician; also, employer must inform employee of possible health consequences if employee refuses any required medical exam
Medical removal plan	No

Cotton Dust 1910.1043(h)

Standard Requirements	
Pre-placement exam	Physical examnot specified; other tests required
Periodic exam	Physical examnot specified; other tests required[1, 4]
Emergency/exposure examination and tests	No
Termination exam	No
Examination includes special emphasis on these body systems	Not specified
Work and medical history	Medical history; standardized questionnaire required; see standard, Appendix B-1[1, 2, 4]
Chest x-ray	No
Pulmonary function test (PFT)	FVC, FEV_1, FEV_1/FVC Employees with specific abnormalities are referred to specialists[1, 4, 5]
Other required tests	No
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	No
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician re: results of exam and any medical conditions requiring further examination or treatment
Medical removal plan	Yes – for inability to wear a respirator (6 months)

1,2-dibromo-3-chloropropane 1910.1044(m)

Standard Requirements	
Pre-placement exam	Yes
Periodic exam	Yes[1]
Emergency/exposure examination and tests	Yes – male reproductive; repeat in 3 months
Termination exam	No
Examination includes special emphasis on these body systems	Reproductive, genitourinary; see standard for details
Work and medical history	Required for all exams[2]; includes reproductive history; see standard, Appendix C
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	Sperm count, FSH, LH, Total estrogen (females); see standard, Appendix C for guidelines
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician
Medical removal plan	No

Ethylene Oxide 1910.1047(i)

Standard Requirements	
Pre-placement exam	Yes[1]
Periodic exam	Yes – annual[1]
Emergency/exposure examination and tests	Yes[1]
Termination exam	Yes[1]
Examination includes special emphasis on these body systems	Pulmonary, skin, neurologic, hematologic, reproductive, eyes
Work and medical history	Required for all exams; includes reproductive history and special emphasis on some body systems; see standard
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	CBC, white cell count with differential, hematocrit, hemoglobin, red cell count; if requested by employee, pregnancy testing and fertility testing (female/male) will be added to the exam as deemed appropriate by physician
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician
Medical removal plan	No

Formaldehyde 1910.1048(l)

Standard Requirements	
Pre-placement exam	Yes[1], [4]
Periodic exam	Yes[1], [4]
Emergency/exposure examination and tests	Yes[4]
Termination exam	No
Examination includes special emphasis on these body systems	Evidence of irritation or sensitization of skin, respiratory system, eyes; shortness of breath
Work and medical history	Required for all exams[2]; questionnaire required; see standard, Appendix D
Chest x-ray	No
Pulmonary function test (PFT)	FVC, FEV_1, FEF should be evaluated if respiratory protection is used
Other required tests	No
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician; includes information on whether medical conditions were caused by past exposures or emergency exposures
Medical removal plan	Yes

HAZWOPER 1910.120(f)

Standard Requirements	
Pre-placement exam	Yes[1]
Periodic exam	Yes – annually or at physician's discretion[1]
Emergency/exposure examination and tests	Yes[1]
Termination exam	Yes – if no exam within 6 months of termination/reassignment
Examination includes special emphasis on these body systems	Determined by physician; see standard, Appendix D, reference 10 for guidelines
Work and medical history	Yes – with emphasis on symptoms related to handling hazardous substances and health hazards, fitness for duty and ability to wear PPE[2]
Chest x-ray	No – unless determined by physician
Pulmonary function test (PFT)	No – unless determined by physician
Other required tests	No – unless determined by physician
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician
Medical removal plan	No

Hazardous Chemicals in Laboratories 1910.1450(g)

Standard Requirements	
Pre-placement exam	When required by other standards
Periodic exam	When required by other standards
Emergency/exposure examination and tests	Yes[1]
Termination exam	No
Examination includes special emphasis on these body systems	Not specified
Work and medical history	When required by other standards
Chest x-ray	When required by other standards
Pulmonary function test (PFT)	When required by other standards
Other required tests	When required by other standards
Evaluation of ability to wear a respirator	Yes – when required by other standards
Additional tests if deemed necessary	When required by other standards
Written medical opinion	Yes – physician to employer
Employee counseling re: exam results, conditions of increased risk	Yes – by physician
Medical removal plan	No

Lead 1910.1025(j)

Standard Requirements	
Pre-placement exam	Yes[1, 4] except in construction industries; construction requires initial blood tests only
Periodic exam	Yes[1, 4]
Emergency/exposure examination and tests	Yes[1, 4]
Termination exam	No
Examination includes special emphasis on these body systems	Teeth, gums, hematologic, gastrointestinal, renal, cardiovascular (BP), neurological; pulmonary status if respiratory protection used
Work and medical history	Required for all exams[2]; includes reproductive history, past lead exposure, both work/non-work, and history of specific body systems; see standard
Chest x-ray	No
Pulmonary function test (PFT)	No – unless deemed necessary by physician
Other required tests	Hemoglobin, hematocrit, ZPP, BUN, serum creatinine, urinalysis with micro, blood lead levels, peripheral smear morphology, red cell indices[1, 5]; if requested by employee, pregnancy testing and fertility testing (female/male)
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician; includes advising the employee of any medical condition, occupational or non-occupational, requiring further medical examination or treatment
Medical removal plan	Yes

Methylene Chloride 1910.1052(j)

Standard Requirements	
Pre-placement exam	Yes[1, 4]
Periodic exam	Yes[1, 4]
Emergency/exposure examination and tests	Yes[4] – see standard for specifics
Termination exam	Yes – if no exam within 6 months of termination
Examination includes special emphasis on these body systems	Lungs, cardiovascular (including BP and pulse), liver, nervous, skin; extent of exam determined by examiner based on employee's health status, work, and medical history
Work and medical history	Required for all exams; example of work and medical history form provided in standard, Appendix B
Chest x-ray	No
Pulmonary function test (PFT)	No – unless deemed necessary by physician or other licensed healthcare professional
Other required tests	Laboratory surveillance may include tests as determined by examiner including "before and after shift tests"; see standard, Appendix B
Evaluation of ability to wear a respirator	Yes – as specified under the Respiratory Protection standard 1910.134(e)
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – by physician or other licensed healthcare professional to employer and employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician or other licensed healthcare professional
Medical removal plan	Yes

Methylenedianiline 1910.1050(m)

Standard Requirements	
Pre-placement exam	Yes[1, 3, 4]
Periodic exam	Yes – annual[1, 4]
Emergency/exposure examination and tests	Yes[1, 4]
Termination exam	No
Examination includes special emphasis on these body systems	Skin, hepatic
Work and medical history	Required for all examinations[2]; includes past work with MDA and other specific items; see standard
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	Liver function tests, urinalysis
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician
Medical removal plan	Yes

Noise 1910.95(g)

Standard Requirements	
Pre-placement exam	Baseline audiograms are required within 6 months of exposure at or above 85dB. Mobile test van exception, within one year of exposure at or above 85dB
Periodic exam	Annual audiometric testing required
Emergency/exposure examination and tests	No
Termination exam	No requirements
Examination includes special emphasis on these body systems	No
Work and medical history	No
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	Initial and annual audiometric testing[1, 4, 5]; see standard re: specific qualifications for the test administrator
Evaluation of ability to wear a respirator	No
Additional tests if deemed necessary	Yes
Written medical opinion	No
Employee counseling re: exam results, conditions of increased risk	Yes – if standard threshold shift or suspected ear pathology
Medical removal plan	No

Respiratory Protection 1910.134(e)

Standard Requirements	
Pre-placement exam	Evaluation questionnaire or exam; follow-up exam when required[5]
Periodic exam	Yes – in specific situations[5]
Emergency/exposure examination and tests	No
Termination exam	No
Examination includes special emphasis on these body systems	Yes[5] – see standard, Appendix C
Work and medical history	Yes[2] – see standard, Appendix C
Chest x-ray	As determined by physician or other licensed healthcare professional
Pulmonary function test (PFT)	As determined by physician or other licensed healthcare professional
Other required tests	As determined by physician or other licensed healthcare professional
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician or other licensed healthcare professional to employer and employee
Employee counseling re: exam results, conditions of increased risk	Yes – by physician or other licensed healthcare professional
Medical removal plan	No

Vinyl Chloride 1910.1017(k)

Standard Requirements	
Pre-placement exam	Yes[1]
Periodic exam	Yes[1]
Emergency/exposure examination and tests	Yes
Termination exam	No
Examination includes special emphasis on these body systems	Special attention to detecting enlargement of the liver, spleen or kidneys, or dysfunction of these organs and abnormalities in skin, connective tissue and pulmonary system; see standard, Appendix A
Work and medical history	Required for initial and periodic exams[2]; includes alcohol intake, history of hepatitis, exposure to hepatotoxic agents, blood transfusions, hospitalizations, and work history
Chest x-ray	No
Pulmonary function test (PFT)	No
Other required tests	Blood test for total bilirubin, alkaline phosphatase, SGOT, SGPT and gamma glutamyl transpeptidase
Evaluation of ability to wear a respirator	Yes
Additional tests if deemed necessary	Yes
Written medical opinion	Yes – physician to employer; employer to employee
Employee counseling re: exam results, conditions of increased risk	No
Medical removal plan	Yes

Footnotes

[1] Pre-placement and periodic examinations are dependent upon specific factors cited in the standard such as airborne concentrations of the substance and/or years of exposure, biological indices, age of employee, amount of time exposed per year. In addition, some standards require periodic exams to be conducted at varying time intervals. Refer to standard for complete details.

[2] Standard requires medical and work history focused on special body systems, symptoms, personal habits, and/or specific family, environmental or occupational history. Refer to standard for complete details.

[3] No examination required if previous examination done within specified time frame (e.g., 6 months or 12 months) and provisions of standard met. Refer to standard for details.

[4] Additional physician review: Some standards have provisions for referring employees with abnormalities to a specialist as deemed necessary by examiner. Other standards have provisions for multiple physician review. See specific standard for details.

[5] Standard requires specific protocol. See standard for details

OSHA COMPLIANCE MANUAL

ERGONOMICS

OSHA COMPLIANCE MANUAL

Reserved

Ergonomics

Introduction

In the past, workers were usually trained to perform the task and any changes made to work processes were done for reasons relating to productivity, without regard to worker comfort. For example, incorporating the assembly line into production facilities increased production rates, but necessitated that each worker in the line perform the same task or tasks all day long, often at increasing production rates. These same changes in production methods, which were often made as a result of technological advances that saved companies hundreds or thousands of dollars, are now costing companies in the form of workers' compensation claims, lost work time, and training.

Many of these technological advances require workers to perform repetitive procedures or work in positions that put a great deal of stress on the musculoskeletal system. This stress can be caused by any number of factors including repetitive motion, excessive force, mechanical stresses caused by tools or machines, poor posture, awkward positioning, lifting, vibrations, temperature extremes, and unaccustomed activity.

The cost of worker injuries and illnesses caused by these ergonomic stressors is staggering. Over one third of all workers' compensation costs are associated with musculoskeletal disorders (MSDs), injuries caused by trauma to the body occurring over a period of time. A conservative estimate of the medical costs of treating one industrial case of carpal tunnel syndrome, a type of disorder affecting the wrists and hands, is about $20,000 a year.

This cost estimate does not take into consideration the costs involved with lost work time, replacement workers, and reduced productivity. Lower back pain, for example, which is often associated with improper or repeated lifting or sitting for an extended period of time, is responsible for about 1,400 lost work days per 1,000 workers every year. Only the common cold and the flu cause workers to miss more work annually.

What is ergonomics?

Ergonomics is the science of fitting the job to the worker. In the workplace, ergonomic principles are used to make alterations to a job so that it conforms to the person doing that job, rather than to force the person to fit the job. Redesigning various job functions to match a person's stature will reduce stress on the body and eliminate many potential injuries associated with the overuse of muscles, unnatural postures, and repetitive motions.

Ergonomic solutions may involve the redesign of tasks, workstations, tools, lighting, and equipment to fit a worker's physical capabilities and limitations. This may mean adjusting the height of a workstation or a computer screen, or rearranging the steps in a process so the worker will not have to lift and twist in the same motion.

Today, technological advances which result in more specialized tasks, higher assembly line speeds, and increased repetition are often major causes of ergonomic problems. Consequently, workers' hands, wrists, arms, shoulders, backs, and legs may be subjected to thousands of repetitive twisting, forceful, or flexing motions during a typical workday. When this occurs on the job, the stress on those body parts builds up over time and results in musculoskeletal disorders (MSDs).

The goal of a workplace ergonomics program is to reduce or eliminate the risk factors that lead to MSDs. Jobs that expose workers to excessive vibration, repetitive motions, heavy lifting, awkward postures, and continual contact pressure will be assessed and ways found to reduce exposure to those factors that cause MSDs. Identifying ergonomic risk factors in your workplace is the first step toward making changes that will improve the safety and health of all workers.

Bureau of Labor Statistics reports on ergonomic injuries

In the 2005 report on lost-worktime injury and illness characteristics, the Bureau of Labor Statistics (BLS) reported that workers afflicted with carpal tunnel syndrome missed an average of 27 days of work. Women suffer from carpal tunnel syndrome more often than men. Surprisingly, more women sustained carpal tunnel syndrome by operating machinery, on assembly lines, and tending retail stores than they did typing, keying, and performing other duties associated with office workers.

Virtually all cases of carpal tunnel syndrome resulted from stress or strain on a worker's wrist due to a task's repetitive nature. Examples include grasping tools, scanning groceries, typing or data entry, and cutting meat or poultry on an assembly line. According to the BLS, these repetitive motion injuries resulted in the longest absences from work — an average of 19 days.

In 2005, 375,540 work-related musculoskeletal disorders were reported, accounting for 30 percent of the injuries and illnesses involving recuperation away from work. The service industries had 71 percent of the MSD cases, followed by goods-producing industries with 29 percent. The three occupational groups with the most musculoskeletal disorders were laborers and material movers; nursing aides, orderlies, and attendants; and truck drivers.

As the work force continues to age and medical costs continue to escalate, the cost of ergonomic-related illnesses in the workplace will rise. If you look beyond worker health and the dollars-and-cents side of the issue, however, there is at least one other reason why you should be concerned with ergonomic hazards in the workplace. Even though OSHA's ergonomics standard has been withdrawn, the Agency can and will continue to cite and fine companies with a pattern of ergonomic-related injuries under the 5(a)(1) or General Duty clause of the OSH Act.

NIOSH develops guide for ergonomics program development

In 1997, the National Institute for Occupational Safety and Health (NIOSH) issued guidelines for developing practical and cost-effective approaches to protecting workers from job-related musculoskeletal disorders. It describes the basic elements of a workplace program aimed at preventing work-related MSDs by focusing on management commitment, worker participation, and training as essential elements in an overall ergonomics program. It also includes a "toolbox" which is a collection of techniques, methods, reference materials, and other resource information to help employers develop a successful program.

Elements of Ergonomics Programs: A Primer Based on Workplace Evaluations of Musculoskeletal Disorders outlines methods that are commonly used for identifying, correcting, and preventing MSDs. The book, a culmination of two decades of NIOSH research, contains many illustrations and charts on how those techniques can be tailored for specific types of workplaces. It covers these basic steps for controlling work-related musculoskeletal disorders:

- Determine if musculoskeletal problems exist.
- Develop roles for both managers and workers in the ergonomics program.
- Recognize and fill training needs.
- Gather and analyze data to define the scope and characteristics of ergonomics concerns.
- Develop control solutions.
- Establish health care management.
- Create a proactive ergonomics program.

State-plan states move forward with ergonomics rules

California — Title 8, Section 5110, Ergonomics rule

The State of California Department of Industrial Relations began to develop the nation's first rule addressing repetitive motion injuries in the mid-1990s. The rulemaking was mandated by a provision in a workers' compensation bill passed by the California Legislature in 1993 which required that the Cal/OSHA Standards Board promulgate an ergonomics standard designed to prevent injuries caused by repetitive motion. In November 1996, Section 5110, Repetitive Motion Injuries, a new section to the California Title 8, General Industry Safety Orders was adopted.

The standard applies repetitive motion injuries that are work-related (50 percent or more of the worker's job) which have been identified and diagnosed by a licensed physician. Covered employers must establish and implement a program that includes a worksite evaluation, control of exposures which have caused repetitive motion injuries, and training for employees. Employers with nine or fewer employees are exempted. Since the rule became effective on July 3, 1997, Cal/OSHA has issued several citations under it.

Washington — Part 296-62-05101

In November 2003, Washington State voters passed Initiative 841 which repealed the state's ergonomics regulations. I-841 scrapped the ergonomics rule and prevents the state from taking any action until the federal government has adopted a national ergonomics rule. The measure was endorsed by nearly 200 associations and businesses statewide.

Despite the unwanted outcome, the state's Department of Labor and Industries (L&I) believes the initiative heightened awareness of ergonomics and generated a broader discussion of this important safety issue. L&I said that both sides of the debate believe that using proper ergonomic techniques belongs in the work-place and benefits employers as well as workers.

The agency plans to continue working collaboratively with labor and business to reduce ergonomic-related injuries by concentrating on educating workers and employers.

Maine

Maine requires both public and private employers that use two or more terminals at one location to establish an education and training program for computer operators about the proper use of computer terminals.

Training must include an explanation of the proper use of terminals and the protective measures that an operator may take to avoid or minimize symptoms resulting from extended use of terminals. The importance of maintaining proper posture, how to achieve such posture, and how to adjust workstation equipment must also be covered. Training has to be provided within the first month of hire and then annually thereafter to all workers whose primary task is to operate a terminal for more than four consecutive hours each day.

The Maine Video Display Terminal (VDT) Law further requires employers to post a copy of the rule and a written notice explaining employees' rights and employers' duties to train about computer use.

OSHA and ergonomics

After ten years of work on an ergonomics standard, OSHA issued a final rule in November 2000. The goal of the standard was to reduce the level of work-related musculoskeletal disorders (MSDs) such as lower back injuries and carpal tunnel syndrome which are the most prevalent, expensive, and preventable work-place injuries in the country. The standard would have affected over six million employers and 102 million employees in general industry workplaces.

While organized labor supported the new rule which addressed the most common workplace injuries, business organizations denounced it as prohibitively expensive, asserting that it would cost corporations more than $100 billion to implement. Ultimately, the battle was drawn along party lines, with the new Republican

administration invoking a never-before used law, the Congressional Review Act, to swiftly bring an end to the ergonomics standard.

Since the withdrawal of the ergonomics standard, OSHA has published five industry-specific ergonomic guidelines, along with interactive web-based training tools to help employers identify and control ergonomic risk factors unique to their industries. Employers in other industries for which guidelines have not been developed may find useful information in these voluntary guidelines for implementing their own ergonomic programs. The guidelines include:

- Shipyards Guidelines, 56 pages: February 28, 2008.
- Poultry Processing Guidelines, 28 pages: September 2, 2004.
- Retail Grocery Stores Guidelines, 29 pages: May 28, 2004.
- Nursing Home Guidelines, 38 pages: March 13, 2003.
- Ergonomics Program Management Guidelines for Meatpacking Plants, 40 pages: 1993.

Even though there may not be an ergonomics rule in place for some time, OSHA continues to monitor for ergonomic problems in industry and issues citations for hazardous risk factors under the General Duty Clause of the Occupational Safety and Health Act of 1970.

What are musculoskeletal disorders?

Musculoskeletal disorders are caused or aggravated by repetitive motions, forceful exertions, vibration, mechanical compression (hard and sharp edges), and sustained or awkward postures that occur over extended periods of time. MSDs can affect nearly all tissues, the nerves, tendons, tendon sheaths, and muscles, with the upper extremities being the most frequently affected. These injuries range from disorders of the back, the neck, the arms and legs, or the shoulders and involve strains, sprains, or tissue inflammation, and dislocation.

Workers suffering from MSDs may experience less strength for gripping, less range of motion, loss of muscle function, and inability to do everyday tasks. These painful and sometimes crippling injuries develop gradually over periods of weeks, months, and years as the result of the repeated actions required to perform their jobs.

Awareness is the key to preventing serious MSD injuries. It is important for employers and employees alike to know the signs and symptoms of MSDs. These signs and symptoms are often ignored, because they seem slight at first and go away when the employee is not at work. However, as time goes on, the symptoms increase and last longer until finally it's impossible to perform simple tasks such as holding a drinking glass or keyboarding. Early intervention is essential to recovery.

That's why it's important to train employees about MSD signs and symptoms and encourage them to report symptoms as soon as they become aware of them. They also need to understand what may happen if they continue to perform their regular job and don't report the symptoms. Early reporting is essential to lessen the severity of the injury. The longer warning signs are ignored, the more damage is done, the longer recovery takes, and in some cases, the damage can't be repaired.

Signs and symptoms

The presence of MSD signs and/or symptoms is usually the first indication that an employee may be developing an MSD. The signs are objective physical findings that an MSD may be developing. The symptoms, on the other hand, are physical indications that an employee may be developing an MSD.

Symptoms can vary in severity, depending on the amount of exposure to MSD hazards and often appear gradually, for example, as muscle fatigue or pain at work that disappears during rest. Usually symptoms become more severe as exposure continues. If the employee continues to be exposed, symptoms may increase to the point that they interfere with performing the job. Finally, pain may become so severe that the employee is unable to perform physical work activities).

Signs that may indicate an MSD include deformity, decreased grip strength, decreased range of motion, and loss of function. Common symptoms of MSDs include:

- Painful joints,
- Pain, tingling, or numbness in the hands or feet,
- Shooting or stabbing pains in the arms or legs,
- Swelling or inflammation,
- Burning sensation,
- Pain in wrists, shoulders, forearms, or knees,
- Fingers or toes turning white,
- Back or neck pain, and
- Stiffness.

Common MSDs

The most common MSDs in the workplace are tendon disorders such as tendinitis, tenosynovitis, De Quervain's disease, trigger finger, Raynaud's syndrome, and carpal tunnel syndrome. Tendon disorders often occur at or near the joints where the tendons rub against ligaments and bones. The most frequently noted symptoms of tendon disorders are a dull aching sensation over the tendon, discomfort with specific movements, and tenderness to the touch. Recovery is usually slow and the condition may easily become chronic if the cause is not eliminated.

Tendinitis

Tendinitis is tendon inflammation that occurs when a muscle or tendon is repeatedly tensed from overuse, vibration, or unaccustomed usage of the wrist and shoulder. With further exertion, some of the fibers that make up the tendon can actually fray or tear apart. The tendon becomes thickened, bumpy, and irregular in certain areas of the body, such as the shoulder, and the injured area may calcify. Without rest and sufficient time for the tissues to heal, the tendon may be permanently weakened. Tendinitis is common among power press operators, welders, painters, and assembly line workers in the automobile, appliance, and electronic production industries.

Tenosynovitis

Tenosynovitis is an inflammation or injury to the synovial sheath surrounding the tendon. These sheaths secrete synovial fluid which acts as a lubricant to reduce friction during movement. Repetitive motion using the hands and wrists may provoke an excessive secretion of synovial fluid, with the sheath becoming swollen and painful. Repetitions exceeding 1,500 to 2,000 per hour are known to produce symptoms associated with tendon sheath irritation in the hands. Tenosynovitis often affects workers in meatpacking and poultry processing. Also those whose tasks require buffing, grinding, sanding, sawing, and punch press operations.

DeQuervain's disease

In DeQuervain's disease, the tendon sheath of the thumb is inflamed. This disease is attributed to excessive friction between two thumb tendons and their common sheath. Twisting and forceful gripping motions with the hands, similar to a clothes-wringing movement, can place sufficient stress on the tendons to cause DeQuervain's disease. Tasks involving these kinds of motions are frequently performed by butchers, housekeepers, packers, seamstresses, and cutters.

Trigger finger

Trigger finger, another tendon disorder, is attributed to the creation of a groove in the flexing tendon of the finger. If the tendon becomes locked in the sheath, attempts to move that finger will cause snapping and jerking movements. The palm side of the fingers is the usual site for trigger finger. This disorder is often associated with using tools that have handles with hard or sharp edges or whose handles are too far apart for the user's hand. Meatpackers, poultry workers, electronic assemblers, and carpenters are at risk of developing trigger finger.

Carpal tunnel syndrome

Carpal tunnel syndrome (CTS), a disorder affecting the hands and wrists, has probably received more attention in recent years than any other musculoskeletal disorder. CTS is the compression and entrapment of the median nerve where it passes through the wrist into the hand in the carpal tunnel. The median nerve is the main nerve that extends down the arm to the hand and provides the sense of touch in the thumb, index finger, middle finger, and half of the fourth or ring finger.

When irritated, tendons housed inside the narrow carpal tunnel swell and press against the nearby median nerve. The pressure causes tingling, numbness, or severe pain in the wrist and hand. The pain is often experienced at night. The pressure also results in a lack of strength in the hand and an inability to make a fist, hold objects, or perform other manual tasks. If the pressure continues, it can damage the nerve, causing permanent loss of sensation and even partial paralysis.

Carpal tunnel syndrome develops in the hands and wrists when repetitive or forceful manual tasks are performed over a period of time. Workers need to be aware of the symptoms and causes of CTS and what to do about them. Initially, they may have fatigue and pain which develops during the work day and disappears overnight with no physical symptoms. After a length of time, fatigue and pain develop earlier in the day, some physical symptoms such as clumsiness may occur which affect work performance, and there may be no overnight recovery.

When the case becomes full-blown, there is constant fatigue and pain with no overnight recovery and disturbed sleep results. At this point, work performance is inhibited to the extent of requiring off-duty time or light/restricted duty. Often workers do not associate their pain with their work because symptoms may only occur during evening or off-duty hours. When they finally seek medical help, surgery may be necessary and the road to recovery will take more time than anticipated.

Raynaud's syndrome

Raynaud's syndrome, or white finger, occurs when the blood vessels of the hand are damaged as a result of repeated exposure to vibration for long periods of time. The skin and muscles are unable to get the necessary oxygen from the blood and eventually die. Common symptoms include:

- Intermittent numbness and tingling in the fingers;
- Skin that turns pale, ashen and cold; and
- Eventual loss of sensation and control in the fingers and hands.

Raynaud's syndrome is associated with the use of vibrating tools over time, such as pneumatic hammers, electric chain saws, and gasoline powered tools. After long-term exposure, the blood vessels in the fingers may become permanently damaged. This condition is also intensified when the hands are exposed to extremely cold temperatures.

There is no medical remedy for white finger. If the fingers are fairly healthy, the condition may improve if exposure to vibration stops or is reduced. Job activities that can lead to Raynaud's Syndrome include chain sawing, jack hammering, use of vibrating tools, sanding, painting, and using a tool too small for the hand, often in a cold environment.

Other types of vibration may affect the entire body, producing overall fatigue and potential permanent damage. Vibration in conjunction with prolonged sitting may also result in degenerative changes in the spine. For example, drivers of tractors, trucks, buses, construction machinery, and other heavy equipment may suffer from low back pain, and permanent abdominal, spinal and bone damage.

Back disorders

Pulled or strained muscles, ligaments, tendons, and disks are perhaps the most common back problems and may occur in almost half of the work force at least once during their lifetime. The majority of workplace back disorders result from chronic, or long-term injury to the back rather than from one specific incident. Only about four percent of back injuries are associated with a single traumatic incident.

Back disorders are frequently caused by the cumulative effects of faulty body mechanics:

- Excessive or repetitive twisting, bending, and reaching;
- Carrying, moving, or lifting loads that are too heavy or too large;
- Staying in one position for too long;
- Poor physical condition; or
- Awkward posture.

When back muscles or ligaments are injured from these repetitive pulling and straining activities, the back muscles, disks, and ligaments can become scarred and weakened and lose their ability to support the back, making additional injuries more likely.

Prolonged sitting stresses the body, particularly the lower back and the thighs, and may cause the lower back (lumbar) region to bow outward if there is inadequate support. This abnormal curvature (called kyphosis) can lead to painful lower back problems, a common complaint among office workers.

Other factors which are contributors to back injuries include the natural degeneration of the back due to aging, inactivity both at work and at home, seasonal activity undertaken without prior physical conditioning, stress, and vibration.

Risk factors that cause MSDs

The physical stresses that can contribute to or cause MSDs are called “risk factors.” The initial symptoms of MSDs may include fatigue, discomfort, and pain; as tissue damage worsens, other symptoms, such as weakness, numbness, or restricted movement, may also appear. Work-related MSDs occur when the risk factors that cause or contribute to musculoskeletal system pathology are associated with a person’s job duties. Workplace musculoskeletal disorders are caused by exposure to the following risk factors:

Repetition

Doing the same motions over and over again places stress on the muscles and tendons. The severity of risk depends on how often the action is repeated, the speed of movement, the number of muscles involved, and the required force.

Forceful exertions

Force is the amount of physical effort required to perform a task, such as heavy lifting or pushing/pulling, or to maintain control of equipment or tools. The amount of force depends on the type of grip, the weight of an object, body posture, the type of activity, and the duration of the task.

Awkward postures

Posture is the position your body is in and affects muscle groups that are involved in physical activity. Awkward postures include repeated or prolonged reaching, twisting, bending, kneeling, squatting, working overhead with your hands or arms, or holding fixed positions.

Contact stress

Pressing the body against a hard or sharp edge can result in placing too much pressure on nerves, tendons, and blood vessels. For example, using the palm of your hand as a hammer can increase your risk of suffering an MSD.

Vibration

Operating vibrating tools or equipment that typically have high or moderate vibration levels such as sanders, grinders, chippers, routers, drills, and other saws can lead to nerve damage.

Don't wait to start an ergonomics program

Data shows that employers with effective, well-managed ergonomics programs see significant reductions in the severity and number of work-related MSDs. These programs also generally improve productivity and employee morale and reduce turnover and absenteeism.

Even though OSHA's ergonomics standard has been rescinded, your workers' safety and health and rising workers' compensation claims are reason enough for you to carefully analyze your company's work environment, the equipment used, and the tasks performed from an ergonomics perspective. If you do not feel competent to make the evaluation, bring in outside assistance. There are various government and private agencies that are capable of doing a workplace analysis.

Tackling ergonomic hazards

The first step in setting up an ergonomics program is to determine if musculoskeletal disorders are present. Recognizing the signs that a problem exists is the first step. Some signs are obvious while others are more subtle. Look for signs such as the following:

- OSHA injury and illness recordkeeping logs or workers' compensation claims show cases of MSDs such as carpal tunnel syndrome, tendinitis, tenosynovitis, epicondylitis, and low back pain. Sometimes these records contain nonspecific entries like "hand pain," which, while not a specific diagnosis, may be an indicator of a significant health problem if severe or persistent.
- Certain jobs or work conditions cause worker complaints of undue strain, localized fatigue, discomfort, or pain that does not go away after overnight rest.
- Workers visiting the clinic make frequent references to physical aches and pains related to certain types of work assignments.
- Job tasks involve activities such as repetitive and forceful exertions; frequent, heavy, or overhead lifts; awkward work positions; or use of vibrating equipment.

Other signals that alert employers to potential problems include the following:

- Trade publications, employers' insurance communications, and references in popular literature indicating risks of MSDs connected with job operations in the employer's business.
- Cases of MSDs found among competitors or in similar businesses.
- Proposals for increasing line speed, retooling, or modifying jobs to increase individual worker output and overall productivity.

Clues that indicate ergonomic problems may also suggest the scope of the effort required to correct them. Signs that implicate multiple jobs in various departments and involve a large percent of the workforce may indicate the need for a full-scale, company-wide program. Signs that the suspected problems are confined to isolated tasks and relatively few workers may suggest starting with a more limited, job-focused activity.

The financial benefits of comprehensive safety and health programs have been well documented. Workplaces safe from hazardous conditions have lower costs due to decreased lost time, absenteeism, and worker compensation premiums. Ergonomics programs have been shown to be cost effective for similar reasons. In addition, ergonomic improvements may result in increased productivity and higher product quality.

Management commitment and employee involvement

The first step in implementing an ergonomics program is to gain the support of both management and employees. Commitment and involvement are complementary and essential elements of a sound safety and health program. Commitment by management provides the organizational resources and motivating forces necessary to deal effectively with ergonomic hazards. An ergonomics program in the workplace is likely to fail without commitment from management.

Employee involvement and feedback through clearly established procedures are likewise essential, both to identify existing and potential hazards and to develop and implement an effective way to abate all kinds of ergonomic hazards.

Management commitment

To fulfill the ergonomics program's goals, it is essential that the employer demonstrate leadership by developing ways for employees to report MSDs, respond to those reports, and be involved in the overall ergonomics program. Ensure that your company's policies or practices do not discourage employees from reporting MSD signs or symptoms or from participating in the ergonomics program. To be effective, management leadership must be active rather than passive.

A successful program should take a team approach, and include the following:

- Management's involvement demonstrated through personal concern for employee safety and health by placing a priority on eliminating the ergonomic hazards.
- A policy that places safety and health on the same level of importance as production. To accomplish this, production processes and safety and health protection should be integrated to assure that this protection is part of the daily production activity within each facility.
- The commitment of the employer to assign and communicate responsibility for various aspects of the ergonomics program so that everyone knows what is expected of them.
- The commitment of adequate authority and resources so that the program can be properly implemented.
- Employer commitment to ensure that each manager, supervisor, and employee responsible for the ergonomics program is accountable for carrying out those responsibilities.

Employee involvement

Management leadership and employee involvement are complementary as well as essential to the success of an ergonomics program. Employees' intimate knowledge of the jobs they perform and the special concerns they bring to their job give them a unique perspective that can be used to make the program more effective.

Employee participation provides the means through which workers develop and express their own commitment to safe and healthful work, as well as sharing in the overall success of the company. Employees must have:

- A way to report MSD signs and symptoms;
- Prompt responses to their reports;
- Information about the ergonomics program; and
- Ways to be involved in developing, implementing and evaluating each element of the ergonomics program.

Form a committee

One form of employee participation in an organization's efforts to reduce work-related injuries is through a joint labor-management safety and health committee, which may be company-wide or department-wide. Membership on company-wide committees includes union leaders to elected worker representatives, department heads, and key figures from various areas of the organization. At this level, typical committee functions consist of:

1. Discussing ways to resolve safety and health issues;
2. Making recommendations for task forces or working groups to plan and carry out specific actions; and
3. Approving use of resources for such actions and providing oversight.

Committee make-up and function at the department level are more localized, since they are directed to issues specific to their own operations. Composition here can be limited to workers from the department or area engaged in similar jobs who, with their supervisors and select others (e.g., maintenance), propose ways for reducing work-related problems, including those posing injury or disease risks. Because of their smaller size and opportunities for closer contacts among members, such committees may be referred to as a work group. The department or area work group approach appears to be a popular one in addressing ergonomic problems.

Involve people from all over the company

Ergonomic problems typically require a response that cuts across a number of organizational units. Hazard identification through job task analyses and review of injury records or symptom surveys, as well as the development and implementation of control measures, can require input from:

- Safety and hygiene personnel,
- Health care providers,
- Human resource personnel,
- Engineering personnel,
- Maintenance personnel, and
- Ergonomics specialists.

In small businesses, two or more of the functions noted on the list may be merged into one unit, or one person may handle several of the listed duties. Regardless of the size of the organization, persons identified with these responsibilities are crucial to an ergonomics program. Purchasing personnel in particular should be included, since the issues raised can dictate new or revised specifications on new equipment orders.

How best to fit these different players into the program may depend on the company's existing occupational safety and health program practices. No single form or level of worker involvement fits all situations or meets all needs. Much depends on the nature of the problems to be addressed, the skills and abilities of those involved, and the company's prevailing practices for participative approaches in resolving workplace issues.

Employee involvement, however, is only effective when the employer welcomes it and provides protection from any discrimination to the employees involved. Inclusion of employees in labor-management committees, safety circle teams, rotational assignments, or in other ways that provide the employee with an opportunity to impact decisions about safety and health protection will strengthen the program for ergonomic hazard protection.

Develop an MSD reporting system

There should be a method/system for employees to report MSD signs and symptoms and to get prompt responses. It may take either a formal or informal approach. Large employers may decide that a formal system of reporting that includes written documentation is appropriate to ensure that nothing falls through the cracks. Employers with fewer than ten employees, on the other hand, may find that oral reporting systems are adequate.

Your company probably has an injury and illness reporting system in place that can be adapted to accommodate MSD reporting. Regardless of how methods are tailored to meet the needs of a specific workplace and workforce, the process must be systematic and accessible to all employees.

A reporting system is important for a successful ergonomics program. In order for you to know that MSDs are occurring, employees must have a mechanism for reporting this information. A system that is well-known to employees is one way to ensure employee participation in the ergonomics program.

It's a good idea to designate at least one person to receive and respond to employee reports, and to take appropriate action. Depending on the workplace, that responsibility may be designated to front-line supervisors, a safety officer or safety committee, an occupational health nurse, or in small companies, the employer may encourage workers to report MSD signs and symptoms directly to him or her.

Build in-house expertise

Training is recognized as an essential element for any effective safety and health program. For ergonomics, the overall goal of training is to enable managers, supervisors, and employees to identify aspects of job tasks that may increase a worker's risk of developing musculoskeletal disorders, recognize the signs and symptoms of the disorders, and participate in the development of strategies to control or prevent them. Training ensures that everyone involved is well informed about the hazards so they can actively participate in identifying and controlling exposures.

Ergonomics awareness training objectives should include:

- Recognize workplace risk factors for musculoskeletal disorders and understand general methods for controlling them.
- Identify the signs and symptoms of musculoskeletal disorders that may result from exposure to risk factors, and be familiar with the company's health care procedures.
- Know the process the employer is using to address and control risk factors, the employee's role in the process, and ways employees can actively participate.
- Know the procedures for reporting risk factors and musculoskeletal disorders, including the names of designated persons who should receive the reports.

Job analysis and control measures training objectives should include:

- Demonstrate the way to do a job analysis for identifying risk factors for musculoskeletal disorders.
- Select ways to implement and evaluate control measures.

Problem solving training objectives include:

- Identify the departments, areas, and jobs with risk factors through a review of company reports, records, walk-through observations, and special surveys.
- Identify tools and techniques that can be used to conduct job analyses and serve as a basis for recommendations.
- Develop skills in team building, consensus development, and problem solving.
- Recommend ways to control ergonomic hazards based on job analyses and pooling ideas from employees, management, and other affected and interested parties.

Training objectives are not intended to have workers, supervisors, or managers diagnose or treat ergonomic-related disorders. Rather, the purpose is to instill an understanding of what type of health problems may be work related and when to refer employees for medical evaluation. The training should include what is known about work and non-worker causes of musculoskeletal disorders and the current limitations of scientific knowledge.

Training should be understandable to the target audience and the materials used should consider the participants' education levels, literacy abilities, and language skills. This may mean providing materials, instruction, or assistance in languages other than English.

Open and frank interactions between trainers and trainees, especially those in affected jobs, are especially important. Employees know their own jobs better than anyone else and often are the source of good ideas for ways to improve them. At a minimum, employees must be given an opportunity to discuss ergonomic problems in their jobs as they see them and engage in relevant problem-solving exercises during the training.

Audit the ergonomics program

A comprehensive ergonomics program audit is also essential to periodically evaluate the whole set of safety and health management methods and processes to ensure that they protect against potential ergonomic hazards at a specific worksite. The audit determines whether policies and procedures are implemented as planned and whether, in practice, they have met the objectives set for the program.

Performing an audit will ensure that the overall ergonomics effort is consistent with the priorities and goals of your organization. Include accounting and engineering activities as well as safety in your audit. An ergonomic audit should focus on these areas.

- Identification of existing and potential problems.
- Ergonomic assessment of jobs with possible problems.
- Correction for and prevention of ergonomic problems.
- Medical management.
- Ergonomics training at all employee levels.
- Organizational issues and management.

When either performance or the objectives themselves are found inadequate, revisions to the program should be made. Without such a comprehensive review, its impossible to gage the effectiveness of the ergonomic controls you've implemented.

Worksite analysis

A worksite analysis provides for both the identification of problem jobs and risk factors associated with these jobs. The worksite analysis can be used to determine what jobs and workstations are the source of the greatest problems. Recognizing the signs that may indicate a problem through a systematic analysis of injury and illness records can be done to accomplish this step.

Analyze company data

An easy and straightforward approach to assessing potential ergonomic-related problems is to conduct a review of various injury and illness records. The records can be different for every company but may include:

- OSHA 200 forms for years prior to 2002,
- OSHA 300 Log forms for years after 2002
- Workers' compensation claims,
- Group health insurance records,
- First-aid logs,
- Absentee and turnover records,
- Records of employee complaints or grievances.

Using all these information sources, try to identify entries which may indicate the presence of Musculoskeletal Disorders (MSDs). Musculoskeletal disorders (MSDs) is a term of art in scientific literature that refers collectively to a group of injuries and illnesses that affect the musculoskeletal system. While there is no single diagnosis for MSDs, the conditions identified below are commonly included in the range of conditions that potentially constitute "MSDs":

- Tendinitis,
- Tenosynovitis,
- Epicondylitis,
- Carpal tunnel syndrome,
- Bursitis,
- DeQuervain's disease,
- Ganglion cyst,
- Thoracic outlet syndrome,
- Less precise entries such as sprains, strains, tears, or even just pain.

Identify and analyze trends

Second, identify and analyze any apparent trends or ergonomic problems relating to particular departments, process units, production lines, job titles, operations, or workstations.

- Certain jobs or work conditions cause worker complaints of undue strain, localized fatigue, discomfort, or pain that does not go away after overnight rest.
- Workers visiting the clinic make frequent references to physical aches and pains related to certain types of work assignments.
- Job tasks involve activities such as repetitive overhead lifts; awkward work positions; or use of vibrating equipment.

A company's initial efforts in ergonomics should be directed toward fixing the most obvious problem jobs. Implementing the program can have value by enabling early detection of and more timely interventions in potential ergonomic problems. Also, an ergonomics program can influence the design of future changes in work processes to reduce the possibility of musculoskeletal disorders.

This information will provide you with an idea about where "problem jobs" exist. Worker surveys and a background knowledge of certain jobs considered "high risk" can also help in targeting specific worksite analyses. Employee questionnaires on ergonomic problems and issues are a useful way to gather information about work conditions that may contribute to ergonomic hazards. Other forms of regular employee participation might include a complaint log or a suggestion book.

Determine risk factors

The next step to take is conducting a more detailed analysis of those job tasks and positions determined to be problem areas for their own specific ergonomic risk factors. This analysis can be done with a checklist and should be performed either by direct observation or, where feasible, through videotape review. The analysis should be routinely performed and documented by a qualified person, ideally an ergonomist, although trained engineers, managers, health care providers, and affected employees can often contribute significantly to the process.

A combination of risk factors rather than any single factor may be responsible for the occurrence of musculoskeletal disorders. Therefore, identifying all the risk factors that may be present in the job is important. Some typical risk factors for cumulative trauma and back disorders that are likely to be identified in a work-site analysis include:

- Excessive repetition or prolonged activities such as for an 8-hour shift, cause fatigue and muscle/tendon strain which can accumulate and may result in permanent tissue damage.
- Forceful exertions (including lifting, pushing, and pulling) place higher loads on the muscles, tendons, and joints. As the force increases, the muscles fatigue more quickly.
- Pinch grips which usually place three to four times more force on the tendons than power grips.

Postures determine which muscles are used in an activity and how forces are translated from the muscles to the object being handled. More muscular force is required when awkward postures are used because muscles cannot perform efficiently.

Look for these postures when analyzing a task:

- Prolonged static postures of the body, trunk or its extremities, either sitting or standing.
- Awkward postures of the upper body, including reaching above the shoulders or behind the back.
- Excessive bending or twisting of the hand or wrist.
- Continued elevation of the elbow and forearm.
- Continued physical contact with work surfaces, such as contact with edges of machines can inhibit nerve function and blood flow.
- Inappropriate or inadequate hand tools that cause awkward posturing.
- Restrictive workstations and inadequate clearances that may cause stooping and bending.
- Improper seating or support.
- Bad body mechanics such as continued bending at the waist, continued lifting below the knuckles or above the shoulders, or twisting at the waist while lifting.
- Lifting heavy objects or objects of abnormal sizes without mechanical aids.

- Lack of adjustable chairs, footrests, body supports, and work surfaces at workstations or slippery footing.

Perform the job analysis

Job analysis breaks a job into its various elements or actions, describes them, measures and quantifies risk factors inherent in the elements, and identifies conditions contributing to the risk factors. Most job analyses have several common steps. Each task is studied to determine the specific risk factors that occur during the task. Sometimes each risk factor is evaluated in terms of its magnitude, that is, the number of times it occurs during the task, and how long the risk factor lasts each time it occurs.

The tasks of most jobs can be described in terms of (1) the tools, equipment, and materials used to perform the job, (2) the workstation layout and physical environment, and (3) the task demands and organizational climate in which the work is performed. Job screening provides some of this data. More definitive procedures for collecting information on these components can include the following:

- Observing the workers performing the task in order to furnish time-activity analysis and job or task cycle data; videotaping the workers is typically done for this purpose.
- Still photos of work postures, workstation layouts, tools, etc., to illustrate the job.
- Workstation measurements (e.g., work surface heights, reach distances).
- Measuring tool handle sizes, weighing tools and parts, and measuring tool vibration and part dimensions.
- Determining characteristics of work surfaces such as slip resistance, hardness, and surface edges.
- Measuring exposures to heat, cold, and whole body vibration.
- Biomechanical calculations (e.g., muscle force required to accomplish a task or the pressure put on a spinal disc based on the weight of a load lifted, pulled or pushed).
- Physiological measures (e.g., oxygen consumption, heart rate).
- Special questionnaires, interviews, and subjective rating procedures to determine the amount of perceived exertion and the psychological factors influencing work performance.

Jobs in which current cases have been identified should receive immediate attention, followed by those in which past records have noted a high incidence or severity of musculoskeletal disorders despite the lack of current cases. Priority for job analysis and intervention should be given to those jobs in which most people are affected or in which work method changes are going to be taking place anyway.

The analysis should take multiple causes into consideration, as the combined effect of several risk factors often results in the onset of cumulative trauma disorders. Jobs, operations, or workstations that have multiple risk factors have a higher probability of causing these disorders.

Ideally, all risk factors within a problem area should be identified and proper controls implemented to eliminate each of them. The goal of an ergonomic approach is to make things better than they were before. Incremental improvements in reducing or eliminating some, if not all, risk factors within a problem area will reduce the cumulative risk and the overall level of physical stress for the worker. Thus, the benefits of hazard prevention and control strategies can be quite significant.

Ergonomic hazard identification checklist

Use the following responses to describe **how frequently** workers are exposed to the job conditions described below:

Never (worker is never exposed to the condition)

Sometimes (worker is exposed to the condition less than 3 times daily)

Usually (worker is exposed to the condition 3 times or more daily)

		Never	Sometimes	Usually	If *usually,* list jobs to which answer applies here
1.	Do workers perform tasks that are externally paced?				
2.	Are workers required to exert force with their hands (e.g., gripping, pulling, pinching)?				
3.	Do workers use handtools or handle parts or objects?				
4.	Do workers stand continuously for periods of more than 30 minutes?				
5.	Do workers sit for periods of more than 30 minutes without the opportunity to stand or move around freely?				
6.	Do workers use electronic input devices (e.g., keyboards, mice, joysticks, track balls) for continuous periods of more than 30 minutes?				
7.	Do workers kneel (one or both knees)?				
8.	Do workers perform activities with hands raised above shoulder height?				
9.	Do workers perform activities while bending or twisting at the waist?				
10.	Are workers exposed to vibration?				
11.	Do workers lift or lower objects between floor and waist height or above shoulder height?				
12.	Do workers lift or lower objects more than once per minute for continuous periods of more than 15 minutes?				
13.	Do workers lift, lower, or carry large objects or objects that cannot be held close to the body?				
14.	Do workers lift, lower, or carry objects weighing more than 50 pounds?				

NIOSH *Elements of Ergonomics Programs* 1997.

Control the hazards

Risk factors can be controlled either during the development stages of a product or process or after work has begun. In the development stages, very effective controls can be achieved (proactively) for a small investment. Once production has begun, changes can still be implemented (retrofit changes) but usually require modifications to existing equipment. Retrofit changes also require workers to change work patterns. Implementing a change after habits have been formed requires that the need, the objective, the time frame, and the consequences of the change be communicated. One way to ensure this communication is through employee involvement.

After risk factors and their causes have been identified, either in development or after implementation, the next step is to identify control measures that reduce or eliminate the presence of these factors. Traditional classification of control measures distinguishes between engineering controls and administrative controls. Opportunities for both types of controls differ depending on whether the job or process is new or existing.

A three-tier hierarchy of controls is widely accepted as an intervention strategy for controlling workplace hazards, including ergonomic hazards. These procedures should be evaluated when determining how to correct or control your ergonomic hazards:

- Engineering controls to reduce or eliminate potentially hazardous conditions (e.g., work station, tool, and equipment design or redesign).
- Administrative controls, usually changes in work practices and management policies (e.g., worker rotation, reduced production demand, and increased rest breaks).
- Personal protective equipment.

Engineering controls

The preferred means of controlling or reducing ergonomic hazards in the workplace is through the use of engineering controls. After all, the primary focus of ergonomic hazard abatement is to make the job fit the person, not force the person to fit the job. These are typically permanent controls and can be accomplished by ergonomically designing workstations, tools, or equipment.

The preferred approach to prevent and control musculoskeletal disorders is to design the job — including (1) the workstation layout, (2) selection and use of tools, and (3) work methods — to take account of the capabilities and limitations of the workforce. Engineering control strategies to reduce ergonomic risk factors include the following:

- Changing the way materials, parts, and products can be transported.
- Changing the process or product to reduce worker exposures to risk factors.
- Modifying containers and parts presentation, such as height-adjustable material bins.
- Changing workstation layout, which might include using height-adjustable workbenches.
- Changing the way parts, tools, and materials are to be manipulated. Examples include using fixtures (clamps, vice-grips, etc.) to hold work pieces to relieve the need for awkward hand and arm positions or suspending tools to reduce weight and allow easier access.
- Changing tool designs — for example, squeeze-grip-actuated screwdrivers to replace finger-trigger-actuated screwdrivers.
- Changes in materials and fasteners such as lighter weight packaging materials to reduce lifting loads.

Administrative and work practice controls

Administrative controls

Administrative controls are management-dictated work practices and policies to reduce or prevent exposures to ergonomic risk factors. Administrative control strategies include (1) changes in job rules and procedures such as scheduling more rest breaks, (2) rotating workers through jobs that are physically tiring, and (3) training workers to recognize ergonomic risk factors and to learn techniques for reducing the stress and strain while performing their work tasks.

Although engineering controls are preferred, administrative controls can be helpful as temporary measures until engineering controls can be implemented or when engineering controls are not technically feasible. Administrative controls can be used to reduce the duration, frequency, and severity of exposure to ergonomic hazards. Some examples of frequently employed administrative controls include:

- *Job rotation* can be used as a means to alleviate physical fatigue and stress to a particular set of muscles and tendons. To be effective, employees should be rotated to jobs that utilize different muscle-tendon groups. Job rotation in this regard is used as a preventative measure, not in response to symptoms of cumulative trauma disorders.
- *Broadening or varying the job content* to offset certain risk factors (e.g., repetitive motions, static and awkward postures).
- *Shift length and overtime* can have a major impact on exposure to risk factors, depending on the physical and mental demands of the job. For example, jobs requiring heavy materials handling may need shorter shift lengths. Where demand fluctuates, employees may be asked to work overtime; if the frequency or length of overtime is excessive, fatigue may result and recovery time may be reduced.
- *Frequent breaks* can be incorporated into the workday to relieve fatigued muscles and to reduce stress and strain on various muscle groups.
- *Decreasing production rates and limiting overtime work* are two ways to reduce the total number of repetitions per employee.
- *Adjusting the work pace* to relieve repetitive motion risks and give the worker more control of the work process.
- *Increasing the number of employees assigned* to a task can help alleviate severe work conditions.
- *Training* in the recognition of risk factors for musculoskeletal disorders and instruction in work practices that can ease the task demands or burden.
- *Consider ergonomic strategies when developing new products and procedures*. When a product is designed, consideration should be given to materials, containers for moving product and materials, fasteners, assembly access and sequence, and software interfaces.

Work practice controls

An effective program for ergonomic hazard prevention and control also includes safe and proper work practices that are understood and followed by managers, supervisors, and employees. Key elements of a good work practice program include instruction in proper work techniques, employee training and conditioning, regular monitoring, feedback, adjustments, modification, and maintenance.

For example, after employees are trained in a particular work activity, such as proper lifting or proper tool handling, supervisors and managers should be involved in monitoring workers to ensure that employees continue to use the proper techniques. Improper practices should be corrected to prevent injury.

Proper training with reasonable “break-in” periods for new employees or employees that have been away from the job is another work practice that can help reduce the incidence of cumulative trauma disorders. Break-in periods permit employees to build the strength needed to perform the work and reduce muscle fatigue.

Some companies have also initiated exercise periods for warming up workers at the beginning of a shift and for stretching, relaxing, and strengthening muscle groups frequently used by workers. Exercise periods help to prevent injuries by warming up cold muscles and relaxing fatigued muscles which are more susceptible to injury.

Personal protective equipment

One of the most controversial questions in the prevention of MSDs is whether the use of personal equipment worn or used by the employee is effective. In the field of occupational safety and health, PPE generally provides a barrier between the worker and the hazard source. Respirators, ear plugs, safety goggles, chemical aprons, safety shoes, and protective helmets are all examples of PPE.

Whether braces, wrist splints, back belts, and similar devices can be regarded as offering personal protection against ergonomic hazards remains open to question. Although these devices may, in some situations, reduce the duration, frequency, or intensity of exposure, evidence of their effectiveness in injury reduction is inconclusive. In some instances they may decrease one exposure but increase another because the worker has to "fight" the device to perform his or her work such as the use of wrist splints while engaged in work that requires wrist bending.

According to many ergonomists and safety and health professionals, PPE is placed last in the hierarchy of risk factor controls because:

- Its effectiveness depends on human behavior (the manager's, supervisor's and worker's);
- Studies have shown that the effectiveness of PPE is highly variable and inconsistent from one worker to the next;
- The protection provided cannot be measured reliably;
- PPE must be maintained and replaced frequently to maintain its effectiveness;
- It is burdensome for employees to wear, because it decreases mobility and is often uncomfortable; and
- It may pose hazards of its own (e.g., the use of vibration-reduction gloves may also force workers to increase their grip strength).

Ergonomics-related PPE may include palm pads and knee pads to reduce contact stress, vibration-attenuation gloves, and gloves worn to protect against cold temperatures.

Implement the controls

Ideas for controls can be derived from a variety of sources. These ideas are in addition to those gained from brainstorming with employees who perform the jobs or from work teams engaged in such problem solving.

- Trade associations may have information about good control practices for addressing different problem operations within an industry.
- Insurance companies that offer loss control services to their policyholders.
- Consultants and vendors who deal in ergonomic speciality services and products.
- Visits to other worksites known to have dealt with similar problem operations.

Implementing controls normally consists of trials or tests of the selected solutions, making modifications or revisions, full-scale implementation, and follow-up on evaluating control effectiveness.

Testing and evaluation verify that the proposed solution actually works and identifies any additional enhancements or modifications that may be needed. Employees who perform the job can provide valuable input into the testing and evaluation process. Worker acceptance of the changes put into place is important to the success of the intervention.

After the initial testing period, the proposed solution may need to be modified. If so, further testing should be conducted to ensure that the correct changes have been made, followed by full-scale implementation. Designating the personnel responsible, creating a timetable, and considering the logistics necessary for implementation are elements of the planning needed to ensure the timely implementation of controls.

In a number of jobs, workplaces, and physical work activities, it may not be possible to eliminate MSDs. One of the goals of your ergonomics program is to have a good working system in place so that quick and effective action can be taken when MSDs occur.

Evaluate control effectiveness

A follow-up evaluation is necessary to ensure that the controls reduced or eliminated the ergonomic risk factors and that new risk factors were not introduced. It should use the same risk factor checklist or other method of job analysis that first documented the presence of ergonomic risk factors. If the hazards are not substantially reduced or eliminated, the problem-solving process is not finished. Employees who perform the job can provide valuable input into the testing and evaluation process. Worker acceptance of the changes put into place is important to the success of the intervention.

The follow-up may also include a symptom survey, which can be completed in conjunction with the risk-factor checklist or other job analysis method. The results of the follow-up symptom survey can then be compared with the results of the initial symptom survey (if one was performed) to determine the effectiveness of the implemented solutions in reducing symptoms.

When to conduct the follow-up

Because some changes in work methods (and the use of different muscle groups) may actually make employees feel sore or tired for a few days, follow-up should occur no sooner than one to two weeks after implementation, and a month is preferable. Recognizing this fact may help avoid discarding an otherwise good solution.

Follow-up is also essential in those cases where there is a need to prioritize the control of hazards. It tells whether you are on schedule with abatement plans. And, it's a good way of determining whether the elements of the program are functioning properly. For example, evaluating controls, especially work practice controls, is one way to determine whether the ergonomics training has been effective. Many employers evaluate controls within 30 to 60 days after implementation. This gives employees enough time to get accustomed to the controls and to see whether the controls have introduced other problems into the job.

In addition to the short-term evaluations using job analysis methods and symptom surveys, long-term indicators of the effectiveness of an ergonomics program can include:

- Reduction in the incidence rate of musculoskeletal disorders,
- Reduction in the severity rate of musculoskeletal disorders,
- Increase in productivity or the quality of products and services, or
- Reduction in job turnover or absenteeism.

These indicators offer bottom-line results in evaluating interventions that have been put into place. Other indicators may also be used that represent in-process or interim accomplishments achieved on the path to building an ergonomic program. For example, the extent of the ergonomic training given the workforce, the number of jobs analyzed for potential problems, and the number of workplace solutions being implemented are indicators for evaluating the success of your interventions. While bottom-line results are most telling in terms of defining a successful program, the interim measures allow the total development to be monitored.

Medical management

In general, health care management emphasizes the prevention of impairment and disability through early detection, prompt treatment, and timely recovery. Medical management responsibilities fall on employers, employees, and health care professionals (HCPs). A medical management program can help to either eliminate or substantially reduce the risk of development of ergonomics-related problems and symptoms through early identification and treatment.

Identifying and addressing signs and symptoms at an early stage helps to slow or halt the progression of the disorder. When MSDs are caught early, they are more likely to be reversible, to resolve quickly, and not to result in disability or permanent damage. Early intervention plays a big part in reducing the need for surgery.

Employer responsibilities

An employer's basic obligation is to make MSD management available promptly to employees with work-related MSDs. In other words, MSD management means that you have established a process for assuring that employees receive timely attention for it, including, if appropriate, work restrictions or job accommodation and follow-up.

Where there is no onsite HCP, an individual should be designated to receive and respond promptly to reports of MSD signs, symptoms, and hazards. Where there is an onsite HCP, he or she would be the likely person to have responsibility for MSD management, including referral as appropriate.

An effective MSD management program has:

1. A method for identifying available appropriate work restrictions and promptly providing them when necessary;
2. A method for ensuring that an injured employee has received appropriate evaluation, management, and follow-up in the workplace;
3. A process for input from persons contributing to the successful resolution of an employee's covered MSD; and
4. A method for providing relevant information and communicating with the safety and health professionals and HCPs involved in the process.

Employee responsibilities

Employees should participate in the health care management process by:

- Following applicable workplace safety and health rules,
- Following work practice procedures related to their jobs, and
- Reporting early signs and symptoms of MSDs.

Employees may be faced with conflicting job demands or requirements. Safe work practices or rules may conflict with pressures or incentives to be more productive.

Health care professional responsibilities

Health care professionals who evaluate employees, determine employees' functional capabilities, and prepare opinions regarding work relatedness should be familiar with employee jobs and job tasks. With specific knowledge of the physical demands involved in various jobs and the physical capabilities or limitations of employees, the HCP can match the employees' capabilities with appropriate jobs. Being familiar with employee jobs not only assists the HCP in making informed case management decisions but also assists with the identification of ergonomic hazards and alternative job tasks.

The health care professional should:

- Acquire experience and training in the evaluation and treatment of MSDs.
- Seek information and review materials regarding employee job activities.
- Ensure employee privacy and confidentiality to the fullest extent permitted by law.
- Evaluate symptomatic employees including:
  - Medical histories with a complete description of symptoms,
  - Descriptions of work activities as reported by the employees,
  - Physical examinations appropriate to the presenting symptoms and histories,
  - Initial assessments or diagnoses,
  - Opinions as to whether occupational risk factors caused, contributed to, or exacerbated the conditions, and
  - Examinations to follow-up symptomatic employees and document symptom improvements or resolutions.

Treatment for musculoskeletal disorders

Health care professionals are responsible for determining the physical capabilities and work restrictions of the affected workers and the employer must give the employee a task consistent with these restrictions.

Until effective controls are installed, employee exposure to ergonomic stressors can be reduced through restricted duty and/or temporary job transfer. Complete removal from the work environment should be avoided unless the employer is unable to accommodate the prescribed work restrictions.

Splints and supports

Immobilization devices, such as splints or supports, can provide relief to the symptomatic area in some cases. These devices are especially effective off-the-job, particularly during sleep. They should not be used as prophylactic PPE to prevent the development of MSDs. Therefore, these devices should be dispensed to individuals with MSDs only by HCPs who have knowledge of the benefits and possible negatives of these devices.

Wrist splints, typically worn by patients with possible carpal tunnel syndrome, should not be worn at work unless the HCP determines that the employee's job tasks do not require wrist bending. Employees who struggle to perform a task requiring wrist bending with a splint designed to prevent wrist bending can exacerbate symptoms in the wrist because of the increased force needed to overcome the splint. Splinting may also cause other joint areas (elbows or shoulders) to become symptomatic as work techniques are altered.

Recommended periods of immobilization vary from several weeks to months depending on the nature and severity of the disorder. Any immobilization should be monitored carefully to prevent complications (e.g., muscle atrophy caused by nonuse).

The HCP should advise affected employees about the potential risk of continuing hobbies, recreational activities, or other personal habits that may adversely affect their condition as well as the risk of continuing work without job modifications.

Work restrictions

Provide temporary work restrictions, where necessary, to employees with covered MSDs that are serious enough to require some kind of restrictions. Work restrictions are restrictions on the way in which a job is performed or on the activities that the injured employee performs during the recovery period. Work restrictions include changes to the employee's existing job, such as limiting the tasks the employee may perform. Restrictions also include temporary transfer to a restricted duty job or removal from the workplace during the recovery period or a portion of it.

If a HCP has recommended restricted work, you should consider such restrictions necessary to prevent the employee's condition from worsening and to allow the employee's injured tissues to recover. In those instances where the employee has been referred to a HCP, follow the temporary work restriction recommendations, if any, included in the HCP's written opinion.

Evaluate control's effectiveness

A follow-up evaluation is necessary to ensure that the controls reduced or eliminated the ergonomic risk factors and that new risk factors were not introduced. This evaluation should use the same risk factor checklist or other method of job analysis that first documented the presence of ergonomic risk factors. If the hazards are not substantially reduced or eliminated, the problem-solving process is not finished.

Because some changes in work methods may actually make employees feel sore or tired for a few days, follow-up should occur no sooner than one to two weeks after implementation, and a month is preferable. Recognizing this fact may help avoid discarding an otherwise good solution.

In addition to the short-term evaluations using job analysis methods and symptom surveys, long-term indicators of the effectiveness of an ergonomics program can include:

- Reduction in the incidence rate of musculoskeletal disorders.
- Reduction in the severity rate of musculoskeletal disorders.
- Increase in productivity or the quality of products and services.
- Reduction in job turnover or absenteeism.

Company health care management strategies and policies and health care providers can be an important part of the overall ergonomics program.

Training and education

One of the purposes of training and education is to ensure that employees are sufficiently informed about the ergonomic hazards to which they may be exposed so they are better able to participate actively in their own protection. Suggestions and input from workers who are educated about ergonomic hazards can be very helpful in designing improved work practices to reduce ergonomic hazards.

A good ergonomics education and training program will teach employees how to properly use equipment, tools, and machine controls, as well as the correct way to do a variety of job tasks. For example, to minimize or prevent back disorders, workers can be taught proper postures and lifting techniques. Using correct posture is important whether an employee is sitting, standing, pulling, pushing, lifting, or using tools or equipment or whether the job is in a factory setting or an office setting.

Provide MSD information

Employees need access to MSD information in order to be alert to the onset of signs or symptoms and to effectively participate in the ergonomics program, as well as to protect themselves while at work. You should provide the information periodically, that is on a regular basis appropriate for the conditions in the workplace.

That means as often as needed, such as when significant changes are made in the workplace that may result in increased exposure to MSD hazards. Examples of significant changes in the workplace include the introduction of new equipment, new processes, or new production demands that may increase the likelihood that employees will be exposed to MSD hazards.

The information provided to current and new employees (either written or oral) should include:

- Common MSD hazards;
- The signs and symptoms of MSDs and the importance of reporting them early; and
- How to report MSD signs and symptoms.

Presentation methods

There are many practical ways to present the information. One method that aids the understanding of technical information is to allow employees an opportunity to ask questions and receive answers. Examples include question and answer sessions that are:

- Organized classroom style;
- Part of regularly scheduled meetings with employees and their supervisors;
- An outgrowth of informal talks with employees; and
- Incorporated into safety meetings.

Merely arranging for employees to view a videotape on common MSD hazards, without an opportunity for discussion or questions and answers, won't ensure that the information has been effectively communicated. Provide the information in the language and at levels that employees comprehend.

While training and education are an important part of an ergonomic hazard prevention program, they should not be considered the sole solution to the problem. Training in good lifting techniques, for example, is only likely to change existing employee habits for a short period of time. After that, people begin to forget and old habits return. Regular retraining is necessary in order to refresh memories.

Also, training will have a limited impact on an employee whose job still requires a great deal of repetitive motion, twisting, or heavy lifting. In these instances, the problem lies not with the person performing the job, but with the job itself. Other prevention strategies will need to be used in addition to training in order to improve the job such as tool or workstation redesign.

Evaluating and redesigning workstations

Workstations should be ergonomically designed to accommodate the full range of required movements among workers. They should be designed to accommodate the workers who are actually using them to perform the job, not just for the "average" or "typical" worker. Many workstations, particularly those in factories, were designed for men, even though they may be primarily used by women.

The workstation should be designed to permit the worker to adopt several different but equally healthful and safe postures that still permit performance of the job; sufficient space should be provided for the knees and feet. Work tables and chairs should be height-adjustable to provide proper back and leg support. Seat cushions can be used to compensate for height variation when chairs or stools are not adjustable. Tools and materials should have a definite and fixed space for storage. Machine controls should be reachable and equally accessible by both right- and left-handed operators.

When evaluating or redesigning a workstation, give special attention to the following items:

Static loading of muscles (prolonged or sustained exertion of a body part without movement) causes rapid fatiguing of the muscles. Requiring a worker to constantly hold a tool, even when not in use, is a good example of static loading.

Proper work activity height can help control postural risk. Activity height can be adjusted by providing an adjustable work surface; by lowering the work surface and placing the work piece in a fixture that raises it to a proper height; or by raising the worker to the work surface.

The ***reach*** at which tasks are performed affects the strength, precision capability, stress, and other biomechanical aspects of the worker. Therefore, maximum reach distance should be kept within the normal reaching distance, somewhere between 14 and 18 inches. The distance depends on the difficulty of the task, the forces exerted, and the frequency of the activity. Reaches above the shoulder, behind the worker, and far in front or to the side of the worker should be avoided.

Force requirements should be reduced or minimized when possible. The worker should not be required to exert high forces. Work can often be performed more efficiently and more safely by providing a mechanical advantage, so mechanical solutions should be incorporated into the work station when possible. If workers are required to exert high forces, the work piece should be located and stabilized so that the forces are optimal and minimized. Force can sometimes be reduced by using fixtures and proper workstation height.

Hard or sharp edges can be a hazard in a workstation. When the worker's arm or hand repeatedly comes in contact with a hard or sharp edge, damage to the tissues, including nerve or blood vessel damage, can result. Control measures include rounding edges, padding edges, or relocating equipment so people will not hit the edges.

Contact with ***thermally conducting work surfaces*** can be responsible for loss of heat in the hands and arms. This can cause discomfort and, if the wrist and fingers become cold, the tendons and joints become stiff. This may cause symptoms of cumulative trauma disorders to develop.

Proper seating should be made available to workers where the job permits. This is possible in many jobs where tradition has dictated that standing is the only way to do the job. It is also important to provide support for the limbs, both arms and legs. Arm and footrests help to reduce worker stress and fatigue.

Work piece orientation can cause numerous problems, including higher than necessary repetitions, higher than necessary forces, and static and awkward postures. Care should be taken to ensure that the work piece is in such a position that the required tasks do not expose the workers to unnecessary hazards. Proper workstation height and proper fixtures and orientation devices can reduce or eliminate this problem.

Work piece holding is a simple solution to ergonomic hazards which is often overlooked. Fixtures that hold the work piece and orient it for ease of work can greatly reduce the stress of the job and often increase productivity.

Layout of a workstation has an impact on all of the preceding points of workstation design. A good layout will facilitate the flow of materials and product through the station.

OSHA COMPLIANCE MANUAL

Computer workstation checklist

Yes	No	
		Can the work station be adjusted to ensure proper posture by
❑	❑	• Adjusting knee and hip angles to achieve comfort and variability?
❑	❑	• Supporting heels and toes on the floor or on a footrest?
❑	❑	• Placing arms comfortably at the side and hands parallel to the floor?
❑	❑	• Supporting wrist (nearly straight) on a padded surface?
		Does the work area
❑	❑	• Provide enough clearance for the feet, knees and legs relative to the edge of the work surface?
❑	❑	• Provide sufficient space for the thighs between the work surface and the seat?
❑	❑	• Include arm rests for intensive or long duration keying jobs?
❑	❑	• Include headsets for use when frequent telephone work is combined with hand tasks such as typing, using a calculator, or writing?
❑	❑	• Provide adjustments for either right-or left-handed activities?
		Does the chair
❑	❑	• Adjust easily from the seated position?
❑	❑	• Have a padded seat pan.
❑	❑	• Have a seat that is approximately 18 inches wide (45.72 centimeters)?
❑	❑	• Have a back rest that provides lumbar support that can be used while working?
❑	❑	• Have a stable base with casters that are suited to the type of flooring?
❑	❑	• Have different seat pad lengths (15 to 17 inches or 38.10 and 43.18 centimeters) with a waterfall design available?
❑	❑	• Allow the seat pad to adjust for both height (minimum of 4 $^{1}/_{2}$ inches or 10.16-1.27 centimeters) and angle (plus or minus 5 degrees)?
❑	❑	• Have adjustable arm rests, where needed?
		Is the keyboard
❑	❑	• Height from the floor and the slope of the keyboard surface adjustable?
❑	❑	• Prevented from slipping when in use?
❑	❑	• Detachable?
❑	❑	• Keying action require minimal force?
		Are other inputs and devices (mouse, pointer, calculator)
❑	❑	• At keyboard height?
❑	❑	• Adjustable, as for a document holder?
		Is the display screen
❑	❑	• Clean and free from flickering?
❑	❑	• Able to swivel horizontally and tilt or elevate vertically?
		Is the monitor situated so that
❑	❑	• The work can be performed with the head in a neutral posture for most of the workshift?
❑	❑	• It is between 18 and 30 inches (45.72 and 76.20 centimeters, respectively) away from the operator?
❑	❑	• The top line of text is ar or slightly below eye height?

OSHA COMPLIANCE MANUAL

Computer workstation checklist (continued)

Yes	No	
❑	❑	• Is there sufficient lighting without glare on the screen from lights, windows, or surfaces?
		Does the monitor
❑	❑	• Have brightness and contrast controls?
❑	❑	• Have glare and reflection screening?
		Is the job organized so that
❑	❑	• Workers can change postures frequently?
❑	❑	• Workers can perform different job tasks to reduce intensive keying?
❑	❑	• Workers can leave their workstations for at least 10 minutes after each hour of intensive keying and for at least 1 minute after every 2 hours of intermittent keying?
❑	❑	• The workers have received training in ergonomics an know how to make adjustments to their work stations, chairs, and other accessories?

Evaluating tools

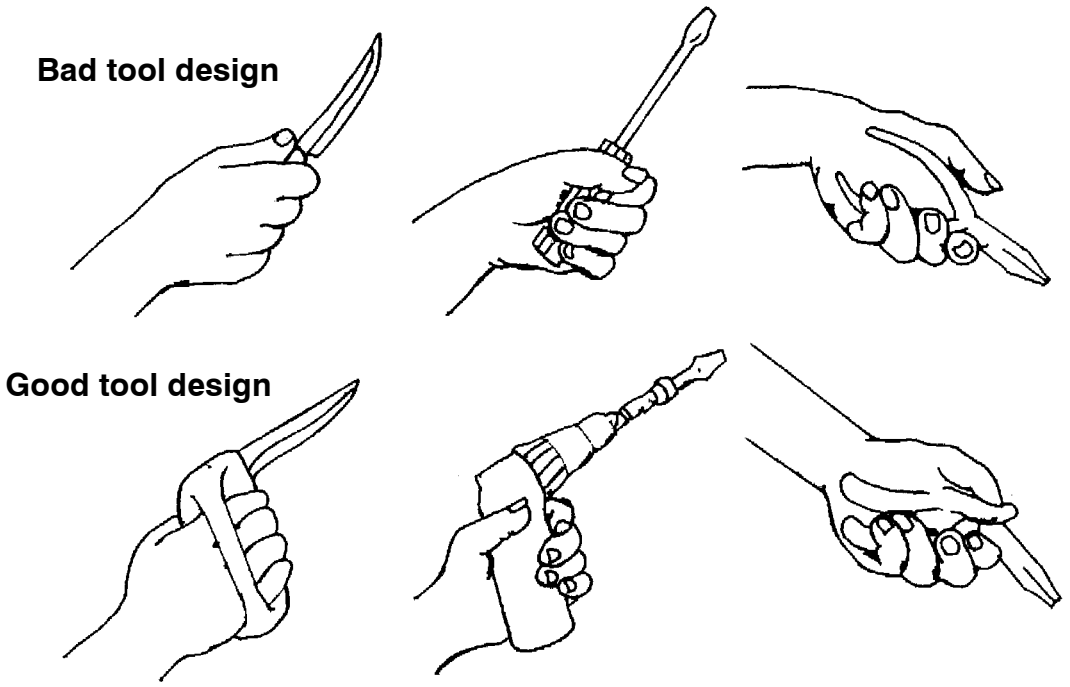
Ergonomic engineering adaptations have been made to many types of tools and tool handles. Tools are a valuable addition to any workplace because they help to improve worker productivity by extending and amplifying workers' abilities. Careful selection and design of hand tools is essential to preventing or reducing the incidence of cumulative trauma disorders.

Because improper use and poor design of hand-held tools can cause damage to the hand and arm, several factors should be considered when selecting a tool:

- Will the tool require extreme or awkward joint positions (bent wrists) to be used.
- Does the tool vibrate.
- Is excessive grip strength required.
- Must force be exerted when the hands or wrists are in awkward positions.
- Is repetitive motion involved.

Before purchasing new tools, it is a good idea to permit workers to test tools in the actual work environment whenever possible. This provides workers who will actually be using the tools with an opportunity to choose a tool that is most comfortable for him or her.

A variety of tool sizes should be available for a variety of workers. Factors that should be considered include handle sizes and their adequacy for gloved hands. Tools should accommodate right- and left-handed workers. The balance, center of gravity, and the weight of the tool should also be considered. Finally, the proper tool should be used when performing a job.



Preventing and controlling back injuries

Low back pain and injuries attributed to manual lifting activities continue as one of the leading occupational health and safety issues facing preventive medicine. Although no approach has been found to totally eliminate back injuries caused by lifting, an effective training program and ergonomically designed work tasks and equipment will help to prevent a substantial number of this type of injury.

Implementing administrative and work practice controls involves carefully selecting and training workers so they know how to safely perform lifting tasks. Engineering controls are used to redesign a job or use mechanical lifting equipment so the lift becomes less hazardous.

Suggested administrative and work practice controls include:

- Strength testing of existing workers, which has been shown to prevent up to one-third of work-related injuries by discouraging the assignment of workers to jobs that exceed their strength capabilities.
- Training employees to utilize lifting techniques that place minimum stress on the lower back.
- Physical conditioning or stretching programs to reduce the risk of muscle strain.
- Use of two-person lift teams when mechanical lifts are not available.
- Observing micro-breaks to minimize muscle fatigue.

Suggested engineering controls include:

- A reduction in the size or weight of the object lifted.
- Adjusting the height of a pallet or shelf. Lifting which occurs below knee height or above shoulder height is more strenuous than lifting between these limits. Obstructions which prevent an employee's body contact with the object being lifted also generally increase the risk of injury.

- Installation of mechanical aids such as pneumatic lifts, conveyors, and automated materials handling equipment.

Other lift factors to be considered to help reduce the risk of injury include frequency of lifting, duration of lifting activities, and type of lifting, as well as individual variables such as age, sex, body size, state of health, and general physical fitness.

The National Institute for Occupational Safety and Health (NIOSH) has issued a revised formula for the design and evaluation of manual lifting tasks. This updated equation provides methods for evaluating asymmetrical lifting tasks and lifts of objects with less than optimal connection between the object and the worker's hands. It also provides guidelines for a larger range of work durations and lifting frequencies than the previous formula. It is not, however, designed to be applied to situations such as one-handed lifting, lifting extremely hot or cold objects, or to factors that may increase the risk of a slip or fall.

By evaluating on-the-job lifting tasks and using the NIOSH formula to reduce the physical stresses associated with each task, the incidence of low back injuries to workers can be reduced.

Proper lifting using the NIOSH equation

The Recommended Weight Limit (RWL) is the principal product of the revised lifting equation. The RWL is defined for a specific set of task conditions as the weight of the load that nearly all healthy workers could perform over a substantial period of time (e.g., up to 8 hours) without an increased risk of developing lifting-related lower back pain. "Healthy workers" is defined as workers who are free of adverse health conditions that would increase their risk of musculoskeletal injury.

The equation is based on a model that provides a unit value for each of six task variables. The values are expressed as coefficients that serve to decrease the load constant, which represents the maximum recommended load weight to be lifted under ideal conditions.

The Recommended Weight Limit is defined by the following equation:

$$RWL = LC \times HM \times VM \times DM \times AM \times FM \times CM$$

		METRIC	U.S. CUSTOMARY
Load Constant	*LC*	23 kg	51 lb
Horizontal Multiplier	*HM*	(25 / *H*)	(10 / *H*)
Vertical Multiplier	*VM*	1-(.003 | *V*-75 |)	1-(.0075 | *V*-30 |)
Distance Multiplier	*DM*	.82 + (4.5 / *D*)	.82 + (1.8 / *D*)
Asymmetric Multiplier	*AM*	1-(.0032*A*)	1-(.0032*A*)
Frequency Multiplier	*FM*	From Table 7	From Table 7
Coupling Multiplier	*CM*	From Table 6	From Table 6

Where:

H = horizontal distance of hands from midpoint between the ankles. Measure at the origin and the destination of the lift (cm or in).

V = vertical distance of the hands from the floor. Measure at the origin and destination of the lift (cm or in).

D = vertical travel distance between the origin and the destination of the lift (cm or in).

A = angle of asymmetry—angular displacement of the load from the sagittal plane. Measure at the origin and destination of the lift (degrees).

F = average frequency rate of lifting measured in lifts/minute. Duration is defined to be: ≤ 1 hour (short); ≤ 2 hours (moderate); or ≤8 hours (long) depending on the work pattern.

The term "task variables" refers to the measurable task descriptors (i.e., H, V, D, A, F, and C). The term "multipliers" refers to the reduction coefficients in the equation (i.e., HM, VM, DM, AM, FM, and CM).

Components of the equation

Horizontal values range between 10 inches and 25 inches

If the horizontal distance is less than 10 inches (25 cm), then H is set at 10 inches (25 cm). Although objects can be carried or held closer than 10 inches from the ankles, most objects that are closer than this cannot be lifted without interference with the body. The maximum value of H is 25 inches (63 cm). Objects at a distance of more than 25 inches from the ankles normally cannot be lifted vertically without some loss of balance.

Vertical values range between 0 and 70 inches

The vertical location is limited by the floor surface and the upper limit of vertical reach for lifting (i.e. 70 inches or 175 cm). The vertical location should be measured at the origin and the destination of the lift to determine the travel distance (D).

Distance values range between 10 inches and 70 inches

The variable D is assumed to be at least 10 inches (25 cm), and no greater than 70 inches (175 cm). If the vertical travel distance is less than 10 inches (25 cm), then D should be set at the minimum distance of 10 inches (25 cm).

Asymmetry values

The angle A is limited to the range from 0° to 135°. If A > 135°, then AM is set equal to zero, which results in a RWL of zero, or no load.

Frequency value range

Lifting frequency (F) for repetitive lifting may range from 0.2 lifts/minute to a maximum frequency that is dependent on the vertical location of the object (V) and the duration of lifting (Table 7). Lifting above the maximum frequency results in a RWL of 0.0, except for discontinuous lifting where the maximum frequency is 15 lifts/minute.

Classification of gripping method (coupling)

The hand-to-object coupling or gripping method (C) affects not only the maximum force a worker can or must exert on the object, but also the vertical location of the hands during the lift. A good coupling will reduce the maximum grasp forces required and increase the acceptable weight for lifting, while a poor coupling will generally require higher maximum grasp forces and decrease the acceptable weight for lifting. The entire range of the lift should be considered when classifying hand-to-object couplings, with classification based on overall effectiveness. The coupling must be classified as **good**, **fair**, or **poor**. If there is any doubt about a particular classification, select the more stressful classification.

Lifting index (LI)

The Lifting Index (LI) provides a relative estimate of the physical stress associated with a manual lifting job. The equation for the (LI) is:

$$LI = \frac{\text{Load Weight*}}{\text{Recommended Weight Limit}} = \frac{L}{RWL}$$

* Where Load Weight (L) = weight of the object lifted (1 lb. or kg.)

How to use the RWL and LI to guide ergonomic design

The recommended weight limit (RWL) and lifting index (LI) can be used to guide ergonomic design in several ways:

- The individual multipliers can be used to identify specific job-related problems. The relative magnitude of each multiplier indicates the relative contribution of each task factor (e.g., horizontal, vertical, frequency, etc.).
- The RWL can be used to guide the redesign of existing manual lifting jobs or to design new manual lifting jobs. For example, if the task variables are fixed, then the maximum weight of the load could be selected so as not to exceed the RWL; if the weight is fixed, then the task variables could be optimized so as not to exceed the RWL.
- The LI can be used to estimate the relative magnitude of physical stress for a task or job. The greater the LI, the smaller the fraction of workers capable of safely sustaining the level of activity. Thus, two or more job designs could be compared.
- The LI can be used to prioritize ergonomic redesign. For example, a series of suspected hazardous jobs could be ranked according to the LI and a control strategy could be developed according to the rank ordering (i.e., jobs with lifting indices above 1.0 or higher would benefit the most from redesign).

This Lifting Index can be used to identify potentially hazardous lifting jobs or to compare the relative severity of two jobs for the purpose of evaluating and redesigning them. Lifting tasks with a LI > 1.0 pose an increased risk for lifting-related low back pain for a fraction of the workforce. Therefore, the goal should be to design all lifting jobs to achieve a LI of 1.0 or less.

Table 6. Coupling multiplier

	$V < 75$ cm (30 in)	$V \geq 75$ cm (30 in)
Couplings	Coupling multipliers	
Good	1.00	1.00
Fair	0.95	1.00
Poor	0.90	0.90

Table 7. Frequency multiplier

Frequency lifts/min	Work duration					
	≤1h		≤2h		≤8h	
	V<75	*V* ≥75	*V*<75	*V* ≥75	*V*<75	*V* ≥75
0.2	1.00	1.00	0.95	0.95	0.85	0.85
0.5	0.97	0.97	0.92	0.92	0.81	0.81
1	0.94	0.94	0.88	0.88	0.75	0.75
2	0.91	0.91	0.84	0.84	0.65	0.65
3	0.88	0.88	0.79	0.79	0.55	0.55
4	0.84	0.84	0.72	0.72	0.45	0.45
5	0.80	0.80	0.60	0.60	0.35	0.35
6	0.75	0.75	0.50	0.50	0.27	0.27
7	0.70	0.70	0.42	0.42	0.22	0.22
8	0.60	0.60	0.35	0.35	0.18	0.18
9	0.52	0.52	0.30	0.30	0.00	0.15
10	0.45	0.45	0.26	0.26	0.00	0.13
11	0.41	0.41	0.00	0.23	0.00	0.00
12	0.37	0.37	0.00	0.21	0.00	0.00
13	0.00	0.34	0.00	0.00	0.00	0.00
14	0.00	0.31	0.00	0.00	0.00	0.00
15	0.00	0.28	0.00	0.00	0.00	0.00
>15	0.00	0.00	0.00	0.00	0.00	0.00

Note: † values of *V* are in cm; 75 cm = 30 in.

Videotape guidelines and analysis

Video guidelines for ergonomic evaluations

Obtaining good video documentation for ergonomic evaluations can be difficult — as the tasks are often performed in inaccessible areas with poor lighting conditions and a lot of extraneous movement taking place. This guide presents suggestions for capturing effective video documentation of potential ergonomic hazards.

Preparation

Use the OSHA Form 200 logs and 101s (and after January 1, 2002 the OSHA Form 300 series), complaint information, and interviews to help prioritize areas for taping. It is desirable to have at least a two-person team when performing an evaluation. One person can operate the video camera while the other can record task and employee information.

The equipment needed for an ergonomic inspection will generally include:

- Video camera with extra tapes and charged batteries,
- Tape measure,
- Small notebook,
- Fanny pack,
- Small scale (Chattillon or fish scale that can measure pull forces),
- Bungee cord or small piece of rope, and
- Questionnaires for employee interviews concerning ergonomic factors.

Other useful items may include:

- Stop watch,
- Lens cleaning paper,
- Extra batteries for internal clock, and
- Skylight UV filter. This is a must in a dirty environment if you do not have a protective case.

The following are general suggestions on camera usage which, if reviewed prior to going on-site, will provide the best video documentation for the analyst and ensure that all pertinent information is obtained and documented.

- Become familiar with the camera and read the operators manual. Shoot some test footage so you are familiar with all the functions of the camera.
- Always activate the date and time mechanism on the camera so that this information is displayed on the video during the entire taping series. This will provide additional reference points with which to correlate written information with the videotape footage. Be aware of the position of the date and time printout on the video footage to make sure that it is not superimposed over the top of important features of the video documentation.
- For operations with extraneous movement it may be necessary to use the manual focus to avoid the camera refocusing on irrelevant moving objects. Determine where the focus point is for the camera you are using. It may not be in the center of the viewfinder. To make this determination place the camera on auto focus and try to focus on a small item such as a hanging pendant that has nothing else in the same plane. Hang the item from a doorway and try to focus by moving the item back and forth in the field of the viewfinder. You have found the focus point when the camera focuses on the item.
- If the camera has a high speed shutter, turn it off and use the auto shutter. high speed requires too much light for most industrial tasks. If you are taping a worker with dark clothes against a light background (such as a window, or a white wall), activate the “back lit” capability on the camera.
- Practice visual slating of information. This should be done by filming a piece of paper with information clearly written on it just prior to or directly after videotaping the task. Use a marker or dark pen that can be clearly seen. The macro-zoom on your camera will permit use of a small notebook or journal to be used as a slate. A small notebook is easy to carry and any pertinent notes can be recorded on the slate sheet for easy correlation and future reference. Macro-zoom is also helpful for documentation of small informational areas such as labels.
- If visual slating is absolutely not possible, cover the lens with your hand and record the information verbally before the actual job taping begins. Be aware that you will need to speak directly into the camera microphone to be clearly understood. Use of an external microphone can be helpful in audio slating.
- Hold the camera as still as possible or use a tripod if available. Don’t walk with the camera unless absolutely necessary to record the task. When you change location, move slowly and minimize camera movement. Use the zoom instead of walking whenever possible. Use the manual focus whenever there is extraneous movement in the frame of action to ensure the focus will be on the items of interest.

Videotaping tasks

The following items outline the procedures used for obtaining useful video documentation.

- If possible tape the operation in the order of production. Do the beginning of the production process first and proceed through all tasks of interest.
- Visually slate at least the name of the task just prior to or directly after videotaping the task.
- Tape 5-10 minutes for all jobs including approximately 10 cycles. A cycle is considered to be a set of repeated motions during which one part or assembly is processed. Jobs that have relatively long cycle

times in excess of 30-60 seconds may require fewer than 10 cycles if all aspects of the job are recorded at least 3-4 times.

- Begin each task with a whole-body view of the worker from the side including the chair and/or the floor. Hold this view for 2-3 cycles and then zoom the camera in for a closer view of the area of principal interest. Tape from a variety of angles to allow a determination of wrist deviation, arm postures, back angles, etc. Tape from both sides and the front if possible. The total footage may be distributed between these different angles.
- Videotape the operation from a distance to give perspective to the analyst about workstation layout.
- Find an entity of known dimension in the frame of the picture and measure it for reference purposes. The employee's forearm from the wrist to the elbow is a convenient landmark since it is in most frames and is measurable on the television screen. If possible place a piece of contrasting tape on the reference points to provide a more distinct and identifiable location point. Record the reference dimensions either by visually slating the information or verbally recording the data. If using a ruler or tape measure as your reference point, ensure that the increments are clearly visible.
- Obtain video footage of tools or machinery that are used on the job. Videotape labels from hand tools, machinery, weight from boxes, etc.

Additionally, the following information should be visually slated at the beginning of each individual task or recorded in a written supplemental factors checklist.

- The name of the task and employee.
- Anthropometry (height) of the employee.
- Ambient conditions when working in extreme areas (freezers, furnaces, etc.).
- Clothing and PPE (materials, etc.).
- The period of time in which the task is performed including work-rest schedules.
- The nature of injuries as determined from the 200's, 101's, 300's, or interviews.
- Weight and dimension of loads lifted.
- Dimensions of the work items seen in the shot (i.e., pallets, tables, shelving units, etc.).
- Vertical distance between origin and destination of lift. Horizontal distance the load is held from the body at the beginning and end of the lift. These distances can be estimated directly from the video documentation if measuring will significantly interfere with the operation. To do this there must be a clear view of the entire body and the work space, preferably in profile. Provide dimensional information on as many work items seen in the footage as possible.
- Distance loads must be carried.
- Production data to aid in determining if the video segment is representative of normal activity.
- Conditions that might affect grip or traction (ie., sand on the floor, ice on boxes being lifted, etc.).

Supplemental factors for ergonomic tape evaluation

Worker information:

Worker's name:
Worker's height:
Distance from wrist to elbow or between contrast markers:
Past medical or CTD problems (prior to this task):
Current medical or CTD problems:
Non-occupational activities:

Job information:

Job name:
Location:
Time of videotape sequence:
Job description (task frequency, cycle time, time on job; is the job always performed in this manner?):

Number of employees on job (now and normally):
Line speed; self or machine-paced; (pieces/min):
Break schedule (micro-rest breaks possible):
Rotation schedule:
Jobs in rotation:

Job and ergonomic training

Given by:
Hands-on or theoretical:
Time spent in training:
Updates:
How often:
Last update:
Update given by:

Workstation information

Make a sketch of the workstation layout on separate sheet of paper or reference to area of tape that shows the entire work layout.

Is the workstation adjustable, can it be tilted or rotated (mechanism and range of motion, heights, dimensions):

Table:
Chair:

What is the worker standing on (concrete, wood):

Is it slippery:

Can work positions be changed (sit/stand):

Reach distances:

Horizontal:
Vertical:

Tool information

Answer these questions and make a sketch or identify the tool on the video segment for each tool used. Use other sheets of paper if needed.

Name of tool:

Type of tool and power source:

Torque:
Reciprocating or vibrating:
Other:

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Weight of tool:

Handle:

Span and length:
Material:

If air-powered, is the exhaust away from the hand:

Miscellaneous information:

What objects or materials are handled and their weight (for patients estimate the amount of help they can provide):

Name and weight:
Temperature of work environment:
Personal protective equipment:
Are gloves worn, what material:
Estimate of task exertion level:
Estimate of hand and finger exertion level:

(1 = Low; hold coffee cup; to 5 = high; open large "Bulldog" paper clip)

Does the employee have an opinion concerning the nature of the problem, management commitment, and possible corrective measures?

Employee signature (optional, but desirable)_____

LIFTING ANALYSIS WORKSHEET

DEPARTMENT _____ JOB DESCRIPTION

JOB TITLE _____ _____

ANALYST'S NAME _____ _____

DATE

STEP 1. Measure and record task variables

Object Weight (lbs)		Hand Location				Vertical Distance	Asymmetric Angle (deg.)		Frequency Rate	Duration	Object Coupling
		Origin		Dest.			Origin	Destination			
L(AVG)	L(MAX)	H	V	H	V	D	A	A	F	Hrs	C

STEP 2. Determine the multipliers and compute the RWLs

RWL = LC x HM x VM x DM x AM x FM x CM

ORIGIN	RWL =	51	x		x		x		x		x		x		=
DEST.	RWL =	51	x		x		x		x		x		x		=

STEP 3. Compute the LIFTING INDEX

ORIGIN LIFT INDEX $\frac{\text{OBJECT WEIGHT}}{\text{RWL}}$ = _____ = _____

DESTINATION LIFT INDEX $\frac{\text{OBJECT WEIGHT}}{\text{RWL}}$ = _____ = _____

Risk factor basic screening tool

In the final rule for ergonomics (November 14, 2000) which was withdrawn shortly after publication, OSHA provided the following table for employers to use as a basic screening tool for evaluating jobs with ergonomic risk factors. These definitions can be used as a "rule of thumb" for determining if your workers' routine job tasks are within OSHA's guidelines regarding job risk factors that lead or contribute to musculoskeletal disorders.

Risk factor basic screening tool

		Body part associated with MSD incident			
Risk factors	**Performing job or tasks that involve:**	Neck/ Shoulder	Hand/ Wrist/ Arm	Back/ Trunk/ Hip	Leg/ Knee/ Ankle
Repetition	(1) Repeating the same motions every few seconds or repeating a cycle of motions involving the affected body part more than twice per minute for more than 2 consecutive hours in a workday.	√	√	√	√
	(2) Using an input device, such as a keyboard and/or mouse, in a steady manner for more than 4 hours total in a workday.	√	√		
Force	(3) Lifting more than 75 pounds at any one time; more than 55 pounds more than 10 times per day; or more than 25 pounds below the knees, above the shoulders, or at arms' length more than 25 times per day;	√	√	√	√
	(4) Pushing/pulling with more than 20 pounds of initial force (e.g., equivalent to pushing a 65 pound box across a tile floor or pushing a shopping cart with five 40 pound bags of dog food) for more than 2 hours total per day;	√	√	√	√
	(5) Pinching an unsupported object weighing 2 or more pounds per hand, or use of an equivalent pinching force (e.g., holding a small binder clip open) for more than 2 hours total per day;		√		
	(6) Gripping an unsupported object weighing 10 pounds or more per hand, or use of an equivalent gripping force (e.g., crushing the sides of an aluminum soda can with one hand), for more than 2 hours total per day.		√		

Risk factor basic screening tool

		Body part associated with MSD incident			
Risk factors	**Performing job or tasks that involve:**	Neck/ Shoulder	Hand/ Wrist/ Arm	Back/ Trunk/ Hip	Leg/ Knee/ Ankle
Awkward postures	(7) Repeatedly raising or working with the hand(s) above the head or the elbow(s) above the shoulder(s) for more than 2 hours total per day;	√	√	√	
	(8) Kneeling or squatting for more than 2 hours total per day;			√	√
	(9) Working with the back, neck or wrists bent or twisted for more than 2 hours total per day (see figures:) 	√	√	√	
Contact stress	(10) Using the hand or knee as a hammer more than 10 times per hour for more than 2 hours total per day;		√		√
Vibration	(11) Using vibrating tools or equipment that typically have high vibration levels (such as chainsaws, jack hammers, percussive tools, riveting or chipping hammers) for more than 30 minutes total per day;	√	√	√	
	(12) Using tools or equipment that typically have moderate vibration levels (such as jig saws, grinders, or sanders) for more than 2 hours total per day.	√	√		

Ergonomics safety program

General company policy

The purpose of this program is to inform interested persons, including employees, that _____ is committed to improve our employees' comfort and well-being by identifying and correcting ergonomic risk factors on the job. This program applies to all work operations, both in our plant and in the office areas. Our safety manager coordinates all safety and health programs. The manager reviews the Ergonomics Program and provides guidance, as needed.

Under this program, a team of our employees will evaluate jobs which they have identified as having problem areas and develop and implement solutions to reduce job-related worker injury and illness.

Our goal through this Ergonomics Program is to prevent the occurrence of work-related musculoskeletal disorders by controlling or eliminating the risk factors which cause them. This program ensures that all affected employees are aware of job-related risk factors and provides information and solutions to elevate them. _____ promotes continuous improvement for the efficiency, comfort, and well-being of all employees through a team effort of management and employee involvement.

If, after reading this program, you find that improvements can be made, please contact our safety manager. We encourage all suggestions because we are committed to the success of our Ergonomics Program. We strive for clear understanding, safe and efficient work practices, and involvement in the program from every level of the company.

Ergonomics team

_____ is responsible for our Ergonomics Program. The Ergonomics Team has developed objectives for ergonomic improvements within our company and methods for identifying and resolving these problem areas. The written plan for these goals, objectives, and solutions may be obtained from _____ in _____.

Our Ergonomics Team is comprised of a cross section of employee representatives from various departments/areas and staff levels in our company. _____ Management Team is committed to the success of this program by providing resources and the staff time necessary to identify and correct problem jobs. The members of our Ergonomics Team are: _____.

The Team members have been trained to recognize problem jobs, identify risk factors, and develop solutions to reduce those factors. Elements of this training include the identification of workplace risk factors; job analysis methods, implementation and evaluation of control measures, and teamwork skills.

Additional training completed by Team members includes: _____.

Injury/Medical management

_____ is the health care provider we have chosen to provide medical treatment for our employees with injuries or illnesses relating to ergonomic factors. They have visited our facility and are familiar with our specific workplace job procedures and the job risk factors.

We encourage all employees to immediately report any symptoms of discomfort that may be associated with their job duties. In most cases, employees are to report to their immediate supervisor. Those supervisors are responsible to recommend alternative work or medical evaluation for injured or ill employees.

Supervisors record and file written reports from the first observation of illness or injury through all subsequent follow-up activities. They are also responsible to forward information about the worker injury or illness for recording on the Log of Work-Related Injuries and Illnesses. The supervisor may recommend that the job receive an evaluation from the Ergonomics Team. Supervisors or other personnel with these responsibilities are _____.

Our procedures for entering an MSD-related injury/illness on our OSHA 300 Log include: _____.

Every work procedure that causes a worker injury or illness will be investigated and reported. This documentation provides vital information for the identification of job related risk factors so that the problems can be corrected before other injuries occur.

After an injured employee has been treated by the health care provider, the following procedures are used to monitor the recovery process and their return to work: _____.

The Ergonomics Team has developed a list of light and restricted duty jobs which have low musculoskeletal risks. This list is a valuable resource for assigning duties to recovering employees until they can resume their normal job functions. These jobs include: _____.

After verification of an employee's job-related injury or illness, our safety manager and the Ergonomics Team will review this plan and re-evaluate the work station to determine if additional practices, procedures, or redesign of the station could be implemented to prevent similar injuries.

Identifying problem jobs

There are several methods used to identify problem jobs which are most likely to result in ergonomic disorders. The Ergonomics Team initially reviewed and periodically monitors _____ injury and illness records such as the Log of Work-Related Injuries and Illnesses and workers' compensation data to identify patterns of ergonomic-related injuries and illnesses.

In addition, jobs are evaluated for the following risk factors:

- Rate and number of repetitions: performance of the same motion or motion patterns every few seconds for more than two hours at a time.
- Postures and limb positions: fixed or awkward work postures such as overhead work, twisted or bent back, bent wrist, stooping, or squatting, for more than a total of two hours.
- Vibration: use of vibrating or impact tools or equipment for more than a total of two hours.
- Loads/lifted: lifting, lowering, or carrying of anything weighing more than 25 pounds (11.34 kg) more than once during the workshift.
- Loads/static: holding a fixed or awkward position with arms or neck for more than ten seconds.
- Muscle forces: continually pulling or pushing objects.
- Work pace: piece rate or machine paced work for more than four hours at a time (legally required breaks cannot be included when totaling the four hour limit).

Our Ergonomics Team has identified the following jobs at our facility as having these ergonomic risk factors: _____.

Ergonomics Team members participate in evaluating new equipment and processes for potential risk factors. They also evaluate hand tools to determine if the designs are ergonomically suitable for the intended use and appropriate for the workers who use them.

Solutions

When a job, process, or equipment has been evaluated, the Team completes a risk factor checklist. Through this checklist, problems are identified for correction and supervisors and employees in the affected areas are notified. The Ergonomics Team, in conjunction with those affected employees, will develop possible solutions, choose the most appropriate, implement the changes, and follow up to determine the effectiveness.

For each problem job which has been changed, we maintain a file of the improvements and changes completed. The file contains documentation of the ergonomic-related illnesses or injuries, the actual changes

made, and any similar incidents which occurred after the changes were implemented. To maintain these files, we: _____.

These files are kept in _____.

Employee training

Our company's management staff receives copies of this written ergonomics program and the company's policy statement regarding ergonomics in our workplace. We train each employee who works at a job with exposure to specific risk factors and each employee in a job where a work-related musculoskeletal disorder has been recorded.

These are the ergonomic elements we teach to all employees:

- How to recognize workplace risk factors associated with work-related musculoskeletal disorders and the ways to reduce exposure to those risk factors.
- The signs and symptoms of work related musculoskeletal disorders, the importance of early reporting, and medical management procedures.
- Reporting procedures and the person to whom the employee is to report workplace risk factors and work-related musculoskeletal disorders.
- The process our company is taking to address and control workplace risk factors, each employee's role in the process, and how to participate in the process.
- Opportunity to practice and demonstrate proper use of implemented control measures and safe work methods which apply to the job.

Each employee involved in job analysis will be trained in job analysis methods, especially as they relate to identifying workplace risk factors, and evaluation and implementation of control measures.

This company will not implement any policy or practice which discourages reporting or which results in discrimination or reprisal against any employee who makes a report.

Enforcement

Constant awareness of and respect for ergonomic hazards, and compliance with all safety rules are considered conditions of employment. Supervisors and individuals in the Safety and Personnel Department reserve the right to issue disciplinary warnings to employees, up to and including termination, for failure to follow the guidelines of this program.

Appendix

We have attached to this plan any lists, samples or procedures we thought would ensure better understanding of our written program.

Reserved

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Bloodborne pathogens

Introduction

The Occupational Safety and Health Administration (OSHA) estimates that about 5.6 million workers in health care and other facilities are at risk of exposure to bloodborne pathogens such as the human immunodeficiency (HIV) and hepatitis B (HBV) viruses and other potentially infectious materials. Workers who have occupational exposure to bloodborne pathogens include, but are not limited to, nurses, physicians, dentists and other dental workers, laboratory and blood bank technologists and technicians, medical examiners, morticians, phlebotomists, emergency room personnel, intensive care and operating room nurses and technicians, orderlies, housekeeping personnel, and laundry workers.

Others also at risk include law enforcement personnel, firefighters, paramedics, emergency medical technicians, and *anyone whose job might require providing first-response medical care* in which there is a reasonable expectation of contact with blood or other potentially infectious materials.

OSHA's bloodborne pathogens (BBP) standard, §1910.1030, prescribes safeguards to protect workers against the health hazards from exposure to blood and certain body fluids that may contain bloodborne pathogens and to reduce their exposure risk.

The information in this chapter summarizes the requirements of the bloodborne pathogens standard; provides answers to the most frequently asked questions concerning BBP compliance; and contains a sample exposure control plan. Compliance information from OSHA on how they are enforcing the standard is also included.

Employers having employees who are at risk of bloodborne pathogens exposure are required to prepare a written exposure control program. The plan must evaluate routine tasks and procedures in the workplace that involve exposure to blood or other potentially infectious materials (OPIM); identify workers performing such tasks; and use a variety of methods to reduce the risks.

OSHA's standard specifies the need for engineering and work practice controls; personal protective equipment; housekeeping procedures; post-exposure evaluation and follow-up; recordkeeping; and communicating hazards to personnel. The ultimate goal is to provide safe working conditions that protect employees from unnecessary exposure to bloodborne pathogens health hazards.

Who is covered?

The standard applies to *every employer with one or more employees* who can reasonably be expected to come into contact with blood and other specified body fluids in carrying out or in performing their duties.

The approximately 5.6 million workers covered by the bloodborne pathogens standard include 4.4 million health care workers in facilities such as hospitals and physicians' and dentists' offices and 1.2 million non-health care workers in law enforcement, fire and rescue, correctional facilities, research laboratories, and the funeral industry.

Although the majority of at-risk workers are in the healthcare field, exposures can also occur to workers in general industrial and office settings. In these facilities, employees at greatest risk for contacting blood or body fluids are those whose jobs include:

- Medical and first aid response,
- Maintenance and clean-up work,
- Housekeeping and laundries.

Employers having at least one employee with one or more at-risk responsibilities must develop a bloodborne pathogens exposure control program. The program must evaluate tasks and procedures in the work-

place that may involve exposure to blood or other potentially infectious materials; identify workers performing these tasks; and implement a variety of methods to reduce the risks involved with exposure.

Blood and OPIM definitions

In the bloodborne pathogens rule, OSHA defines "blood" as human blood, blood products, or blood components. "Other potentially infectious materials" (OPIM) are defined as including human body fluids such as saliva in dental procedures, semen, vaginal secretions; cerebrospinal, synovial, pleural, pericardial, peritoneal, and amniotic fluids; any body fluids visibly contaminated with blood; unfixed human tissues or organs; HIV-containing cell or tissue cultures; and HIV or HBV-containing culture mediums or other solutions; and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

Occupational exposure

Occupational exposure is defined as a "reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of the employee's duties." Determining occupational exposure and instituting control methods and work practices appropriate for specific job assignments are key requirements of the BBP standard. The required written control plan and methods of compliance show how employee exposure can be minimized or eliminated.

The exposure control plan

A written exposure control plan is necessary for the safety and health of workers. Covered employers must develop a plan that identifies and documents the tasks, procedures, and job classifications covering instances where there is exposure to blood or other potentially infectious materials.

The written exposure control plan must document the following key elements:

- **Job classifications:** Identify job classifications and, in some cases, the tasks where there is exposure to blood and other potentially infectious materials.
- **Schedule:** Outline how and when the provisions of the standard will be implemented, including schedules and methods for communication of hazards to employees, hepatitis B vaccination and post-exposure evaluation and follow-up, recordkeeping and implementation of the methods of compliance, such as:
  - Engineering and work practice controls,
  - Personal protective equipment, and
  - Housekeeping.
- **Evaluation:** Procedures for evaluating the circumstances of an exposure incident.

The schedule of how and when the provisions of the standard will be implemented may be a calendar with brief notes describing the methods, an annotated copy of the standard, or part of another document, such as the infection control plan.

The written exposure control plan must be accessible to employees and must be reviewed and updated at least annually and whenever necessary to reflect new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure. The review and update must also:

- Reflect changes in technology that eliminate or reduce exposure to bloodborne pathogens; and
- Document annually consideration and implementation of appropriate commercially available and effective safer medical devices designed to eliminate or minimize occupational exposure.

The employer must also request input from non-managerial employees responsible for direct patient care who are potentially exposed to injuries from contaminated sharps in the identification, evaluation, and selection of effective engineering and work practice controls. This process must be documented in the exposure control plan. Planning begins with identifying employees who have occupational exposure.

Identify who has occupational exposure

A majority of workers in the health care field routinely come into contact with blood and body fluids that potentially contain bloodborne pathogens. These workers are known to be at-risk. Other occupations where workers may be exposed to BBP and must be covered by an employer's exposure control plan include the following.

Emergency responders, firefighters, and law enforcement personnel

For emergency responders such as firefighters, law enforcement agents, and other emergency response personnel, the potential sources of contamination from bloodborne pathogens are varied. Emergency responders assist when there is illness and at accidents and fires where there frequently is trauma, such as open wounds. Also, exposure and potential infection can result from handling discarded emergency medical items such as needles and sharps, bandages, or gauze.

Today's firefighters and emergency responders play a greater role in emergency situations, frequently as health care providers, and are often the first to arrive at the scene of an accident. For example, up to 80 percent of all field emergency medical care today is provided by fire service personnel. Although not officially classified as health care workers, fire and rescue personnel are consistently faced with the potential for exposure to infectious blood, blood products, blood components, and body fluids.

Emergency responders frequently face unpredictable, uncontrollable, dangerous, and life-threatening circumstances. Anything can happen in an emergency situation, including exposure to blood and contaminated equipment. This especially applies to fire and rescue personnel and, in many instances, law enforcement personnel who often operate under hostile circumstances. There is an extremely diverse range of potential situations that can put law enforcement officers at risk.

At crime scenes, when processing suspects, or as a result of fights and/or assaults, law enforcement officers may be at risk of exposure. The informed judgment and awareness of the individual officer is critical when unusual circumstances or events arise that can jeopardize his/her safety or health. It is the responsibility of emergency responders' employers to ensure that their employees are properly informed and adequately protected at the work site and in emergency situations.

In-plant first aid responders

Employees who are trained and designated as responsible for rendering first aid or medical assistance as part of their job duties have the potential for exposure and must receive bloodborne pathogens training.

Maintenance workers

While OSHA does not generally consider maintenance personnel and janitorial staff employed in non-health care facilities to have occupational exposure, it is the employer's responsibility to determine which job classifications or specific tasks and procedures involve occupational exposure. For instance, if maintenance or janitorial personnel are required to clean up following an incident involving body fluids, they would need bloodborne pathogens training.

Also, OSHA expects products such as used sanitary napkins to be discarded into waste containers which are lined in such a way as to prevent contact with the contents. But at the same time, the employer must determine if employees can come into contact with blood during the normal handling of such products from initial pick-up through disposal in the outgoing trash.

Note: Occupational exposure is defined as "reasonable anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties." The definition of "other potentially infectious materials" includes any body fluid that is visibly contaminated with blood. Urine, feces, sweat, tears, nasal secretions, and vomitus which are not visibly contaminated with blood are not considered to be "other potentially infectious materials."

Personnel service/contract workers

If your company uses personnel service workers and you, as the the host employer, exercise day-to-day supervision over those workers, then they are considered the employees of the host employer, as well as of the personnel service. In this situation, the host employer must comply with all provisions of the BBP standard with respect to these workers.

Regarding Hepatitis B vaccination, post-exposure evaluation and follow-up, recordkeeping, and generic training, the host employer's obligation is to take reasonable measures to assure that the personnel service firm has complied with these provisions.

Independent contractors that provide a service, such as a cleaning service, provide supervisory personnel, as well as rank-and-file workers to carry out the services. These companies and the host employers are responsible for complying with all provisions of the BBP standard according to OSHA's multi-employer worksite guidelines.

Determine exposure risk

Exposure determination must be based on the definition of occupational exposure without the use of personal protective clothing and equipment. Make the exposure determination by reviewing job classifications within the work setting and dividing the classifications into two groups.

- **Group one:** Includes job classifications in which **all** of the employees have occupational exposure, such as pre-hospital care workers. This includes paramedics, emergency medical technicians, and advance life support personnel. Where all employees have occupational exposure, it is not necessary to list specific work tasks.
- **Group two:** Includes those classifications in which **some** of the employees have occupational exposure. Where only some employees have exposure, specific tasks and procedures causing exposure must be listed. When employees with occupational exposure have been identified, the next step is to communicate the hazards to those employees.

Training at-risk employees

All employees with a potential for exposure must be provided with adequate training and information including:

1. General explanations of the modes of transmission, symptoms, epidemiology, warning signals relating to possible exposure, and procedures to follow if exposure occurs.
2. Appropriate methods for recognizing tasks that may involve exposure to blood or other potentially infectious materials and the use and limitations of practices that would reduce exposure. This includes engineering controls, work practices, and personal protective equipment.
3. Information on the use, location, and decontamination/disposal of personal protective equipment and clothing, and information on what to do in an emergency.

Each occupationally exposed employee must be given free BBP information and training at the time of initial assignment and at least once a year thereafter. The training must be provided during working hours. Additional training is needed when existing tasks are modified or new tasks are required which affect the employees' occupational exposure.

A variety of written material, oral presentations, films, videos, computer programs, or audiotapes can be used in the training program. The information that is presented must be appropriate to the employee's education, literacy level, and language.

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OSHA requires that the trainer provide opportunities for interactive questions and answers with trainees. That means that training done solely with a video or film without a discussion period would be a violation of the BBP standard. However, direct access to a qualified trainer via a telephone hot line or an immediate e-mail answer is an acceptable alternative.

Training program elements

Training sessions must be comprehensive, including information on bloodborne pathogens as well as on OSHA regulations relating to this standard and the employer's exposure control plan.

At a minimum, the training program must include the following elements:

- An accessible copy and explanation of the standard;
- A general explanation of the epidemiology and symptoms of bloodborne diseases;
- An explanation of the modes of transmission of bloodborne pathogens;
- An explanation of the written exposure control plan and how to obtain a copy;
- An explanation of how to recognize events that may involve exposure to blood and other potentially infectious materials;
- An explanation of the basis for selecting personal protective equipment, including information on the types, selection, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment;
- An explanation of the use and limitations of safe work practices, engineering controls, and personal protective equipment;
- Information on hepatitis B vaccination, such as safety, benefits, effectiveness, and availability;
- An explanation of the procedures to follow if an exposure occurs, including methods of reporting and the medical follow-up that will be made available;
- Information on the post-exposure evaluation and follow-up required in the event of an exposure, and information on emergencies that relate to blood or other potentially infectious materials, follow-up procedures, and medical counseling;
- An explanation of information on warning signs, labels, and color-coding.

Trainer qualifications

The person conducting the training must be knowledgeable in the subject matter, especially as it relates to the workplace that the training addresses. Trainer competency should be based on the completion of specialized courses, degree programs, or work experience.

Possible trainers include a variety of healthcare professionals such as infection control practitioners, nurse practitioners, registered nurses, occupational health professionals, physician's assistants, and emergency medical technicians.

Non-healthcare professionals, such as but not limited to, industrial hygienists, epidemiologists, or professional trainers, may conduct the training provided they are knowledgeable in the subject matter covered by the elements contained in the training program as it relates to the workplace.

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Preventive measures

Hepatitis B vaccine

Hepatitis infection represents a significant occupational hazard to all workers who contact blood or body fluids from infected persons. Hepatitis is an inflammation of the liver which can be caused by various toxins, medications, or infectious agents. Although many people with hepatitis may feel or look ill, up to 50 percent of people with a hepatitis B infection are unaware that they have contracted the virus.

Employers must make the hepatitis B vaccine and vaccination series available, free of charge and at a reasonable time and place, to all employees who are at risk of occupational exposure. Any booster doses recommended by the U.S. Public Health Service also must be provided.

Employers must offer free hepatitis B vaccine and the vaccination series after initial training and within 10 working days of initial assignment to employees who have occupational exposure unless:

1. The employee has previously received the complete hepatitis B vaccination series,

2. Antibody testing reveals that the employee is immune, or

3. Medical reasons prevent the employee from being vaccinated.

The employee cannot be required to participate in an antibody prescreening program to receive the hepatitis B vaccination series. All medical evaluations and procedures must be performed by or under the supervision of a licensed physician or an appropriately trained and licensed health care provider and administered according to current recommendations of the U.S. Public Health Service. Vaccinations also must be provided even if the employee initially declines but later accepts treatment while covered by the BBP standard. Employees who decline the vaccination must sign the declination form.

All laboratory tests must be free of charge and conducted by an accredited lab. The health care professional must provide a written opinion to the employer as to whether hepatitis B vaccination is needed and if the employee has received it.

Hepatitis B vaccination declination statement

The following statement of declination of hepatitis B vaccination must be signed by an employee who chooses *not to accept* the vaccine. The statement can only be signed by the employee following appropriate training regarding hepatitis B, hepatitis B vaccination, the effectiveness, safety, method of administration, and benefits of vaccination, and the availability of the vaccine and vaccination free of charge to the employee. The statement is not a waiver; employees can request and receive the hepatitis B vaccination at a later date if they remain occupationally at risk for hepatitis B.

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Declination statement

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to me. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Employee signature _____ Date _____

Universal precautions

Universal precautions is a method of infection control in which all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens. Universal precautions are to be observed in all situations where there is a potential for contact with blood or other potentially infectious material.

> **Under circumstances in which the differentiation between body fluid types is difficult or impossible, all body fluids are to be considered potentially infectious and universal precautions must be observed.**

Methods of control

Engineering and work practice controls are the primary methods used to control the transmission of HBV and HIV. To the extent feasible, the employer must institute these controls to eliminate or minimize employee exposure to bloodborne diseases.

Engineering controls

Engineering controls reduce employee exposure in the workplace by either removing the hazard or isolating the worker from exposure. Self-sheathing needles and special containers for contaminated sharp instruments are examples of engineering controls. Engineering controls must be examined and maintained or replaced on a scheduled basis.

For example, disposable airway equipment or resuscitation bags and mechanical respiratory assist devices, such as oxygen demand valve resuscitators, should be available on all emergency vehicles and to all emergency response personnel who respond to medical emergencies or victim rescues. Pocket mouth-to-mouth resuscitation devices designed to isolate emergency response personnel from direct contact with fluids should be provided.

Puncture-resistant sharps containers must be easily accessible and located in areas where needles, syringes, or other sharp instruments are commonly used.

Work practice controls

Work practice controls alter the manner in which a task is performed. Correct work procedures include proper handling and disposal of needles and sharps, used bandages and gauze, linens, and all other emergency items that come in contact with blood or other potentially infectious materials.

All procedures involving blood or other potentially infectious materials must be performed in such a manner as to minimize spattering, generating droplets, splashing, and spraying. Mouth pipetting/suctioning of blood or other potentially infectious materials is prohibited.

Needles and sharps

Shearing or breaking of needles is prohibited. Needles must not be bent, removed, or recapped unless it can be demonstrated that no alternative is feasible or that such action is required by a specific medical procedure. Any recapping or removing of needles must be done through the use of a mechanical device or one-handed technique.

Blood tube holders with needles attached must be immediately discarded into a sharps container after the device's safety feature is activated.

Immediately, or as soon as possible after use, contaminated reusable sharps must be placed in puncture-resistant, leak-proof containers, labeled as a biohazard, or color-coded red until properly reprocessed. Specimens of blood or other potentially infectious materials must be placed in leak-proof containers.

Disposal receptacles

Bags or receptacles containing articles or disposable items contaminated with body fluids must be labeled or color-coded according to the requirements of the BBP standard.

Restrictions

In work areas where there is a reasonable likelihood of occupational exposure, safe work practices include restricting eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses, and preventing the storage of food and/or drink in refrigerators or other locations where blood or potentially infectious materials are kept.

Washing facilities

Employers must provide readily accessible hand washing facilities and ensure that personnel wash hands and any other exposed skin area with soap and water, and flush mucous membranes with water immediately or as soon as feasible following contact with blood or other potentially infectious materials or after removing personal protective equipment.

If hand washing facilities are not available, employees must be provided with antiseptic hand cleanser, clean cloth/paper towels, or antiseptic towelettes. In this instance, employees must be instructed to wash their hands with soap and running water as soon as possible.

Contaminated equipment

Equipment, other than personal protective equipment, which during the course of operations could become contaminated with blood or other potentially infectious materials, must be checked routinely and, prior to servicing or shipping, must be decontaminated, unless the employer can demonstrate that decontamination of the equipment or portions of it is not feasible.

Law enforcement officers

For law enforcement officers, there is a potential for exposure during searches and evidence handling. In these instances, employees should use caution in searching clothing and in searching purses or other similar items. Where the contents cannot be determined easily, contents should be emptied by turning the bag upside down over a flat surface. Also, to avoid tearing gloves, use evidence tape instead of staples to seal evidence.

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Personal protective equipment

In addition to instituting engineering and work practice controls, appropriate personal protective equipment (PPE) should be used to reduce the risk of exposure. Personal protective equipment is specialized clothing or equipment worn by employees for protection from contact with blood or other potentially infectious materials. Employers must make appropriate personal protective equipment readily available at no cost to at-risk employees. There must be a variety of sizes to provide a good fit.

What is "appropriate"?

Personal protective equipment will be considered "appropriate" only if it does not permit blood or other potentially infectious substances and contaminated materials to pass through to, or reach, an employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes. This is considered under normal conditions of use and for the duration of time the protective equipment is in use. Hypoallergenic alternatives must be available to employees who have an allergic sensitivity to protective equipment, such as hypoallergenic or powderless gloves.

Types of PPE

Personal protective equipment consists of, but is not limited to, gloves, face shields, masks, and eye protection, gowns, aprons, and similar items. It is the employer's responsibility to ensure that:

- Appropriate personal protective equipment is used;
- The PPE is used correctly; and
- Protective equipment is properly cleaned, laundered, repaired, replaced, or disposed of as needed.

Disposable gloves should be a standard component of emergency response equipment and should be donned by all personnel prior to initiating any emergency patient care tasks involving occupational exposure. Extra pairs should always be available. There is no single type or thickness of glove appropriate for all situations. Selection criteria should include dexterity, durability, fit, and the tasks that will be undertaken while the gloves are worn.

PPE declination

An employee may temporarily and briefly decline wearing personal protective equipment under rare and extraordinary circumstances, and when in the employee's professional judgment, it prevents the delivery of health care or public safety services or poses a greater hazard to workers. For example, in the case of emergency responders, this could occur when a firefighter rescues an individual who is not breathing from a burning building and discovers that the necessary resuscitation equipment is lost or damaged and the firefighter must administer cardiopulmonary resuscitation.

When the employee makes this judgment, the circumstances must be investigated and documented to determine whether changes can be instituted to prevent such occurrences in the future. In general, appropriate personal protective equipment is to be used whenever occupational exposure may occur.

The employer also must ensure that employees observe the following precautions for handling and using personal protective equipment:

- Remove garments penetrated by blood or other infectious materials immediately, or as soon as feasible.
- Before leaving the work area contaminated protective equipment must be placed in appropriately designated areas or containers for storing, washing, decontaminating, or discarding.
- Wear appropriate gloves when there is a potential for hand contact with blood, other potentially infectious materials, mucous membranes, and non-intact skin; when performing vascular access procedures; and when handling or touching contaminated items or surfaces.

An exception to this occurs when an employee in a volunteer blood donation center judges that routine gloving for phlebotomies is not necessary. Replace gloves if torn, punctured, contaminated, or if their ability to function as a barrier is compromised.

- Disposable (single use) gloves, such as surgical or examination gloves, must be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured, or when their ability to function as a barrier is compromised. They cannot be washed or decontaminated for reuse.
- Utility gloves may be decontaminated for reuse if the integrity of the glove is not compromised. However, they must be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration, or when their ability to function as a barrier is compromised.
- Wear appropriate face and eye protection such as goggles, glasses with solid side shields or chin-length face shields when splashes, sprays, spatters, or droplets of infectious materials pose a hazard to the eyes, nose, or mouth. These should be available on all emergency vehicles.
- Masks in combination with eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, shall be worn whenever splashes, spray, spatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated. These should be used in accordance with the level of exposure encountered.
- An extra change of work clothing should be available.

Housekeeping

The Centers for Disease Control state that HBV can survive for at least one week in dried blood on surfaces so it's very important to clean and sanitize properly. Contaminated work surfaces must be decontaminated with a disinfectant following an emergency incident. Take into consideration the appropriate methods of decontamination based upon the location within the facility, type of surface, types of contamination, if any, and tasks or procedures being performed.

Decontamination procedures

Clean up and decontamination must be done with appropriate disinfectants which include diluted bleach solutions and EPA-registered tuberculocides (List B), sterilants (List A), or products registered against HIV/HBV(List D). The lists of these EPA registered products are available from the National Antimicrobial Information Network at (800) 447-6349 or its website at (http://ace.orst.edu/info/nain/lists.htm). OSHA allows the use of these products provided the surfaces have not become contaminated with agents, volumes, or concentrations for which higher level disinfection is recommended.

Follow the label instructions regarding the amount of disinfectant and the length of time it must remain wet on the surface. For employees who will be responsible to clean up following a bloodborne pathogens related incident, training must include the proper use of the disinfectant.

Fresh solutions of diluted household bleach are also considered appropriate for disinfection of environmental surfaces and for decontamination of sites following initial wiping up of blood or other potentially infectious materials. Contact time for bleach is generally considered to be the time it takes the product to air dry.

Solutions of bleach should not be stored in glass containers, but in material such as the plastic in which the bleach, the consumer product, is packaged in. Household bleach (5.25 sodium hypochlorite) diluted to the appropriate strength for the clean up job at hand is also an effective disinfectant. In addition, gross contamination must be cleaned up first with a soap and water solution, to ensure the disinfectant is completely effective.

Work surfaces and containers

All equipment and working surfaces that could have become contaminated must be cleaned and decontaminated as necessary. If thorough decontamination cannot be done immediately, a label must be attached to equipment stating which portions of the equipment remain contaminated to inform downstream servicing/repair employees of the hazard and precautions they need to take.

All coverings used for protecting working surfaces should be removed and replaced as soon as possible after they have been contaminated. All bins, pails, cans, and similar reusable receptacles must be decontaminated on a regularly scheduled basis and cleaned and decontaminated immediately or as soon as possible after visible contamination.

Sharp objects

Broken glassware, which may be contaminated, must be picked up only by using mechanical means such as tongs, brush and dust pan, or forceps—*never* with bare or gloved hands. Contaminated reusable items, such as sharps, may not be stored or processed in a way that requires employees to reach into containers where the contents cannot be seen or safely handled.

Contaminated laundry

Contaminated laundry that has been contaminated with blood or other potentially infectious materials should be handled as little as possible with a minimum of agitation. Protective gloves and other appropriate personal protective equipment should be used when handling these materials. Contaminated laundry must be placed and transported in bags or containers which prevent soak-through or leakage and properly labeled according to the BBP labeling requirements.

When a facility exercises universal precautions when handling soiled laundry, alternative labeling or color-coding is sufficient if it permits all employees to recognize the containers as requiring compliance with universal precautions. Employees should not take contaminated clothing or protective equipment home to launder. It is the employer's responsibility to provide, launder, repair, replace, and dispose of such materials.

Regulated waste

Regulated waste must be placed in closeable, leak-proof containers built to contain all contents during handling, storing, transporting, or shipping and labeled appropriately. Regulated waste is defined as:

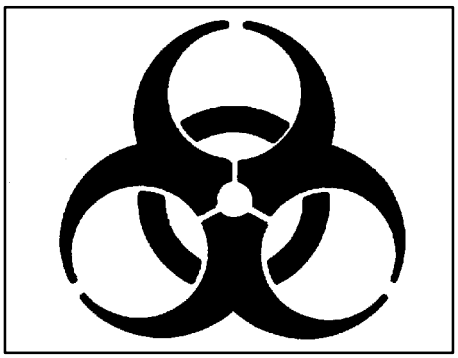
- Liquid or semi-liquid blood or other potentially infectious materials;
- Contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed;
- Items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and
- Pathological and microbiological wastes containing blood or other potentially infectious materials.

OSHA does not generally consider discarded feminine hygiene products to fall within the definition of regulated waste. These products should be discarded in waste containers which are lined in such a way as to prevent contact with the contents. OSHA notes, however, that it is the employer's responsibility to determine which job classifications or specific tasks and procedures involve occupational exposure. For example, the employer must determine whether employees can come into contact with blood during the normal handling of such products from initial pick-up through disposal in the outgoing trash.

Labeling

Containers of regulated waste, refrigerators and freezers containing blood and other potentially infectious materials, and other containers used to store, transport, or ship blood or other potentially infectious materi-

als must be labeled with fluorescent orange or orange-red biohazard warning labels. The warning label must contain the biohazard symbol and must have the word BIOHAZARD on it and be attached to each object by string, wire, adhesive, or another method to prevent loss or unintentional removal of the label.



Biohazard Symbol

These labels are not required:

1. When red bags or red containers are used;

2. On individual containers of blood, blood components or blood products clearly marked as such and which have been released for transfusion or other clinical use; or

3. On individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment or disposal.

Exposure incidents

An exposure incident is specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties. Examples of exposure incidents include:

- A puncture from a contaminated sharp;
- An emergency responder getting blood or OPIM in a cut or in the mouth while administering first aid or CPR to an injured employee; or
- Maintenance or janitorial personnel getting blood or OPIM in a cut or open sore while cleaning up following an incident.

Employees should immediately report exposure incidents. This allows for timely medical evaluation and follow-up by a health care professional as well as for timely testing of the source individual's blood for HIV and HBV. Reports must be treated by employers in the strictest confidence.

Evaluating the incident

It is the employer's responsibility to establish procedure for evaluating exposure incidents. When evaluating an exposure incident, thorough assessment and confidentiality are critical issues. At the time of the exposure incident, the exposed employee must be directed to a health care professional. The employer must provide the health care professional with a copy of the bloodborne pathogens standard, a description of the employee's job duties as they relate to the incident, a report of the specific exposure (accident report), including route of exposure, and relevant employee medical records, including hepatitis B vaccination status.

The medical evaluation and follow-up must at the very least:

- Document the routes of exposure and how exposure occurred.
- Identify and document the source individual if feasible and not prohibited by law.
- Obtain consent and test source individual's blood as soon as possible to determine infectivity and document the source's blood test results. Testing cannot be done in most states without written consent. If consent is not obtained, the employer must show that legally required consent could not be obtained. Where consent is not required by law, the source individuals's blood, if available, should be tested and the results documented.
- If the source is known to be infectious for HBV or HIV, testing need not be repeated to determine the known infectivity.
- Provide the exposed employee with the test results and information about applicable disclosure laws and regulations concerning the source identity and infection status.
- Obtain consent, collect, and test exposed employee's blood as soon as possible after the exposure incident.
- If the exposed employee consents to baseline blood collection but does not consent to HIV serologic testing, the employee's blood samples must be preserved for at least 90 days. If, within 90 days of the exposure incident, the employee agrees to have the baseline sample tested, such testing shall be conducted as soon as feasible.

Following the post-exposure evaluation, the health care professional will provide a written opinion to the employer. This opinion is limited to a statement that the employee has been informed of the results of the evaluation and told of the need, if any, for further evaluation or treatment. All other findings are confidential. The employer must provide a copy of the written opinion to the employee within 15 days of the evaluation.

Recordkeeping

OSHA requires that all needlestick and sharps injuries and illnesses that result from bloodborne pathogens exposure be recorded on the OSHA 300 Log, the sharps injury log, and employee-related medical and training records.

OSHA 300 Log

All occupational bloodborne pathogens exposure incidents that are work-related and involve contamination with another person's blood or potentially infectious material, such as needlesticks and lacerations, must be recorded on the OSHA 300 Log as an injury. However, to protect an employee's privacy, do not enter the name on the Log.

Medical records

A confidential medical record for each employee with potential for exposure must be preserved and maintained according to OSHA's standard governing access to employee exposure and medical records at §1910.1020. This standard requires that medical records must be kept confidential and maintained for at least the duration of employment plus 30 years. Also, if you contract with a healthcare provider, the medical records may be kept at their worksite.

In addition, under the bloodborne pathogens standard, medical records also must include the following information:

- Employee's name and social security number;
- Employee's hepatitis B vaccination status, including dates of all hepatitis B vaccinations and any medical records related to the employee's ability to receive vaccinations;
- Results of examinations, medical testing, and post-exposure evaluation and follow-up procedures;

- The employer's copy of the health care professional's written opinion; and
- A copy of information provided to healthcare professional.

Sharps injury log

Employers having workers with occupational exposure to BBP must establish and maintain a sharps injury log for the recording of percutaneous injuries from contaminated sharps. The information in the sharps injury log has to be recorded and maintained in such manner as to protect the confidentiality of the injured employee. The sharps injury log need to contain, at a minimum:

- The type and brand of device involved in the incident,
- The department or work area where the exposure incident occurred, and
- An explanation of how the incident occurred.

This applies to any employer who is required to maintain a log of occupational injuries and illnesses under OSHA's injury and illness recordkeeping standard, part 1904. However, employers may use the OSHA 300 Log and 301 incident report to meet the sharps injury log requirements. To use the recordkeeping forms, the type and brand of the device has to be entered on either the 300 or 301 form, and the records must be maintained in a way that segregates sharps injuries from other types of work injuries. However, if you prefer to maintain a separate sharps injury log, there is a sample form on page 77 of this chapter.

Training records

The bloodborne pathogens standard also requires you to maintain and to keep accurate training records. Training records are not considered to be confidential and may be stored onsite where they are easily accessible. They must be retained for three years from the training date. Employee training records must include the following:

- Training dates,
- Content or a summary of the training,
- Names and qualifications of trainer(s), and
- Names and job titles of trainees.

Records access

Upon request, both medical and training records must be made available to both NIOSH and OSHA officials. Training records must be available to employees or employee representatives upon request. Medical records can be obtained only by the employee or anyone having the employee's written consent.

Also, if an employer ceases to do business, medical and training records must be transferred to the successor employer. If there is no successor employer, the employer must notify the director of NIOSH for specific directions regarding disposition of the records at least three months prior to intended disposal.

Bloodborne pathogens: Questions and answers

On December 6, 1991, OSHA issued the Occupational Exposure to Bloodborne Pathogens standard, §1910.1030. This standard is designed to protect workers in the health care and related occupations from the risk of exposure to bloodborne pathogens such as HIV and HBV.

Through its enactment, OSHA received numerous questions regarding how to implement the provisions of the standard. The following information provides answers to many of those questions; however, it is not intended to be used as a substitute for the standard's requirements. Please refer to §1910.1030 for the complete text.

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Scope

Q. Who is covered by the standard?

A. The standard applies to all employees who have occupational exposure to blood or other potentially infectious materials (OPIM).

- Occupational exposure is defined as "reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or OPIM that may result from the performance of the employees duties."
- Blood is defined as human blood, human blood components, and products made from human blood.
- OPIM is defined as the following human body fluids: saliva in dental procedures, semen, vaginal secretions, cerebrospinal, synovial, pleural, pericardial, peritoneal, and amniotic fluids; body fluids visibly contaminated with blood; along with all body fluids in situations where it is difficult or impossible to differentiate between body fluids; unfixed human tissues or organs (other than intact skin); HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV- containing culture media or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Q. Will the bloodborne pathogens standard apply to employees in agriculture, maritime, and construction industries?

A. The standard will not apply to agriculture. The standard applies to maritime in shipyards and boatyards (where 29 CFR 1910 applies), in commercial fishing vessels, towboats, barges, tugs and other vessels where OSHA has jurisdiction. However, the standard does not apply to longshoring and marine terminals. The construction industry is not covered by the standard. However, the General Duty Clause (Section 5(a)(1) of the OSH Act) will be used to enforce bloodborne hazards in construction.

Q. Are volunteers and students covered by the standard?

A. Volunteers and students may be covered by the standard depending on a variety of factors including compensation.

Q. Are physicians who are not employees of the hospital in which they work covered by the standard?

A. Physicians of professional corporations are considered employees of that corporation. The corporation which employs these physicians may be cited by OSHA for violations affecting those physicians. The hospital where the physician practices may also be held responsible as the employer who created or controlled the hazard. Physicians who are sole practitioners or partners are not considered employees under the OSH Act, and therefore, are not covered by the protections of the standard. However, if a non-incorporated physician were to create a hazard to which hospital employees were exposed, it would be consistent with current OSHA policy to cite the employer of the exposed employees for failure to provide the protections of the Bloodborne Pathogens Standard.

Q. We have employees who are designated to render first aid. Are they covered by the standard?

A. Yes. If employees are trained and designated as responsible for rendering first aid or medical assistance as part of their job duties, they are covered by the protections of the standard. However, OSHA will consider it a *de minimis* violation — a technical violation carrying no penalties — if employees, who administer first aid as a collateral duty to their routine work assignments, are not offered the pre-exposure hepatitis B vaccination, provided that a number of conditions are met. In these circumstances no citations will be issued.

The *de minimis* classification for failure to offer hepatitis B vaccination in advance of exposure does **not** apply to personnel who provide first aid at a first aid station, clinic, or dispensary, or to the health care, emergency response or public safety personnel expected to render first aid in the course of their work.

Exceptions are limited to persons who render first aid only as a collateral duty, responding solely to injuries resulting from workplace incidents, generally at the location where the incident occurred. To merit the *de minimis* classification, the following conditions also must be met:

- Reporting procedures must be in place under the exposure control plan to ensure that all first aid incidents involving exposure are reported to the employer before the end of the work shift during which the incident occurs.
- Reports of first aid incidents must include the names of all first aid providers and a description of the circumstances of the accident, including date and time, as well as a determination of whether an exposure incident, as defined in the standard, has occurred.
- Exposure reports must be included on a list of such first aid incidents that is readily available to all employees and provided to OSHA upon request.
- First aid providers must receive training under the Bloodborne Pathogens Standard that covers the specifics of the reporting procedures.
- All first aid providers who render assistance in any situation involving the presence of blood or other potentially infectious materials, regardless of whether or not a specific exposure incident occurs, must have the vaccine made available to them as soon as possible but in no event later than 24 hours after the exposure incident. If an exposure incident as defined in the standard has taken place, other post-exposure follow-up procedures must be initiated immediately, per the requirements of the standard.

Q. Are employees such as housekeepers, maintenance workers, or janitors covered by the standard?

A. Housekeeping workers in health care facilities may have occupational exposure to bloodborne pathogens, as defined by the standard. Individuals who perform housekeeping duties, particularly in patient care and laboratory areas, may perform tasks, such as cleaning blood spills and handling regulated wastes, which constitute occupational exposure.

While OSHA does not generally consider maintenance personnel and janitorial staff employed in non-health care facilities to have occupational exposure, it is the employers responsibility to determine which job classifications or specific tasks and procedures involve occupational exposure. For example, OSHA expects products such as discarded sanitary napkins to be discarded into waste containers which are lined in such a way as to prevent contact with the contents. But at the same time, the employer must determine if employees can come into contact with blood during the normal handling of such products from initial pick-up through disposal in the outgoing trash. If OSHA determines, on a case-by-case basis, that sufficient evidence of reasonably anticipated exposure exists, the employer will be held responsible for providing the protections of 29 CFR 1910.1030 to the employees with occupational exposure.

Exposure control

Q. What is an exposure control plan?

A. The exposure control plan is the employers written program that outlines the protective measures an employer will take to eliminate or minimize employee exposure to blood and OPIM.

The exposure control plan must contain at a minimum: (1) the exposure determination which identifies job classifications and, in some cases, tasks and procedures where there is occupational exposure to blood and OPIM; (2) the procedures for evaluating the circumstances surrounding an exposure incident; and (3) a schedule of how and when other provisions of the standard will be implemented, including methods of compliance, HIV and HBV research laboratories and production facilities requirements, hepatitis B vaccination and post-exposure follow-up, communication of hazards to employees, and recordkeeping.

Q. In the exposure control plan, are employers required to list specific tasks that place the employee at risk for all job classifications?

A. No. If all the employees within a specific job classification perform duties where occupational exposure occurs, then a list of specific tasks and procedures is not required for that job classification. However, the job classification (e.g., "nurse") must be listed in the plans exposure determination and all employees within the job classification must be included under the requirements of the standard.

Q. Can tasks and procedures be grouped for certain job classifications?

A. Yes. Tasks and procedures that are closely related may be grouped. However, they must share a common activity, such as "vascular access procedure," or "handling of contaminated sharps."

Q. Does the exposure control plan need to be a separate document?

A. No. The exposure control plan may be part of another document, such as the facility's health and safety manual, as long as all components are included. However, in order for the plan to be accessible to employees, it must be a cohesive entity by itself or there must be a guiding document which states the overall policy and goals and references the elements of existing separate policies that comprise the plan. For small facilities, the plans schedule and method of implementation of the standard may be an annotated copy of the final standard that states on the document when and how the provisions of the standard will be implemented. Larger facilities could develop a broad facility program, incorporating provisions from the standard that apply to their establishments.

Q. How often must the exposure control plan be reviewed?

A. The standard requires an annual review of the exposure control plan. In addition, whenever changes in tasks, procedures, or employee positions affect or create new occupational exposure, the existing plan must be reviewed and updated accordingly.

Q. Must the exposure control plan be accessible to employees?

A. Yes, the exposure control plan must be accessible to employees, as well as to OSHA and NIOSH representatives. The location of the plan may be adapted to the circumstances of a particular workplace, provided that employees can access a copy at the workplace during the workshift. If the plan is maintained solely on computer, employees must be trained to operate the computer.

A hard copy of the exposure control plan must be provided within 15 working days of the employees request in accordance with 29 CFR 1910.1020.

Q. What should be included in the procedure for evaluating an exposure incident?

A. The procedure for evaluating an exposure incident shall include:

- the engineering controls and work practices in place,
- the protective equipment or clothing used at the time of the exposure incident,
- an evaluation of the policies and "failures of control" at the time of the exposure incident.

Methods of control

Q. What is meant by the term universal precautions?

A. Universal Precautions is OSHAs required method of control to protect employees from exposure to all human blood and OPIM. The term, "Universal Precautions," refers to a concept of bloodborne disease control which requires that all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.

Q. What are engineering controls?

A. The term, "engineering controls," refers to controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the bloodborne pathogens hazards from the workplace.

Q. Can employees of an ambulance medical rescue service eat or drink inside the cab of the unit?

A. Employees are allowed to eat and drink in an ambulance cab only if the employer has implemented procedures to permit employees to wash up and change contaminated clothing prior to entering the ambulance cab, has prohibited the consumption, handling, storage, and transport of food and drink in the rear of the vehicle, and has procedures to ensure that patients and contaminated materials remain behind the separating partition.

Q. What alternatives are acceptable if soap and running water are not available for handwashing?

A. Antispetic hand cleaner in conjunction with clean cloth/paper towels or antiseptic towelettes are examples of acceptable alternatives to running water. However, when these types of alternatives are used, employees must wash their hands (or other affected areas) with soap and running water as soon as feasible. This alternative would only be acceptable at worksites where soap and running water are not feasible.

Personal protective equipment

Q. What type of personal protective equipment (PPE) should employees in a dental office wear?

A. The standard requires that PPE be "appropriate." PPE will be considered "appropriate" only if it does not permit blood or OPIM to pass through to, or reach, the skin, employees underlying garments, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time that the PPE will be used. This allows the employer to select PPE based on the type of exposure and the quantity of blood or OPIM which can be reasonably anticipated to be encountered during performance of a task or procedure.

Q. Who is responsible for providing PPE?

A. The financial responsibility for repairing, replacing, cleaning, and disposing of PPE rests with the employer. The employer is not obligated under the standard to provide general work clothes to employees, but is responsible for providing PPE. If laboratory jackets or uniforms are intended to protect the employees body or clothing from contamination, they are to be provided by the employer.

Q. Does protective clothing need to be removed before leaving the work area?

A. Yes. OSHA requires that personal protective equipment be removed prior to leaving the work area. While work area must be determined on a case-by-case basis, a work area is generally considered to be an area where work involving occupational exposure occurs or where the contamination of surfaces may occur.

Q. What type of eye protection do I need to wear when working wth blood or OPIM?

A. The use of eye protection would be based on the reasonable anticipation of facial exposure. Masks in combination with eye protection devices such as glasses with solid side shields, goggles, or chin-length face shields, shall be worn whenever splashes, spray, spatter, or droplets of blood or OPIM may be generated, and eye, nose, or mouth contamination can be reasonably anticipated.

Gloves

Q. When should gloves be changed?

A. Disposable gloves shall be replaced as soon as practical after they have become contaminated, or as soon as feasible if they are torn, punctured, or their ability to function as a barrier is compromised. Hands must be washed after the removal of gloves used as PPE, whether or not the gloves are visibly contaminated.

Q. What are some alternatives when an employee is allergic to the gloves provided?

A. Hypoallergenic gloves, glove liners, powderless gloves or other similar alternatives must be provided for employees who are allergic to the gloves that are normally provided.

Housekeeping

Q. What type of disinfectant can be used to decontaminate equipment or working surfaces which have come in contact with blood or OPIM?

A. EPA registered tuberculocidal disinfectants are appropriate for the cleaning of blood or OPIM. A solution of 5.25 percent sodium hypochlorite, (household bleach), diluted between 1:10 and 1:100 with water, is also acceptable for cleaning contaminated surfaces.

Quaternary ammonium products are appropriate for use in general housekeeping procedures that do not involve the cleanup of contaminated items or surfaces.

The particular disinfectant used, as well as the frequency with which it is used, will depend upon the circumstances in which a given housekeeping task occurs (i.e., location within the facility, type of surface to be cleaned, type of soil present, and tasks and procedures being performed). The employers written schedule for cleaning and decontamination should identify such specifics on a task-by-task basis.

Regulated waste

Q. What does OSHA mean by the term "regulated waste"?

A. The Bloodborne Pathogens Standard uses the term, "regulated waste," to refer to the following categories of waste which require special handling at a minimum: (1) liquid or semi-liquid blood or OPIM; (2) items contaminated with blood or OPIM and which would release these substances in a liquid or semi-liquid state if compressed; (3) items that are caked with dried blood or OPIM and are capable of releasing these materials during handling; (4) contaminated sharps; and (5) pathological and microbiological wastes containing blood or OPIM.

Q. Are feminine hygiene products considered regulated waste?

A. OSHA does not generally consider discarded feminine hygiene products, used to absorb menstrual flow, to fall within the definition of regulated waste. The intended function of products such as sanitary napkins is to absorb and contain blood. The absorbent material of which they are composed would, under most circumstances, prevent the release of liquid or semi-liquid blood or the flaking off of dried blood.

OSHA expects these products to be discarded into waste containers which are properly lined with plastic or wax paper bags. Such bags should protect the employees from physical contact with the contents.

At the same time, it is the employers responsibility to determine the existence of regulated waste. This determination is not based on actual volume of blood, but rather on the potential to release blood, (e.g., when compacted in the waste container). If OSHA determines, on a case-by-case basis, that sufficient evidence of regulated waste exists, either through observation, (e.g., a pool of liquid in

the bottom of a container, dried blood flaking off during handling), or based on employee interviews, citations may be issued.

Q. How do I dispose of waste?

A. Regulated waste shall be placed in containers which are:

- Closable;
- Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;
- Labeled or color-coded in accordance with paragraph (g)(1)(i) of the standard; and
- Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

If outside contamination of the regulated waste container occurs, it shall be placed in a second container. The second container shall be:

- Closable;
- Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport, or shipping;
- Labeled or color-coded in accordance with paragraph (g)(1)(i) of the standard; and
- Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

Disposal of all regulated waste shall be in accordance with applicable regulations of the United States, states and territories, and political subdivisions of states and territories.

Laundry

Q. What does OSHA mean by the term "contaminated laundry?"

A. Contaminated laundry means laundry which has been soiled with blood or other potentially infectious materials or may contain sharps.

Q. How should contaminated laundry be handled?

A. Contaminated laundry shall be handled as little as possible with a minimum of agitation. Contaminated laundry shall be bagged or containerized at the location where it was used and shall not be sorted or rinsed in the location of use. Other requirements include:

- Contaminated laundry shall be placed and transported in bags or containers labeled or color-coded in accordance with paragraph (g)(1)(i) of the standard. When a facility utilizes Universal Precautions in the handling of all soiled laundry, alternative labeling or color-coding is sufficient if it permits all employees to recognize the containers as requiring compliance with Universal Precautions.
- Whenever contaminated laundry is wet and presents a reasonable likelihood of soak-through or leakage from the bag or container, the laundry shall be placed and transported in bags or containers which prevent soak-through and/or leakage of fluids to the exterior.
- The employer shall ensure that employees who have contact with contaminated laundry wear protective gloves and other appropriate personal protective equipment.
- When a facility ships contaminated laundry off-site to a second facility which does not utilize Universal Precautions in the handling of all laundry, the facility generating the contaminated laundry must place such laundry in bags or containers which are labeled or color-coded in accordance with paragraph (g)(1)(i) of the standard.

Q. Are employees allowed to take their protective equipment home and launder it?

A. Employees are not permitted to take their protective equipment home and launder it. It is the responsibility of the employer to provide, launder, repair, replace, and dispose of personal protective equipment.

Q. Do employers have to buy a washer and dryer to clean employees personal protective equipment?

A. There is no OSHA requirement stipulating that employers must purchase a washer and dryer to launder protective clothing. It is an option that employers may consider. Another option is to contract out the laundering of protective clothing. Finally, employers may choose to use disposable personal protective clothing and equipment.

Q. Are there guidelines to be followed when laundering personal protective equipment? What water temperature and detergent types are acceptable?

A. The decontamination and laundering of protective clothing should be handled by washing and drying the garments according to the clothing manufacturers instructions.

Hepatitis B vaccination and post-exposure follow-up procedures

Q. Who must be offered the hepatitis B vaccination?

A. The hepatitis B vaccination series must be made available to all employees who have occupational exposure. The employer does not have to make the hepatitis B vaccination available to employees who have previously received the vaccination series, who are already immune as their antibody tests reveal, or who are prohibited from receiving the vaccine for medical reasons.

Q. When should the hepatitis B vaccination be offered to employees?

A. The hepatitis B vaccination must be made available within 10 working days of initial assignment, after appropriate training has been completed. This includes arranging for the administration of the first dose of the series. In addition, see page 17 for vaccination of designated first aiders.

Q. Can pre-screening be required for hepatitis B titer? Post-screening?

A. No. The employer cannot require an employee to take a pre-screening or post-vaccination serological test. An employer may, however, decide to make pre-screening available at no cost to the employee. Routine post-vaccination serological testing is not currently recommended by the CDC unless an employee has had an exposure incident, and then it is also to be offered at no cost to the employee.

Q. If an employee declines the hepatitis B vaccination, can the employer make up a declination form?

A. If an employee declines the hepatitis B vaccination, the employer must ensure that the employee signs a hepatitis B vaccination declination. The declination's wording must be identical to that found in Appendix A of the standard. A photocopy of the Appendix may be used as a declination form, or the words can be typed or written onto a separate document.

Q. Can employees refuse the vaccination?

A. Employees have the right to refuse the hepatitis B vaccine and/or any post-exposure evaluation and follow-up. Is important to note, however, that the employee needs to be properly informed of the benefits of the vaccination and post-exposure evaluation through training. The employee also has the right to decide to take the vaccination at a later date if he or she so chooses. The employer must make the vaccination available at that time.

Q. Can the hepatitis B vaccination be made a condition of employment?

A. OSHA does not have jurisdiction over the issue.

Q. Is a routine booster does of hepatitis B vaccine required?

A. Because the U.S. Public Health Service (USPHS) does not recommend routine booster doses of hepatitis B vaccine, they are not required at this time. However, if a routine booster dose of hepatitis B vaccine is recommended by the USPHS at a future date, such booster doses must be made available at no cost to those eligible employees with occupational exposure.

Q. Whose responsibility is it to pay for the hepatitis B vaccine?

A. The responsibility lies with the employer to make the hepatitis B vaccine and vaccination, including post-exposure evaluation and follow-up, available at no cost to the employees.

Q. What information must the employer provide to the healthcare professional following an exposure incident?

A. The healthcare professional must be provided with a copy of the standard, as well as the following information:

- A description of the employee's duties as they relate to the exposure incident;
- Documentation of the route(s) and circumstances of the exposure;
- The results of the source individual's blood testing, if available; and
- All medical records relevant to the appropriate treatment of the employee, including vaccination status, which are the employer's responsibility to maintain.

Q. What serological testing must be done on the source individual?

A. The employer must identify and document the source individual if know, unless the employer can establish that identification is not feasible or is prohibited by state or local law. The source individual's blood must be tested as soon as feasible, after consent is obtained, in order to determine HIV and HBV infectivity. The information on the source individual's HIV and HBV testing must be provided to the evaluating healthcare professional. Also, the results of the testing must be provided to the exposed employee. The exposed employee must be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual.

Q. What if consent cannot be obtained from the source individual?

A. If consent cannot be obtained and is required by state law, the employer must document in writing that consent cannot be obtained. When the source individual's consent is not required by law, the source individual's blood if available shall be tested and the results documented.

Q. When is the exposed employee's blood tested?

A. After consent is obtained, the exposed employee's blood is collected and tested as soon as feasible for HIV and HBV serological status. If the employee consents to the follow-up evaluation after an exposure incident, but does not give consent for HIV serological testing, the blood sample must be preserved for 90 days. If, within 90 days of the exposure incident, the employee elects to have the baseline sample tested for HIV, testing must be done as soon as feasible.

Q. What information does the healthcare professional provide to the employer following an exposure incident?

A. The employer must obtain and provide to the employee a copy of the evaluating healthcare professional's written opinion within 15 days of completion of the evaluation. The healthcare professional's written opinion for hepatitis B is limited to whether hepatitis B vaccination is indicated and if the employee received the vaccination. The written opinion for post-exposure evaluation must include information that the employee has been informed of the results of the evaluation and told about any medical conditions resulting from exposure that may further require evaluation and treatment. All other findings or diagnoses must be kept confidential and not included in the written report.

Q. What type of counseling is required following an exposure incident?

A. The standard requires that post-exposure counseling be given to employees following an exposure incident. Counseling should include USPHS recommendations for prevention of HIV. These recommendations include refraining from blood, semen, or organ donation; abstaining from sexual intercourse or using measures to prevent HIV transmission during sexual intercourse; and refraining from breast feeding infants during the follow-up period. In addition, counseling must be made available regardless of the employee's decision to accept serological testing.

Q. What information about exposure incidents is recorded on the OSHA 300 Log?

A. All work-related needlestick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious materials must be recorded. Enter the case on the 300 Log as an injury. To protect the employee's privacy, do not enter the employee's name. Enter the case on the sharps injury log or enter comparable data on the OSHA 300 Log.

Communication of hazard to employees

Q. When are labels required?

A. A warning label that includes the universal biohazard symbol, followed by the term "biohazard," must be included on bags/containers of contaminated laundry, on bags/containers of regulated waste, on refrigerators and freezers that are used to store blood or OPIM, and on bags/containers used to store, dispose of, transport, or ship blood or OPIM (e.g., specimen containers). In addition, contaminated equipment which is to be serviced or shipped must have a readily observable label attached which contains the biohazard symbol and the word "biohazard" along with a statement relating which portions of the equipment remain contaminated.

Q. What are the required colors for the labels?

A. The background must be fluorescent orange or orange-red or predominantly so, with symbols and lettering in a contrasting color. The label must be either an integral part of the container or affixed as close as feasible to the container by a string, wire, adhesive, or other method to prevent its loss or unintentional removal.

Q. Can there be substitutes for the labels?

A. Yes. Red bags or red containers may be substituted for the biohazard labels.

Q. What are the exceptions to the labeling requirement?

A. Labeling is not required for:

- Containers of blood, blood components, and blood products bearing an FDA required label that have been released for transfusion or other clinical uses.
- Individual containers of blood or OPIM that are placed in secondary labeled containers during storage, transport, shipment, or disposal.
- Specimen containers, if the facility uses Universal Precautions when handling all specimens, the containers are recognizable as containing specimens, and the containers remain within the facility.
- Laundry bags or containers, containing contaminated laundry, may be marked with an alternative label or color-coded provided the facility uses Universal Precautions for handling all soiled laundry and the alternative marking permits all employees to recognize the containers as requiring compliance with Univeral Precautions. If contaminated laundry is sent off-site for cleaning to a facility which does not use Universal Precautions in the handling of all soiled laundry, it must be placed in a bag or container which is red in color or labeled with the biohazard label described above.
- Regulated waste that has been decontaminated.

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Q. Does OSHA accept Department of Transportation's (DOT) labels for waste and specimens which will be shipped or transported?

A. The labeling requirements do not preempt either the U.S. Postal Service labeling requirements (39 CFR Part III) or the Department of Transportation's Hazardous Materials Regulations (49 CFR Parts 171-181).

DOT labeling is required on some transport containers (i.e., those containing "known infectious substances"). It is not required on all containers for which 29 CFR 1910.1030 requires the biohazard label. Where there is an overlap between the OSHA-mandated label and the DOT-required label, the DOT label will be considered acceptable on the outside of the transport container provided the OSHA-mandated label appears on any internal containers which may be present. Containers serving as collection receptacles within a facility must bear the OSHA label since these are not covered by the DOT requirements.

Q. Which employees must be trained?

A. All employees with occupational exposure must receive initial and annual training.

Q. Should part-time and temporary employees be trained?

A. Part-time and temporary employees are covered and are also to be trained on company time.

Q. Who has the responsibilty for training workers employed by agencies which provide personnel (e.g., nurses) to other employers?

A. As stated in a similar answer, OSHA considers personnel providers, who send their own employees to work at other facilities, to be employers whose employees may be exposed to hazards. Since personnel providers maintain a continuing relationship with their employees, but another employer (your client) creates and controls the hazard, there is a shared responsibilty for assuring that your employees are protected from workplace hazards. The client employer has the primary responsibility for such protection, but the "lessor employer" likewise has a responsibility under the Occupational Safety and Health Act.

In the context of OSHA's standard on Bloodborne Pathogens, the personnel provider would be required to provide the general training outlined in the standard. The client employer would be responsible for providing site-specific training.

The contract between the personnel provider and the client should clearly describe the training responsibilities of both parties in order to ensure that all training requirements of the standard are met.

Q. What are the qualifications that a person must possess in order to conduct employee training regarding bloodborne pathogens?

A. The person conducting the training is required to be knowledgeable in the subject matter covered by the elements in the training program and be familiar with how the course topics apply to the workplace that the training will address. The trainer must demonstrate expertise in the area of occupational hazards of bloodborne pathogens.

Q. Who are some examples of persons who could conduct training on the bloodborne standard?

A. Examples of health care professionals include infection control practitioners, nurse practitioners, and registered nurses. Non-health care professionals include industrial hygienists, epidemiologists or professional trainers, provided that they can demonstrate evidence of specialized training in the area of bloodborne pathogens.

Recordkeeping

Q. What is contained in the medical record?

A. The medical record includes the name and social security number of the employee; a copy of the employee's hepatitis B vaccination status including the dates of all the hepatitis B vaccinations, and any medical records relative to the employee's ability to receive the vaccination; copies of all results of examinations, medical testing, and the follow-up procedures; copies of the healthcare professional's written opinion; and a copy of the information provided to the healthcare professional.

Q. Who keeps the medical records?

A. The employer is responsible for the establishment and maintenance of medical records. However, these records may be kept off-site at the location of the healthcare provider.

Q. How long must the medical records be kept?

A. Medical records must be kept for the duration of employment plus 30 years.

Q. What information must be included on the sharps injury log?

A. The sharps injury log, which protects the confidentiality of the injured employee, must contain at a minimum, the type and brand of device involved in the incident; the department or work area where the exposure incident occurred; and an explanation of how the incident occurred.

Q. How long must the sharps injury log be retained?

A. The sharps injury log must be retained for five years following the end of the year to which it relates.

Q. What is included in the training record?

A. The training record contains the dates of the training, the contents or a summary of the training sessions, the names and job titles of all persons attending the training, and the names and qualifications of the persons conducting the training.

Q. How long must the training records be kept?

A. Training records must be retained for three years from the training date.

OSHA's bloodborne pathogens clarifications

Since the promulgation of the Bloodborne Pathogens standard, OSHA has issued a number of clarifications and interpretations regarding particular aspects of the standard. Summaries of several clarifications follow.

Construction, maritime and agriculture exemptions

The Bloodborne Pathogens standard does not apply to the construction, agriculture, marine terminal, and longshoring industries. OSHA has not, however, stated that these industries are free from the hazards of bloodborne pathogens. For industries not covered by the standard, these safety issues are being enforced under the General Duty Clause. While the General Duty Clause is not used to cite for violations of the Bloodborne Pathogens standard, it may be used to cite for failure to provide a workplace free from exposure to bloodborne hazards.

First aid providers and the hepatitis B vaccination requirement

First aid providers fall in a category of worker that is protected by the Bloodborne Pathogens standard because of the possibility of occupational exposure to blood or other potentially infectious material. However, most first aid providers have completely unrelated job duties and have very little actual likelihood of occupational exposure.

For those first aid providers where the risk of occupational exposure is extremely low, OSHA has issued an official exemption from the pre-exposure hepatitis B vaccination requirement. Such employees only need to be offered the HBV vaccine in post-exposure situations.

All other requirements of the standard still apply to workers exempted from the HBV vaccination requirements. Their employers are subject to the same written program, recordkeeping, training, and other requirements of the Bloodborne Pathogens standard. See page 29 for the news release regarding this exemption.

Feminine hygiene products handling practices

In response to an industry inquiry regarding feminine hygiene product waste, OSHA issued a letter clarifying the intent of the standard. The information in the letter could prove useful to every workplace, since all female restrooms generate feminine hygiene waste handling and disposal issues. This interpretation provides a strong incentive to organize an effective sanitary program to deal with the feminine hygiene product disposal practices, change them if possible to avoid potential exposure situations, and cover any workers potentially exposed to bloodborne pathogens. See page 30 for the interpretative letter.

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Occupational Safety and Health Administration News Release

Monday, July 6, 1992

FIRST AID PROVIDERS MAY RECEIVE HEPATITIS B VACCINE UPON EXPOSURE, OSHA SAYS

The U.S. Labor Department's Occupational Safety and Health Administration (OSHA) today announced it will allow employers to offer hepatitis B vaccinations to certain employees after they've given first aid rather than offering pre-exposure vaccinations.

Based on the low risk of exposure for these first aid providers, OSHA believes that post-exposure prophylaxis, including hepatitis B vaccination within 24 hours of possible exposure, both minimizes the risk to employees and lessens demands on limited supplies of the vaccine.

OSHA is revising the inspection directive issued under its bloodborne pathogens standard. OSHA will consider it a de minimis violation—a technical violation carrying no penalties—if employees who administer first aid as a collateral duty to their routine work assignment are not offered the hepatitis B vaccination until they give aid involving blood or other potentially infectious materials. In these circumstances, no citations will be issued.

All other requirements of the standard apply to employers with employees who are designated to render first aid on the job.

The de minimis classification for failure to offer hepatitis B vaccination in advance of exposure would **NOT** apply to personnel who provide first aid at a first aid station, clinic or dispensary or the health care, emergency response or public safety personnel expected to render first aid in the course of their work.

Exceptions would be limited to persons who render first aid only as a collateral duty, responding solely to injuries resulting from workplace incidents, generally at the location where the incident occurred. To merit the de minimis classification, the following conditions also must be met:

- Reporting procedures must be in place under the exposure control plan to ensure that all first aid incidents involving exposure are reported to the employer **before the end of the work shift** during which the incident occurs.
- Reports of first aid incidents must include the names of all first aid providers and a description of the circumstances of the accident, including date and time as well as a determination of whether an exposure incident, as defined in the standard, has occured.
- Exposure reports must be included on a list of such first aid incidents that is readily available to all employees and provided to OSHA upon request.
- First aid providers must receive training under the bloodborne pathogens standard that covers the specifics of the reporting procedures.
- All first aid providers who render assistance in any situation involving the presence of blood or other potentially infection materials, regardless of whether or not a specific exposure incident occurs, must be offered the full immunization series—as soon as possible, but in no event later than **24 hours.** If an exposure incident as defined in the standard has taken place, other post-exposure follow-up procedures must be initiated immediately, per the requirements of the standard.

The new policy is effective immediately.

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June 1, 1992

Ms. Susan H. Blackburn
Industrial Hygienist
Martin Marietta Energy Systems, Inc.
Post Office Box 2003
Oak Ridge, Tennessee 37831

Dear Ms. Blackburn:

This is in response to your letter of April 30, in which you requested a clarification on the Occupational Safety and Health Administration (OSHA) regulation 29 CFR 1910.1030, "Occupational Exposure to Bloodborne Pathogens". You wrote regarding the coverage of feminine hygiene products as regulated waste.

29 CFR 1910.1030 defines regulated waste as liquid or semi-liquid blood or other potentially infectious material (OPIM); items contaminated with blood or OPIM and which would release these substances in a liquid or semi-liquid state if compressed; items that are caked with dried blood or OPIM are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or OPIM.

OSHA does not generally consider discarded feminine hygiene products, used to absorb menstrual flow, to fall within the definition of regulated waste. The intended function of products such as sanitary napkins is to absorb and contain blood; the absorbent material of which they are composed would, under most circumstances, prevent the release of liquid or semi-liquid blood or the flaking off of dried blood.

OSHA expects these products to be discarded into waste containers which are lined in such a way as to prevent contact with the contents. Please note, however, that it is the employer's responsibility to determine which job classifications or specific tasks and procedures involve occupational exposure. For example, the employer must determine whether employees can come into contact with blood during the normal handling of such products from initial pick-up through disposal in the outgoing trash. If OSHA determines, on a case-by-case basis, that sufficient evidence exists of reasonably anticipated exposure, the employer will be held responsible for providing the protections of 29 CFR 1910.1030 to the employees with occupational exposure.

We hope this information is responsive to your concerns. Thank you for your interest in worker safety and health.

Patricia K. Clark, Director
Directorate of Compliance Programs

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Enforcement procedures for the occupational exposure to bloodborne pathogens: Excerpts from OSHA compliance directive CPL 2-2.69

The best source for information and interpretations on how OSHA inspectors enforce the Bloodborne Pathogens standard is compiled in OSHA's compliance directive CPL 2-2.69, which became effective November 2001. This document contains paragraph-by-paragraph interpretations of the standard, describes what compliance officers must look for when performing an inspection, and details how they uniformly enforce provisions of the BBP standard.

NOTE: The following information has been selected from CPL 2-2.69.

Purpose

This instruction establishes policies and provides clarification to ensure uniform inspection procedures are followed when conducting inspections to enforce the Occupational Exposure to Bloodborne Pathogens standard at §1910.1030.

Cancellation

Instruction CPL 2-2.69 cancels OSHA CPL 2-2.44D, Enforcement Procedures for the Occupational Exposure to Bloodborne Pathogens, which was effective November 5, 1999.

Background

In September 1986, OSHA was petitioned by various unions representing healthcare employees to develop an emergency temporary standard to protect employees from occupational exposure to bloodborne diseases. The agency decided to pursue the development of a Section 6(b) standard and published a proposed rule on May 30, 1989.

The agency also concluded that the risk of contracting the hepatitis B virus (HBV) and human immunodeficiency virus (HIV) among members of various occupations within the healthcare sector required an immediate response and therefore issued OSHA Instruction CPL 2-2.44, January 19, 1988. That instruction was superseded by CPL 2-2.44A, August 15, 1988; subsequently, CPL 2-2.44B was issued February 27, 1990.

On December 6, 1991, the agency issued its final regulation on occupational exposure to bloodborne pathogens (29 CFR 1910.1030). Based on a review of the information in the rulemaking record, OSHA determined that employees face a significant health risk as the result of occupational exposure to blood and other potentially infectious materials (OPIM) because they may contain bloodborne pathogens. These pathogens include but are not limited to HBV, which causes hepatitis B; HIV, which causes acquired immunodeficiency syndrome (AIDS); hepatitis C virus; human T-lymphotrophic virus Type 1; and pathogens causing malaria, syphilis, babesiosis, brucellosis, leptospirosis, arboviral infections, relapsing fever, Creutzfeldt-Jakob disease, and viral hemorrhagic fever. The agency further concludes that these hazards can be minimized or eliminated by using a combination of engineering and work practice controls, personal protective clothing and equipment, training, medical surveillance, hepatitis B vaccination, signs and labels, and other provisions. Both the standard and CPL 2-2.44C became effective on March 6, 1992.

On September 9, 1988 OSHA published a Request for Information (RFI) on engineering and work practice controls used to eliminate or minimize the risk of occupational exposure to bloodborne pathogens due to percutaneous injuries from contaminated sharps. The responses indicated that safer medical devices along with training are the most effective means of reducing injury rates. A Summar of the comments received in response to the RFI was published in March 1999. On November 5, 1999 CPL 2-2.44D was issued. It incorporated information from the RFI, past interpretations and several CDC guidelines on vaccination and post-exposure prophylaxis.

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On November 6, 2000, the Needlestick Safety and Prevention Act was signed into law (Public Law 106-430). It directed OSHA to revise the Bloodborne Pathogens standard to include new examples in the definition of engineering controls; to require that exposure control plans reflect changes in technology that eliminate or reduce exposure to bloodborne pathogens; to require employers to document annually in the exposure control plans consideration and implementation of safer medical devices; to require employers to solicit input from non-managerial employees responsible for direct patient care in the identification, evaluation, and selection of engineering and work practice controls; to document this input in the exposure control plan; and to require certain employers to establish and maintain a log of percutaneous injuries from contaminated sharps. OSHA published these revisions on January 18, 2001 with an effective date of April 18, 2001.

Inspection scheduling, and scope

All inspections, programmed or unprogrammed, should include, if appropriate, a review of the employer's exposure control plan and employee interviews to assess compliance with the standard.

Expansion of an inspection to areas involving the hazard of occupational exposure to blood or other potentially infectious materials (including on site healthcare units and emergency response or first aid personnel) should be performed when:

1. The exposure control plan or employee interviews indicate deficiencies in complying with OSHA requirements, as set forth in §1910.1030 or this instruction.
2. Relevant formal employee complaints are received which are specifically related to occupational exposure to blood or OPIM.
3. A fatality/catastrophe inspection is conducted as the result of occupational exposure to blood or OPIM.

General inspection procedures

The procedures given in the FIRM, Chapter II, should be followed except as modified in the following sections:

Where appropriate, the facility administrator, as well as the directors of infection control, employee (occupational) health, training and education, and environmental services (housekeeping) will be included in the opening conference or interviewed early in the inspection.

The facility's sharps injury log and any other file of "incident reports" that document the circumstances of exposure incidents in accordance with the provisions in the exposure control plan, and any first aid log of injuries, should be reviewed. The compliance officer should ask for any other additional records that track bloodborne incidents. The compliance officer should review the most recent Part 1904 — Recording and Reporting Occupational Injuries and Illnesses regulations prior to citing recordkeeping violations.

Compliance officers should take necessary precautions to avoid direct contact with blood or OPIM and should not participate in activities that will require them to come into contact with blood or OPIM. The CSHO should avoid direct contact with needles or other sharp instruments potentially contaminated with blood or OPIM. To evaluate such activities, compliance officers normally should establish the existence of hazards and adequacy of work practices through employee interviews and should observe them at a safe distance.

On occasions when entry into potentially hazardous areas is judged necessary, the compliance officer should be properly equipped as required by the facility as well as by his/her own professional judgment, after consultation with the supervisor, who should refer to OSHA's exposure control plan for further guidance.

Compliance officers should use appropriate caution when entering patient care areas of the facility. When such visits are judged necessary for determining actual conditions in the facility, the privacy of patients must

be respected. Photos or videos are normally not necessary and in no event should identifiable photos be taken without the patient's consent.

Recording of exposure incidents

The new recordkeeping rule effective January 1, 2002 requires at 29 CFR 1904.8 that all employers, whether or not they are covered by the bloodborne pathogens standard, record all work-related needlesticks and cuts from sharp objects that are contaminated with another person's blood or OPIM on the 300 Log as an injury. The employee's name must not be entered on the 300 Log. [See the requirements for privacy cases in paragraphs 1904.29(b)(6) through (b)(9).]

If the employee is later diagnosed with an infectious bloodborne disease, the identity of the disease must be entered and the classification must be changed to an illness. If an employee is splashed or exposed to blood or OPIM without being cut or punctured, the incident must be recorded on the OSHA 300, if it results in the diagnosis of a bloodborne illness or it meets one or more of the recording criteria of 1904.7.

Multi-employer and related worksites

There are a number of different types of multi-employer worksites. This paragraph addresses a few typical situations but does not address all the circumstances that occur. In addition, this paragraph deals with situations in which employees are sent out to sites that are not multi-employer worksites. Where these guidelines do not address a particular question, see CPL 2-0.124, Multi-Employer Citation Policy.

Employment agencies

An employment agency refers job applicants to potential employers but does not put these workers on the payroll or otherwise establish an employment relationship with them; thus, the employment agency is not the employer of these workers. These agencies shall not be cited for violations affecting the workers they refer. The company that uses these workers, *e.g.*, a hospital, is the employer of these workers and shall be cited for all violations affecting them.

Personnel services

Personnel services firms employ medical care staff and service employees who are assigned to work at hospitals and other healthcare facilities that contract with the firm. Typically, the employees are on the payroll of the personnel services firm, but the healthcare facility exercises day-to-day supervision over them. In these circumstances, due to the concerns expressed by the court in *American Dental Association v. Martin, 984 F.2d 823, 829-30* (7th Cir. 1993) (dictum about medical personnel services) the personnel services firm should be cited for violations of the bloodborne pathogens standard only in the following categories: (1) hepatitis B vaccinations; (2) post-exposure evaluation and follow-up; (3) recordkeeping under paragraph (h) of the standard; (4) generic training; (5) violations occurring at the healthcare facility about which the personnel services firm actually knew and where the firm failed to take reasonable steps to have the host employer (the employer using the workers, *e.g.*, a hospital) correct the violation (see FIRM multi-employer worksite guidelines); and (6) pervasive serious violations occurring at the healthcare facility about which the personnel service firm could have known with the exercise of reasonable diligence.

When the host employer exercises day-to-day supervision over the personnel service workers, they are the employees of the host employer, as well as of the personnel service, and thus the host employer must comply with all provisions of the standard with respect to these workers. With respect to Hepatitis B vaccination, post-exposure evaluation and follow-up, recordkeeping, and generic training, the host employer's obligation is to take reasonable measures to assure that the personnel service firm has complied with these provisions.

Home health services

The *American Dental Association v. Martin* decision upheld the bloodborne pathogens standard but restricted its application in the home health services industry. These are companies whose employees provide home health services in private homes. The court held that OSHA had not adequately considered feasibility problems for such employers, where employees work at sites that the employer does not control. As a result, OSHA may not cite those employers for site-dependent provisions of the standard when the hazard is site-specific.

In implementing this decision, OSHA determined that the employer will not be held responsible for the following site-specific violations: housekeeping requirements, such as the maintenance of a clean and sanitary worksite and the handling and disposal of regulated waste; ensuring the use of personal protective equipment; and ensuring that specific work practices are followed (e.g., handwashing with running water) and ensuring the use of engineering controls.

The employer will be held responsible for all non-site-specific requirements of the standard, including the non-site specific requirements of the exposure control plan, hepatitis B vaccinations, post exposure evaluation and follow-up, recordkeeping, and the generic training requirements. OSHA will also cite employers for failure to supply appropriate personal protective equipment to employees.

Physicians and healthcare professionals who have established an independent practice

In applying the provisions of the standard in situations involving physicians, the status of the physician is important. Physicians may be employers or employees. Physicians who are unincorporated sole proprietors or partners in a bona fide partnership are employers for purposes of the OSH Act and may be cited if they employ at least one employee (such as a technician or secretary). Such physician-employers may be cited if they create or control bloodborne pathogens hazards that expose employees at hospitals or other sites where they have staff privileges in accordance with the multi-employer worksite guidelines of CPL 2-0.124, Multi-Employer Citation Policy. Because physicians in these situations are not themselves employees, citations may not be based on the exposure of such physicians to the hazards of bloodborne diseases.

Physicians may be employed by a hospital or other healthcare facility or may be members of a professional corporation and conduct some of their activities at host employer sites where they have staff privileges. In general, professional corporations are the employers of their physician-members and must comply with the hepatitis B vaccination, post-exposure-evaluation and follow up, recordkeeping, and generic training provisions with respect to these physicians when they work at host employer sites. The host employer is not responsible for these provisions with respect to physicians with staff privileges, but in appropriate circumstances, may be cited under other provisions of the standard in accordance with the multi-employer worksite guidelines of CPL 2-0.124, Multi-Employer Citation Policy. The professional corporation may also be cited under other provisions of the standard for the exposure of its physicians and other workers at a host employer site in accordance with the multi-employer worksite guidelines of CPL 2-0.124, Multi-Employer Citation Policy.

Independent contractors

These are companies that provide a service, such as radiology or housekeeping, to host employers. They provide supervisory personnel, as well as rank-and-file workers, to carry out the service. These companies and the host employers are responsible for complying with all provisions of the standard in accordance with the multi-employer worksite guidelines of CPL 2-0.124, Multi-Employer Citation Policy.

Federal agency facilities

Agencies of the Federal Government are covered by this instruction.

OSHA COMPLIANCE MANUAL

Clarification of the standard on Occupational Exposure to Bloodborne Pathogens, 29 CFR 1910.1030

The guidance that follows relates to specific provisions of §1910.1030 and is provided to assist compliance officers in conducting inspections where the standard may be applicable:

Scope and application
§1910.1030(a)

This paragraph defines the range of employees covered by the standard.

1. Since there is no population that is risk free for HIV, HBV or other bloodborne disease infection, any employee who has occupational exposure to blood or other potentially infectious material will be included within the scope of this standard.
2. Although a list is included below of a number of job classifications that may be associated with tasks that have occupational exposure to blood and other potentially infectious materials, the scope of this standard is not limited to employees in these jobs. The hazard of exposure to infectious materials affects employees in many types of employment and is not restricted to the healthcare industry. At the same time, employees in the following jobs are not automatically covered unless they have the potential for occupational exposure:
    - Physicians, physician's assistants, nurses, nurse practitioners, and other healthcare employees in clinics and physicians' offices;
    - Employees of clinical and diagnostic laboratories;
    - Housekeepers in healthcare and other facilities;
    - Personnel in hospital laundries or commercial laundries that service healthcare or public safety institutions;
    - Tissue bank personnel;
    - Employees in blood banks and plasma centers who collect, transport, and test blood;
    - Freestanding clinic employees (e.g., hemodialysis clinics, urgent care clinics, health maintenance organization (HMO) clinics, and family planning clinics);
    - Employees in clinics in industrial, educational, and correctional facilities (e.g., those who collect blood, and clean and dress wounds);
    - Employees designated to provide emergency first aid;
    - Dentists, dental hygienists, dental assistants and dental laboratory technicians;
    - Staff of institutions for the developmentally disabled;
    - Hospice employees;
    - Home healthcare workers;
    - Staff of nursing homes and long-term care facilities;
    - Employees of funeral homes and mortuaries;
    - HIV and HBV research laboratory and production facility workers;
    - Employees handling regulated waste;
    - Custodial workers required to clean up contaminated sharps or spills of blood or OPIM; Medical equipment service and repair personnel;
    - Emergency medical technicians, paramedics, and other emergency medical service providers;

- Fire fighters, law enforcement personnel, and correctional officers (employees in the private sector, or the Federal Government, or a state or local government in a state that has an OSHA-approved state plan);
- Maintenance workers, such as plumbers in healthcare facilities and employees of substance abuse clinics.

3. **Inspection guidelines.** The scope paragraph of this standard states that it "applies to all occupational exposure to blood or other potentially infectious materials as defined by paragraph (b)." The compliance officer must take careful note of the definition of "occupational exposure" in paragraph (b) in determining if an employee is covered by this standard.

   a. Part-time, temporary, and healthcare workers known as "per diem" employees are covered by this standard.

   b. OSHA jurisdiction extends only to employees in the workplace. It does not extend to students if they are not also considered employees; to state, county, or municipal employees; to health care professionals who are sole practitioners or partners, or to the self-employed. However, the 26 OSHA-approved state plans must protect state and local government workers under an "at least as effective" state standard.

   c. If an employee is trained in first aid and identified by the employer as responsible for rendering medical assistance as part of his/her job duties, that employee is covered by the standard. See the citation policy for paragraph (f)(2) of the standard below regarding designated first aid providers, who administer first aid as a collateral duty to their routine work assignments. An employee who routinely provides first aid to fellow employees with the knowledge of the employer may also fall, de facto, under this designation even if the employer has not officially designated this employee as a first aid provider.

   d. Exposure to bloodborne pathogens in shipyard operations is covered under 29 CFR 1915.1030, which states that its requirements are identical to those in 29 CFR 1910.1030.

   e. **Other industries:** The bloodborne pathogens standard does not apply to the construction, agriculture, marine terminal and longshoring industries. OSHA has not, however, stated that these industries are free from the hazards of bloodborne pathogens. For industries not covered by the bloodborne pathogens standard, Section 5(a)(1) of the OSH Act provides that "each employer shall furnish to each of his employees employment and a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees." The General Duty Clause should not be used to cite for violations of the bloodborne pathogens rule, but may be used to cite for failure to provide a workplace free from exposure to bloodborne pathogens. Section 5(a)(1) citations must meet the requirements outlined in the FIRM, OSHA Instruction CPL 2.103, Chapter III. Failure to implement all or any part of 29 CFR 1910.1030 should not be, in itself, the basis for a citation. Accordingly, 29 CFR 1910.1030 should not be specifically referenced in a citation.

Definitions
§1910.1030(b)

The following provides further clarifications of some definitions found in this paragraph:

1. **Blood:** The term "human blood components" includes plasma, platelets, and serosanguineous fluids (e.g., exudates from wounds). Also included are medications derived from blood, such as immune globulins, albumin, and factors 8 and 9.

2. **Bloodborne pathogens:** While HBV and HIV are specifically identified in the standard, the term includes any pathogenic microorganism that is present in human blood or OPIM and can infect and cause disease in persons who are exposed to blood containing the pathogen. Pathogenic microorganisms can also cause diseases such as hepatitis C, malaria, syphilis, babesiosis, brucellosis, leptospirosis, arboviral infections, relapsing fever, Creutzfeldt-Jakob disease, adult T-cell leu-

kemia/lymphoma (caused by HTLV-I), HTLV-I associated myelopathy, diseases associated with HTLV-II, and viral hemorrhagic fever.

NOTE: According to the Centers for Disease Control and Prevention (CDC), hepatitis C virus (HCV) infection is the most common chronic bloodborne infection in the United States. **(**MMWR: Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease, October 16, 1998/Vol.47/No. RR-19.)

HCV is a viral infection of the liver that is transmitted primarily by exposure to blood. Currently there is no vaccine effective against HCV. See discussion of paragraph (f)(3) below.

3. **Exposure incident:** In this definition, "non-intact skin" includes skin with dermatitis, hangnails, cuts, abrasions, chafing, acne, etc.

4. **Engineering controls:** Controls that isolate or remove the bloodborne pathogens hazard from the workplace. Examples include safer medical devices, such as sharps with engineered sharp injury protection (SESIPs) and needleless systems. These two terms were further defined in the revision to 1910.1030 mandated by the Needlestick Safety and Prevention Act.

5. **Needleless systems:** A device that does not use needles for: (1) the collection of bodily fluids or withdrawal of body fluids after initial venous or arterial access is established; (2) the administration of medication or fluids; or (3) any other procedure involving the potential for occupational exposure to bloodborne pathogens due to percutaneous injuries from contaminated sharps.

   "Needleless systems" provide an alternative to needles for the specified procedures, thereby reducing the risk of percutaneous injury involving contaminated sharps. Examples of needleless systems include, but are not limited to, intravenous medication delivery systems that administer medication or fluids through a catheter port or connector site using a blunt cannula or other non-needle connection, and jet injection systems that deliver subcutaneous or intramuscular injections of liquid medication through the skin without use of a needle.

6. **Occupational exposure:** The term "reasonably anticipated contact" includes the potential for contact as well as actual contact with blood or OPIM. Lack of history of blood exposures among designated first aid personnel of a particular manufacturing site, for instance, does not preclude coverage. "Reasonably anticipated contact" includes, among others, contact with blood or OPIM (including regulated waste) as well as incidents of needlesticks. For example, a compliance officer may document incidents in which an employee observes a contaminated needle on a bed or contacts other regulated waste in order to substantiate "occupational exposure."

   NOTE: This definition does not cover "Good Samaritan" acts (i.e. voluntarily aiding someone in one's place of employment) that result in exposure to blood or other potentially infectious materials from voluntarily assisting a fellow employee, although OSHA encourages employers to offer follow-up procedures to these employees in such cases.

7. **Other potentially infectious materials (OPIM):** Coverage under this definition also extends to blood and tissues of experimental animals that are infected with HIV or HBV.

8. **Parenteral:** This definition includes human bites that break the skin, which are most likely to occur in violent situations such as may be encountered by prison and law enforcement personnel and in emergency rooms or psychiatric wards.

9. **Sharps with engineered sharps injury protections (SESIPs):** "A nonneedle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident." This term encompasses a broad array of devices that make injury involving a contaminated sharp less likely.

   They include, but are not limited to: syringes with guards or sliding sheaths that shield the attached needle after use; needles that retract into a syringe after use; shielded or retracting catheters used to access the bloodstream for intravenous administration of medication or fluids; intravenous medication delivery systems that administer medication or fluids through a catheter port or connector site using a needle that is housed in a protective covering, blunt suture needles; and plastic (instead of glass) capillary tubes.

OSHA COMPLIANCE MANUAL

Exposure control plan
§1910.1030(c)

This paragraph requires the employer to identify those tasks and procedures in which occupational exposure may occur and to identify the positions whose duties include those tasks and procedures identified as having occupational exposure. The exposure control plan required by paragraph (c)(1) is a key provision of the standard because it requires the employer to identify the individuals who will receive the training, protective equipment, vaccination, and other protections of the standard.

1. **Inspection and citation guidelines.** The Compliance Officer should review the facility's written exposure control plan. While the plan may be part of a larger document, such as one addressing all health and safety hazards in the workplace, in order for the plan to be accessible to employees, it must be a cohesive entity by itself or there must be a guiding document which states the overall policy goals and references the elements of existing separate policies that comprise the plan.

   The Compliance Officer should determine whether the plan is reviewed annually and updated to reflect significant modifications in tasks or procedures which may result in occupational exposure as required in paragraph (c)(1)(iv).

   The location of the plan may be adapted to the circumstances of a particular workplace, provided that the employee can access a copy at the workplace, during the workshift (e.g., if the plan is maintained solely on computer, employees must be trained to operate the computer). In accordance with 29 CFR 1910.1020, a hard copy of the exposure control plan must be made available to the employee within 15 working days of the employee's request.

   If a facility is lacking an exposure control plan and the other requirements of the standard have not been implemented, the other relevant paragraphs of the standard should be cited in addition to paragraph (c). These should normally be classified as serious violations.

2. **Paragraphs (c)(1)(ii)(A) and (c)(2)(i).** The exposure determination requires employers to identify and document:

   a. Those job classifications in which all employees have occupational exposure, and/or

   b. Those job classifications in which some employees have occupational exposure.

      1) In the latter case, the specific tasks and procedures, or groups of closely related tasks and procedures, which are associated with occupational exposure must be delineated. For example, only some of the employees in a hospital laundry room might be assigned the task of handling contaminated laundry.

      2) The tasks and procedures that are grouped must be related; i.e., they must share a common activity such as "vascular access procedures," "handling of contaminated sharps," or "handling of deceased persons," etc.

      NOTE: If a job classification, task, or procedure involving occupational exposure is omitted from the list, but all employees in the job or performing the task or procedure have been included in all other aspects of the plan (e.g., vaccinations, training, etc.), it is to be considered an other-than-serious violation.

   c. The exposure determination must have been made without taking into consideration the use of personal protective clothing or equipment.

3. **Paragraph (c)(1)(ii)(B).** While the primary purpose of the exposure control plan is to identify those employees who have occupational exposure and to commit the employer to a timetable for implementation of the standard's requirements, paragraphs (d)-(h) of the standard must also be addressed in a manner appropriate to the circumstances of the particular workplace. An annotated copy of the final standard may be adequate for small facilities. Larger facilities could develop a broad facility-wide program incorporating provisions from the standard that apply to their establishments.

4. **Paragraph (c)(1)(ii)(C).** The exposure control plan must include the procedure for evaluating the circumstances surrounding exposure incidents, in accordance with paragraph (f)(3)(i).

   Citation guidelines: If the employer failed to include procedures for the documentation of exposure incidents in the exposure control plan, a citation for paragraph (c)(1)(ii)(C), should be issued. If procedures are included in the plan but not implemented, then paragraph (f)(3)(i) should be cited.

5. **Paragraph (c)(1)(iv)** requires the employer to review and update the exposure control plan at least annually (every 12 months) and whenever necessary to reflect new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure. As stated in the preamble to the standard, the review and update must reflect innovations in procedure and technological developments that eliminate or reduce exposure to bloodborne pathogens. [56 Fed. Reg. 64109-10 (1991).] This includes, but is not limited to, newly available medical devices designed to reduce the risk of percutaneous exposure to bloodborne pathogens.

   A periodic review ensures that the exposure control plan remains current with the latest information and scientific knowledge pertaining to bloodborne pathogens. A review of the sharps log required in paragraph (h)(5) can identify problem areas and/or ineffective devices which may need replacement. The exposure control plan must document consideration and implementation of appropriate commercially available and effective engineering controls designed to eliminate or minimize exposure. The Exposure Control Plan must also include the procedure for evaluation of circumstances surrounding exposure incidents. See discussion of paragraph (f)(3)(i).

   NOTE: While the exact number of injuries sustained annually in the United States is unknown, current estimates vary between 590,000 and 800,000 injuries annually. The implementation of effective engineering controls can reduce needlesticks and other sharps injuries. Effective engineering controls include safer medical devices used to prevent percutaneous injuries before, during, or after use through safer design features. When the Final Rule was published in December 1991, the variety of engineering controls was limited although some were available. At that time adequate data and information on effective engineering controls and their effectiveness were not available.

   The preamble to the Final Rule in 1991 stated that "with regard to percutaneous incidents, such as needlestick injuries, evidence indicated that most injuries were preventable . . . 75 percent of all exposure incidents are caused by disposable syringes . . . and could be prevented by using syringes which incorporate resheathing or retracting designs." [56 Fed. Reg./64057(1991)] Since publication of the standard, there has been a substantial increase in the number and assortment of effective engineering controls available to employers. There is now a large body of research and data available to OSHA and to the public concerning the effectiveness of these engineering controls.

   Citation guidelines: The employer must review and update the plan, as necessary, to reflect changes in technology, such as the use of effective engineering controls, that can eliminate or minimize exposures. If the employer did not review and update its exposure control plan at least annually, paragraph (c)(1)(iv) should be cited. See Appendix D for a Sample Exposure Control Program.

6. **Paragraph (c)(1)(v)** requires the employer to solicit input from non-managerial employees responsible for direct patient care in the identification, selection and evaluation of effective engineering and work practice controls and document the solicitation in the Exposure Control Plan. The employer must solicit employee input in a manner appropriate to the circumstances in the workplace. Methods for soliciting employee input may include joint labor-management safety committees; involvement in informal problem-solving groups; participation in safety meetings and audits, employee surveys, worksite inspections, or exposure incident investigations; using a suggestion box or other effective methods for obtaining written employee comments; and participation in the evaluation of devices through pilot testing.

   The opportunities for employee input shall be effectively communicated to employees. Input from employees covered by a collective bargaining agreement may also be requested through their bargaining agent. Employers are not required to request input from each and every exposed employee; however, the employees selected must represent the range of exposure situations encountered in the workplace (e.g., emergency department, pediatrics, nuclear medicine). The employer must document the process by which the input was requested and identify the employees or the positions of those employees who were involved.

Inspection guidelines: Compliance Officers should determine how the devices used in the facility were selected and review the employers' documentation of their employees' input. Many departments require different features in a safer device and have different concerns for both employee and patient safety. Employees in various departments and situations should be interviewed to determine the extent to which the employer solicited employee input. The fact that some employees have not provided input does not automatically mean the employer has not solicited input, but should prompt the compliance officer to thoroughly investigate whether input was solicited.

Citation guidelines: This section should only be cited if input was not solicited from non-managerial employees involved in administering treatment or performing any procedure in the presence of an individual receiving care. Any employee who, for example, collects blood from patients in a nursing home; administers flu vaccinations in a factory employee health unit, or collects blood from other employees for research purposes would be performing "patient care." Laboratory workers, on the other hand, who do not have patient contact, would not be included in this provision.

Methods of compliance
§1910.1030(d)

Paragraph (d) sets forth the method by which employers must protect their employees from the hazards of bloodborne pathogens and comply with this standard through the use of universal precautions, engineering controls, work practice controls, personal protective equipment, proper housekeeping and handling of regulated waste.

1. **Universal precautions — Paragraph (d)(1).** Universal precautions are OSHA's required methods of control to protect employees from exposure to all human blood and OPIM. The term "universal precautions" refers to a concept of bloodborne disease control which requires that all human blood and OPIM be treated as if known to be infectious for HIV, HBV, HCV or other bloodborne pathogens, regardless of the perceived "low risk" status of a patient or patient population.

   Alternative concepts in infection control are called Body Substance Isolation (BSI) and Standard Precautions. These methods define all body fluids and substances as infectious. These methods incorporate not only the fluids and materials covered by this standard but expands coverage to include all body fluids and substances.

   These concepts are acceptable alternatives to universal precautions, provided that facilities utilizing them adhere to all other provisions of this standard.

   Citation guidelines: If the employer has a policy of treating the blood or OPIM of some patients as potentially infectious and the blood or OPIM of others (e.g., the elderly or children) as not infectious, a violation of this provision exists.

2. **Engineering controls and work practices — Paragraph (d)(2)(i).** This paragraph requires the employer to institute engineering and work practice controls as the primary means of eliminating or minimizing employee exposure. It conforms to OSHA's traditional adherence to a hierarchy of controls [See 56 Fed. Reg. 64114-15 (1991)]. OSHA has always required employers to use engineering and work practice controls. Thus the employer must use engineering and work practice controls that eliminate occupational exposure or reduce it to the lowest feasible extent. Preventing exposures requires a comprehensive program, including the use of engineering controls (e.g., needleless devices, shielded needle devices, and plastic capillary tubes) and proper work practices (e.g., no-hands procedures in handling contaminated sharps, eliminating hand-to-hand instrument passing in the operating room). Paragraph 1910.1030(b) provides definitions of engineering controls, safer medical devices, needleless systems, and sharps with engineered sharps injury protection. If engineering and work practice controls do not eliminate exposure, the use of personal protective equipment (e.g., eye protection) is required. The use of sharps containers is not an acceptable means of complying with (d)(2)(i). The specific provisions of (d)(4)(iii)(A) covers sharps containers and thus preempts this section, pursuant to 29 CFR 1905 (specific standard preempts general standard).

NOTE: Needles that will not become contaminated by blood during use (such as those used only to draw medication from vials) are not required to have engineering controls under this standard. The needle used for the actual injection, however, must incorporate engineering controls.

The employer must also make changes to its Exposure Control Plan to include the selection and use of these engineering controls. [See discussion of paragraph (c)(1)(iv) above.] Safer medical devices are generally of two types: needleless systems (e.g., needleless IV connectors) and sharps with engineered sharps injury protection (e.g., self-sheathing needles on syringes). Substitution methods such as the use of plastic (instead of glass) capillary tubes are also available. Paragraph (c)(1)(v) requires employers to involve employees in the selection of effective engineering controls to improve employee acceptance of the newer devices and to improve the quality of the selection process.

Where engineering controls will reduce employee exposure either by removing, eliminating or isolating the hazard, they must be used. Significant improvements in technology are most evident in the growing market of safer medical devices that minimize, control or prevent exposure incidents.

Ideally, the most effective way of removing the hazard of a contaminated needle is to eliminate the needle completely by converting to needleless systems. When this is not possible, removal of the hazard as soon as possible after contamination is required. This is best accomplished by using a sharp with engineered sharps injury protection, which shields the sharp from exposure as soon as it is withdrawn from the patient.

No one medical device is appropriate in all circumstances of use. Employers must implement the safer medical devices that are appropriate, commercially available, and effective.

The FDA is responsible for clearing medical devices for marketing, although this “clearance” alone is not enough to guarantee the device will be effective in the workplace. The employer must rely on further evidence to ensure its effectiveness in the situations it will be used. There are specific design features for recessed needle systems that the Food and Drug Administration (FDA Safety Alert, April 16, 1992 and Draft Supplementary Guidance on the Content of Premarket Notification 510(K) Submissions for Medical Devices with Sharps Injury Prevention Features, March 1995) has published and agrees are important in preventing percutaneous injury. These design features have the following characteristics:

a. A fixed safety feature provides a barrier between the hands and the needle after use; the safety feature should allow or require the worker’s hands to remain behind the needle at all times;

b. The safety feature is an integral part of the device and not an accessory;

c. The safety feature is in effect before disassembly and remains in effect after disposal to protect users and trash handlers, and for environmental safety;

d. The safety feature is as simple as possible, and requiring little or no training to use effectively.

Inspection guidelines: The Compliance Officer should determine through interviews or observation of work involving exposure to blood or OPIM whether sufficient engineering controls and work practices are used. While it is generally accepted that an exposure incident can occur at any time or place, a review of the facility records can better direct the Compliance Officer to areas that are more likely to be sites of exposure incidents. Data from The Uniform Needlestick and Sharp Object Injury Report, 77 Hospitals, 1993-1995 (Exposure Prevention Information Network EPINet at http://www.med.virginia.edu/~epinet/soio.html) show that injuries occurred, in order of frequency, in patient rooms, operating rooms, emergency departments, and intensive/critical care units. The report indicates that nurses (RN’s and LPN’s) were injured more often than any other type of healthcare worker.

Furthermore, the report finds that an overwhelming majority (93%) of the injuries were caused by items that were not a “safe design with a shielded, recessed, or retractable needle.” The Compliance Officer should determine if there were occasions where injuries were incurred during the

same procedure, using the same equipment, in the same location or among similar employees (e.g., housekeepers), and determine whether effective engineering or work practices have been or can be implemented to prevent or minimize future injuries. The Compliance Officer should investigate whether the employer has instituted alternative engineering controls and work practices to eliminate or minimize employee exposure in areas where exposure incidents have been documented.

Citation guidelines: Paragraph (d)(2)(i) should be cited for failure to use engineering/work practice controls as discussed above. The lack of recorded injuries on the sharps injury log or OSHA 200 (through the end of 2001) or OSHA 300 (effective January 1, 2002) does not exempt the employer from this provision. The Compliance Officer should carefully evaluate the exposure control measures, such as effective engineering controls, that are in use at the facility. Part of this evaluation should include whether other devices that are commercially available were reviewed or considered by the employer and whether there is evidence that other engineering controls would reduce exposures. Such evidence might include CDC studies of efficacy, pilot tests by the employer, or data available in published studies.

The Record Summary indicated that over 87% of the respondents who provided information on device usage were already using needleless or shielded needle IV line access in 1998. Other popular devices include blunt suture needles, safer syringes, and safer phlebotomy devices. This is not an exhaustive list of effective engineering controls that are available. Appendix B provides some examples of forms an employer might use for evaluation of engineering controls.

Compliance with this paragraph should take into consideration that the availability or use of an engineering control is not enough to guarantee that an employee cannot be injured. Employee acceptance and employee training are necessary for an engineering control to be effective. The Compliance Officer should evaluate the training in accordance with paragraph (g)(2)(vii). A citation for the appropriate paragraph of (g)(2)(vii) should be grouped with paragraph (d)(2)(i), if the Compliance Officer determines that inadequate training caused the failure to use such controls.

Citations for paragraph (d)(2)(i) should be issued when these criteria are met:

- If no engineering controls are being used to eliminate or minimize exposure, a citation should be issued.
- If a combination of engineering and work practice controls used by the employer does not eliminate or minimize exposure, the employer shall be cited for failing to use engineering and work practice controls.
- When the compliance officer finds that an employer is using an engineering control, but believes another device would be clearly more effective than the one in use, the compliance officer should document how the device was being used and how it was selected. The compliance officer should consult with the Regional Bloodborne Pathogens Coordinator to determine if a violation of (d)(2)(i) exists.

The citation should state that the employer failed to use engineering controls or work practices that would “eliminate or minimize exposures” and identify particular engineering controls, such as self-sheathing needles, and particular work practice controls, such as no-hand procedures in handling contaminated sharps, which should have been used. After each particular control mentioned in the citation, the words “among other controls” should be added unless it is clear that there are no other controls.

Paragraph (d)(2)(i) should not be cited where another provision of the standard mandates a specific engineering or work practice control (e.g., paragraph (d)(4)(iii)(A) for sharps containers and paragraph (d)(2)(vii) for the prohibition of recapping).

3. **Paragraph (d)(2)(ii).** This paragraph requires that engineering controls be examined and maintained or replaced on a regular schedule to ensure their effectiveness. Regularly scheduled inspections are required to confirm, for instance, that engineering controls such as safer devices

continue to function effectively, that protective shields have not been removed or broken, and that physical, mechanical or replacement-dependent controls are functioning as intended.

Citation guidelines: It is the employer's responsibility to regularly examine and repair and/or replace engineering controls as often as necessary to ensure that each control is maintained and that it provides the protection intended. If the Compliance Officer finds that there is no system for regular checking of the engineering controls or that regular checking is not done, paragraph (d)(2)(ii) should be cited.

4. **Paragraphs (d)(2)(iii) through (d)(2)(vi).** These paragraphs require employers to provide handwashing facilities which are readily accessible to employees. Handwashing with soap and at least tepid running water must be performed as soon as feasible, particularly in cases of gross contamination, to adequately flush contaminated material from the skin.

   a. **Paragraph (d)(2)(iv).** This paragraph allows the use of alternative handwashing methods as an interim measure when soap and water are not a feasible means of washing the hands or other parts of the body. In such cases, the employer must provide either antiseptic hand cleaner and clean cloth/paper towels, or antiseptic towelettes.

      When these types of alternatives are used, employees must wash their hands (or other affected area) with soap and running water as soon as feasible thereafter.

      The Compliance Officer may see these types of alternative washing methods used by ambulance-based paramedics and emergency medical technicians (EMT's), fire fighters, police, and mobile blood collection personnel who are exposed to blood or OPIM but have no means of washing up with running water at the site of the exposure (e.g., a crime scene, traffic accident, fire).

   b. **Paragraph (d)(2)(v).** This paragraph requires employers to ensure that employees wash their hands immediately or as soon as feasible after removal of gloves or other PPE. There is no requirement for handwashing upon leaving the work area unless contact with blood or OPIM has occurred or gloves/PPE have been removed.

      Citation guidelines: If the compliance officer finds that required handwashing facilities are not being provided, paragraph (d)(2)(iii) should be cited unless the employer demonstrates that handwashing facilities are not feasible. If infeasibility is demonstrated, paragraph (d)(2)(iv) should be cited when the required alternatives are not used. If handwashing is not performed by the employees immediately or as soon as feasible after exposures or removal of gloves, paragraphs (d)(2)(iv), (v), or (vi) should be cited. A citation for one or more of these paragraphs may be grouped with the pertinent training paragraphs of (g)(2) if employees have not been adequately trained in handwashing procedures.

      At a fixed establishment, if handwashing facilities are not readily accessible, i.e., within a reasonable distance from the area where the employee is exposed, (d)(2)(iii) should be cited. For example, if an employee must leave the work area and thread his/her way through doorways and/or stairs to wash, there is a reasonable chance of resultant environmental surface contamination. This situation is a violation.

5. **Paragraph (d)(2)(vii).** Shearing or breaking of contaminated sharps is completely prohibited by this paragraph. Bending, recapping, or removing contaminated needles is prohibited as a general practice. The practice of removing the needle from a used blood-drawing/phlebotomy device is rarely, if ever, required by a medical procedure. Because such devices involve the use of a double-ended needle, such removal clearly exposes employees to additional risk. Devices with needles must be used and immediately discarded after use, un-recapped, into accessible sharps containers. Certain circumstances may exist, however, in which recapping, bending, or removing needles is necessary (e.g., administering incremental doses of a medication such as an anesthetic to the same patient).

a. In these procedures, if the employer can demonstrate that such action is required by a specific medical procedure, or that no alternative is feasible, recapping must be performed by some method other than the traditional two-handed procedure, e.g., by means of a mechanical device or forceps.

b. The use of the properly performed one-hand scoop method (in which the hand holding the sharp is used to scoop up the cap from a flat surface) for recapping is a recognized and acceptable method; however, the scoop method must be performed in a safe manner and must also be limited to situations in which recapping is necessary.

c. If the employer claims that no alternative to bending, recapping, or removing contaminated needles is feasible or that such action is required by a specific medical procedure, the compliance officer should review the exposure control plan for a written justification supported by reliable evidence. This justification must state the basis for the employer's determination that no alternative is feasible or must specify that a particular medical procedure requires, for example, the bending of the needle and the use of forceps to accomplish this.

6. **Paragraph (d)(2)(viii).** Since reusable sharps, such as large bore needles, scalpels, and saws, pose the same percutaneous exposure hazard as disposable sharps, they must be contained in a manner that eliminates or minimizes the hazard until they are reprocessed. Therefore, the containers for reusable sharps must meet the same requirements as containers for disposable sharps, with the exception that they are not required to be closable since it is anticipated that containers used for collecting and holding reusable sharps will, themselves, be reused.

7. **Paragraphs (d)(2)(ix) and (x).** These paragraphs are intended primarily to eliminate or minimize indirect transmission of bloodborne pathogens from contaminated environmental surfaces.

   Hand cream is not considered a "cosmetic" and is permitted. It should be noted that some petroleum-based hand creams can adversely affect glove integrity, and the hand washing requirements of paragraph (d)(2)(v) and (d)(2)(vi) must be followed.

   NOTE: The term "work area" means the area where work involving exposure or potential exposure to blood or OPIM exists, along with the potential contamination of surfaces. Employees are permitted to eat and drink in an ambulance cab, for example, as long as the employer has implemented procedures to permit employees to wash up and change contaminated clothing prior to entering the ambulance cab, and to ensure that patients and contaminated material remain behind the separating partition.

   Inspection guidelines: In addition to direct contamination of food or drink by blood or OPIM, the Compliance Officer must keep in mind that containers of food and beverage may also become contaminated, resulting in unsuspected contamination of the hands. The purpose of this paragraph is to prevent food and drink from being contaminated by the leakage/spilling of specimen containers, contact with contaminated items, or the performance of activities (e.g., laboratory analysis) that could generate splashes, sprays, or droplets of blood or OPIM.

   Citation guidelines: Deficiencies of paragraphs (d)(2)(iv) through (x) should be cited in conjunction with the appropriate paragraph of (g)(2) if inadequate training exists.

8. **Paragraph (d)(2)(xi).** The intent of this paragraph is not only to decrease the chances of direct employee exposure through spraying or splashing of infectious materials onto employees, but also to reduce contamination of surfaces in the general work area.

   Surgical power tools, lasers, and electrocautery devices may generate aerosols as well as be a source for splashing and spattering. Some of these devices include labeling recommendations such as local exhaust ventilation. The employer is responsible for appropriate operation of these devices, including controls recommended by the manufacturer.

   Typically, reasonably anticipated spattering or generation of droplets would necessitate use of eye protection and mask or a face shield to prevent contamination of the mucous membranes of the eyes, nose, and mouth.

Citation guidelines: The use of sprays, brushes, and high pressure in equipment lines is particularly hazardous. A citation should normally be issued for paragraph (d)(2)(xi) if cleaning procedures cause unnecessary splashing, spraying, spattering, or generation of droplets of blood or OPIM.

9. **Paragraph (d)(2)(xii).** While this paragraph prohibits mouth pipetting/suctioning, the agency allows a recognized emergency care method of clearing an infant's airways called "DeLee suctioning" in the following situation: in an emergency; when no other method is available, and a trap which prevents suctioned fluid from reaching the employee's mouth is inserted in-line between the infant and the employee.

10. **Paragraphs (d)(2)(xiii)-(d)(2)(xiii)(C).** These paragraphs deal with the containerization and labeling of specimens with the intent to eliminate or minimize the possibility of inadvertent employee contact with blood or OPIM which have leaked out of the container, contaminated exterior surfaces of the container, and/or surrounding surfaces. The labeling requirement warns employees that these substances are present so that proper handling precautions can be taken.

    The labeling exemption listed in paragraph (d)(2)(xiii)(A) applies to facilities which handle all specimens (not just those specimens which contain blood or OPIM) with universal precautions. This exemption applies only while these specimens remain within the facility. All employees who will have contact with the specimens must be trained to handle all specimens with universal precautions. If the specimens leave the facility (e.g., during transport, shipment, or disposal) a label or red color-coding is required.

    Extracted teeth which are being discarded or used as specimens are subject to the containerization and labeling provisions of the standard. However, OSHA does not issue citations to dentists and doctors for non-employee exposures. Extracted teeth, gall stones and kidney stones may be given to the patients. In these situations, the teeth and stones are not subject to the containerization and labeling provisions of the standard.

    The use of pneumatic tube systems for transport of small materials in hospitals now includes transmittal of laboratory specimens and other more fragile items. The primary concern in the transportation of clinical specimens in a pneumatic tube system is leakage of the specimen into the carrier and potentially into the system tubing. Some systems have virtually eliminated breakage as a cause of leakage by means of padded inserts for carriers and soft delivery of the carrier. Leakage generally results from improper packaging and/or the use of primary containers that do not prevent leakage during transport.

    All employees who might potentially open a carrier must be trained to regard the contents as biohazardous in nature. Employees who open biohazard carriers must wear gloves in accordance with paragraph (d)(3) when removing specimens from the tube system carrier, because it may be contaminated with leakage. They must be trained in decontamination of the carrier and, if need be, the tube system in accordance with paragraph (g)(2).

    All precautions and standards for manual transport of specimens also apply to the automated transport of specimens (e.g., containerization and tagging/labeling).

    Inspection guidelines: The Compliance Officer must observe or document work practices to determine whether a secondary container is being used when necessary. If a bloody glove contaminates the outside of a primary container while the employee is placing a specimen, the employee would need to use a secondary container. Also, primary containers which may be punctured by their contents, including such items as pointed bone slivers, must be placed in a puncture-resistant secondary container.

11. **Paragraph (d)(2)(xiv).** When it is not possible to decontaminate equipment prior to servicing or shipping (e.g., highly technical or sensitive equipment and/or limited access to contaminated parts), at least partial decontamination, such as flushing lines and wiping the exterior, must be accomplished.

Inspection and citation guidelines: The Compliance Officer should ensure that the employer's program makes provision for the required equipment labels. A label must be attached to equipment stating which portions of the equipment remain contaminated in order to inform downstream servicing/repair employees of the hazard and precautions they need to take.

Before citing paragraph (d)(2)(xiv), the Compliance Officer should document that equipment is being shipped and/or serviced. Compliance Officers should observe or document work practices used when employees are decontaminating equipment. When decontaminating reusable equipment that is heavily soiled, the employee will have to perform some prewashing before proceeding with decontamination because most disinfectants/sterilants cannot sufficiently penetrate the organic material that may remain on such heavily soiled equipment.

12. **Personal protective equipment — Paragraph (d)(3).** When there is occupational exposure, PPE must be provided at no cost to the employee to prevent blood or OPIM from passing through to, or contacting, the employees' work or street clothes, undergarments, skin, eyes, mouth, or other mucous membranes.

13. **Paragraph (d)(3)(i).** The type and amount of PPE must be chosen to protect against contact with blood or OPIM based upon the type of exposure and quantity of these substances reasonably anticipated to be encountered during the performance of a task or procedure.

    Inspection and citation guidelines: The financial responsibility for purchasing and providing PPE rests with the employer. The employer is not obligated under this standard to provide general work clothes to employees, but is responsible for providing PPE. If laboratory coats or uniforms are intended to protect the employee's body from contamination, they are to be provided by the employer at no cost to the employee.

    Laboratory coats, uniforms and the like that are used as PPE must be laundered by the employer and not sent home with the employee for cleaning.

    Scrubs are usually worn in a manner similar to street clothing, and normally should be covered by appropriate gowns, aprons or laboratory coats when splashes to skin or clothes are reasonably anticipated.

    If a pullover scrub (as opposed to scrubs with snap closures) becomes minimally contaminated, employees should be trained in accordance with paragraph (g)(2)(vii)(G) to remove the pullover scrub in such a way as to avoid contact with the outer surface, e.g., rolling up the garment as it is pulled toward the head for removal.

    However, if the amount of blood exposure is such that the blood penetrates the scrub and contaminates the inner surface, not only is it impossible to remove the scrub without exposure to blood, but the penetration itself would constitute skin exposure. Even though wearing scrubs for protection against exposures of this magnitude is inappropriate, it may also be prudent to train employees on the proper methods to remove grossly contaminated scrubs and prevent exposure to the face.

    A gown which is frequently ripped or falls apart under normal use would not be considered "appropriate PPE."

    Resuscitator devices are to be readily available and accessible to employees who can reasonably be expected to perform resuscitation procedures. Emergency ventilation devices also fall under the scope of PPE and hence must be provided by the employer for use in resuscitation (e.g., masks, mouthpieces, resuscitation bags, shields/overlay barriers). Improper use of these devices should be cited as a violation of paragraph (d)(3)(ii). In addition, paragraph (g)(2)(vii)(G), which requires employees to be trained in the types, proper use, location, etc., of the PPE should be cited if inadequate training exists. Improper use includes failure to follow the manufacturer's instructions and/or accepted medical practice.

NOTE: The American Society for Testing and Materials (ASTM) has several complete testing and evaluation methods which can be used for assessing the resistance of materials used for PPE for medical use. (ASTM-F1819-98, ASTM-F-1671-97b, and ASTM-F1670-97).

14. **Paragraph (d)(3)(ii).** This paragraph requires the use of PPE. It also provides for a limited exemption from the use of PPE, based on situations in which use of PPE would prevent the proper delivery of healthcare or public safety services, or would pose an increased hazard to the personal safety of the worker or coworker. The following represent examples of when such a situation could occur:

    a. A sudden change in patient status occurs such as when an apparently stable patient unexpectedly begins to hemorrhage profusely, putting the patient's life in immediate jeopardy;

    b. A fire fighter rescues an individual who is not breathing from a burning building and discovers that his/her resuscitation equipment is lost/damaged and he/she must administer CPR;

    c. A bleeding suspect unexpectedly attacks a police officer with a knife, threatening the safety of the officer and/or coworkers.

    NOTE: An employee's decision not to use PPE is to be made on a case-by-case basis and must have been prompted by legitimate and truly extenuating circumstances. In such cases, no citation should be issued when the employee temporarily and briefly abandons use of PPE. This does not relieve the employer of the responsibility to ensure that PPE is readily accessible at all times. The employer must investigate and document why PPE was not used in each case and evaluate the circumstances surrounding the incident to reduce the likelihood of a future (unprotected) incident.

    Citation guidelines: Paragraph (d)(3)(ii) should be cited if PPE is not being used properly. Improper use would include wearing the wrong PPE (e.g., wearing a laboratory coat when a rubber apron is needed) or wearing the wrong size glove.

    In addition, paragraph (g)(2)(vii)(G) should also be cited if the employees have not been adequately trained.

    Unless all elements of the exemption, including the documentation requirement, are met, the employer should not receive the benefit of this exemption and paragraph (d)(3)(ii) should be cited.

15. **Paragraph (d)(3)(iii)**. This paragraph requires that the employer provide PPE in appropriate sizes and accessible locations. In addition, "hypoallergenic" gloves (see Note below), glove liners, powderless gloves, or other similar alternatives must be readily available and accessible at no cost to those employees who are allergic to the gloves normally provided. Similar alternatives must supply appropriate barrier protection and must be approved by the FDA for use as a medical glove. The compliance officer should review the employer's program and, through employee interviews and inspection of places where PPE is kept, ensure that these provisions have been met.

    NOTE: In accordance with a notice published in the Federal Register, Volume 62, No. 189, effective September 30, 1998, the FDA now requires labeling statements for medical devices which contain natural rubber and prohibits the use of the word "hypoallergenic" to describe such products. Additional information on the incidence of hypersensitivity reactions to natural rubber latex can be found in the following documents: NIOSH Alert, Preventing Allergic Reactions to Natural Rubber Latex in the Workplace (Publication No. 97-135) published in June 1997; Directorate of Technical Support, Technical Information Bulletin: Potential for Allergy to Natural Rubber Latex Gloves and other Natural Rubber Products, http://www.osha.gov/dts/tib/tib_data/tib19990412.html.

    Citation guidelines: If PPE is not provided at no cost to the employee, the Compliance Officer should cite paragraph (d)(3)(i). If PPE is not being used properly or the wrong PPE is used (e.g., wearing a laboratory coat when a rubber apron is needed) or wearing the wrong size PPE, paragraph (d)(3)(ii) should be cited. If PPE is not available in appropriate sizes or readily accessible, the Compliance Officer should cite paragraph (d)(3)(iii). For example, the clothing of paramedics out on an emergency call may become blood soaked. If they are unable to change before the next emergency call because a second set of clothing is located at the ambulance's home base, and the ambulance does not return to base for prolonged periods, a violation of paragraph (d)(3)(iii) would exist.

If it is common practice that PPE is not utilized during certain situations or procedures where exposure to blood or OPIM is anticipated, then a violation of paragraph (d)(3)(ii) would exist. If inaccessibility of PPE exists, paragraph (d)(3)(iii) should also be cited.

16. **Paragraph (d)(3)(iv).** It is the employer's responsibility not only to provide PPE, but to clean, maintain, and/or dispose of it. Home laundering is not permitted since the employer cannot guarantee that proper handling or laundering procedures are being followed.

    While many employees have traditionally provided and laundered their own uniforms or laboratory coats or the like, if the item's intended function is to act as PPE, then it is the employer's responsibility to provide, clean, repair, replace, and/or dispose of it.

    Home laundering by employees is not permitted since the standard requires that the laundering be performed by the employer at no cost to the employee. Home laundering is unacceptable because the employer cannot ensure that proper handling or laundering procedures are being followed and because contamination could migrate to the homes of employees.

    If the employee wishes to choose, wear, and maintain his/her own uniform or laboratory coat, then he/she would need to don additional employer-handled and employer-controlled PPE when performing tasks where it is reasonable to anticipate exposure to blood or OPIM.

    Citation guidelines: If PPE is not cleaned, laundered, and disposed of by the employer, or if the employer cleans the PPE but there is a charge to the employee, then paragraph (d)(3)(iv) should be cited. If PPE is not repaired and/or replaced by the employer at no cost to the employee, then paragraph (d)(3)(v) should be cited.

    If a garment is not removed as soon as possible when penetrated by blood or OPIM, the Compliance Officer should cite paragraph (d)(3)(vi).

    If the PPE is not changed, and additional PPE was available, paragraph (g)(2)(vii)(G) may also be cited if employees have not been adequately trained.

17. **Paragraph (d)(3)(vii).** To minimize migration of contamination beyond the work area, employees must remove any contaminated clothing before leaving a work area (i.e. before they may enter designated lunchrooms or break rooms). Failure to wash up would be cited under (d)(2)(iv), (v) or (vi).

    Inspection and citation guidelines: While "work areas" must be determined on a case-by-case basis, a work area is generally considered to be an area where work involving occupational exposure occurs or where the contamination of surfaces may occur. The standard would not require employees to change PPE when traveling, for example, from one hospital laboratory area to another, provided the connecting hallway is also considered to be a work area. The Compliance Officer should evaluate on a case-by-case basis whether the employee received adequate training in accordance with paragraph (g)(2)(vii)(F) to ensure that no surface contamination occurs during the employee's movement. A violation would exist for the following:

    An employee wearing contaminated gloves exits from a pathology laboratory to use a public telephone located in a public hallway of the hospital. Under such circumstances, it can be reasonably anticipated that another employee, without benefit of gloves or knowledge of the potential surface contamination, could use the phone and unwittingly become contaminated.

18. **Paragraph (d)(3)(ix)(A)-(C).** These paragraphs discuss the use of gloves. Gloves of appropriate sizes must be made available in accordance with paragraph (d)(3)(iii). Studies have shown that gloves provide a barrier, but that neither vinyl nor latex procedure gloves are completely impermeable. Thus, hand washing after glove removal is required. Disposable gloves must be replaced as soon as practical or as soon as feasible when contaminated.

    While disposable gloves must be replaced as soon as practical when contaminated, obviously some critical procedures (i.e., surgery, delivery) cannot be interrupted to change gloves. The key words to evaluate are "practical" and "feasible."

Disinfecting agents may cause deterioration of the glove material; washing with surfactants could result in "wicking" or enhanced penetration of liquids into the glove via undetected pores, thereby transporting blood or other potentially infectious materials into contact with the hand. For this reason, disposable (single use) gloves may not be washed and reused.

The Compliance Officer should note that certain solutions, such as iodine, may cause discoloration of gloves without affecting their integrity and function.

At a minimum, gloves must be used where there is reasonable anticipation of employee hand contact with blood, OPIM, mucous membranes, or non-intact skin; when performing vascular access procedures; or when handling or touching contaminated surfaces or items.

Gloves are usually not necessary when administering intramuscular or subcutaneous injections as long as bleeding that could result in hand contact with blood or OPIM is not anticipated.

Plastic film food handling gloves ("cafeteria" or "baggie" gloves) are not considered to be appropriate for use in exposure-related tasks. They would not fit the employee as required by paragraph (d)(3)(iii) of the standard.

19. **Paragraph (d)(3)(ix)(D).** The exemption regarding the use of gloves during phlebotomy procedures applies only to employees of volunteer donor blood collection centers, and does not apply to phlebotomy conducted in other settings such as plasmapheresis centers or hospitals.

    Inspection guidelines: Where an employer in a volunteer donor blood collection center does not require routine gloving for all phlebotomies, the Compliance Officer should document that the employer has fulfilled the requirements of paragraphs (d)(3)(ix)(D)(1) through (d)(3) (ix)(D)(4)(iii), and that employees have received the training necessary to make an informed decision on the wearing of gloves.

    Citation guidelines: Paragraph (d)(3)(ix)(D) should not be cited. Rather, the other paragraphs of (d)(3) should be cited if such an employer violates them and if the employer has not demonstrated fulfillment of all the requirements of the exemptions.

20. **Paragraph (d)(3)(x).** This paragraph requires protection for the mucous membranes of the face and upper respiratory tract from exposure. Depending on the degree and type of anticipated exposure, protection for the face would consist of a surgical mask in conjunction with goggles or eye glasses with solid side shields or, alternatively, a chin length face shield.

    The employer would not necessarily have to provide prescription eyewear for employees. He/she could provide and mandate the use of side shields, goggles, and/or protective face shields, and provide proper training in decontamination procedures.

    During microsurgery, when it is not reasonably anticipated that there would be any splattering, a surgeon would not be required to wear eye protection while observing surgery through the microscope.

21. **Paragraphs (d)(3)(xi)-(xii).** Requirements for the use of protective body clothing, such as gowns, aprons, laboratory coats, clinic jackets, surgical caps, or shoe covers, and the degree to which such PPE must resist penetration, are performance based. The employer must evaluate the task and the type of exposure expected and, based on the determination, select the "appropriate" personal protective clothing in accordance with paragraph (d)(3)(i). For example, laboratory coats or gowns with long sleeves must be used for procedures in which exposure of the forearm to blood or OPIM is reasonably anticipated to occur.

    Inspection guidelines: The Compliance Officer will need to evaluate the task being performed and the degree of anticipated exposure by direct observation, employee interview, or review of written standard operating procedures.

22. **Housekeeping (d)(4).** The term "worksite" in this paragraph refers not only to permanent fixed facilities such as hospitals, dental/medical offices, clinics, etc., but also covers temporary non-fixed workplaces. Examples of such facilities include but are not limited to ambulances, bloodmo-

biles, temporary blood collection centers, and any other non-fixed worksites which have a reasonable possibility of becoming contaminated with blood or OPIM.

Paragraph (d)(4)(i). Cleaning schedules and methods will vary according to the factors outlined in this paragraph. While extraordinary attempts to disinfect or sterilize environmental surfaces such as walls or floors are rarely indicated, routine cleaning and removal of soil are required.

The employer must determine and implement an appropriate written schedule of cleaning and decontamination based upon the location within the facility (e.g., surgical operatory versus patient room), type of surface to be cleaned (e.g., hard-surfaced flooring versus carpeting), type of soil present (e.g., gross contamination versus minor splattering), and tasks and procedures being performed (e.g., laboratory analyses versus routine patient care).

The particular disinfectant used, as well as the frequency with which it is used, will depend upon the circumstances in which the housekeeping task occurs.

23. **Paragraph (d)(4)(ii).** Since environmental contamination is an effective method of disease transmission for HBV (the CDC states that HBV can survive for at least one week in dried blood on environmental surfaces or contaminated needles and instruments), paragraph (d)(4)(ii) provides the minimum requirements for the cleaning and decontamination of equipment and environmental and working surfaces that come into contact with blood or OPIM.

    Under paragraph (d)(4)(ii)(A), cleaning of contaminated work surfaces after completion of procedures is required to ensure that employees are not unwittingly exposed to blood or OPIM remaining on a surface from previous procedures. This paragraph requires contaminated work surfaces to be cleaned with an "appropriate disinfectant." Appropriate disinfectants include a diluted bleach solution and EPA-registered tuberculocides (List B), sterilants registered by EPA (List A), products registered against HIV/HBV(List D) or Sterilants/ High Level Disinfectants cleared by the FDA. The lists of the EPA Registered Products are available from the National Antimicrobial Information Network on its website at http://ace.orst.edu/info/nain/lists.htm or at (800) 447-6349. The sterilants and high level disinfectants cleared by FDA can be found at http://www.fda.gov/cdrh/ode/germlab.html. Any of the above products are considered effective when used according to the manufacturer's instructions, provided the surfaces have not become contaminated with agents or volumes of or concentrations of agents for which higher level disinfection is recommended.

    NOTE: The EPA lists contain the primary registrants' products only. The same formulation is frequently repackaged and renamed and distributed by other companies. These renamed products will not appear on the list, but their EPA Registration number must appear on the label. Products cleared solely by the FDA will not have an EPA number.

    Inspection guidelines: Compliance Officers should check the product label for EPA registration and/or consult the Environmental Protection Agency (EPA) lists of registered sterilants (representing the highest level of antimicrobial activity that destroys all viruses), tuberculocidal disinfectants (effective against tuberculosis bacteria and the specific viruses named on the product label as well as the hepatitis B virus), and antimicrobials with HIV/HBV efficacy claims for verification that the disinfectant used is appropriate. The employer must follow the label instructions regarding the amount of disinfectant and the length of time it must remain wet on the surface. Since the effectiveness of a disinfectant is governed by strict adherence to the instructions on the label, Compliance Officers should also interview employees to ensure that the disinfectants are being used according to the manufacturer's instructions. If employees have not been trained in the proper use of the disinfectant, a violation of the appropriate paragraph in (g)(2)(vii) should be cited.

    NOTE: Fresh solutions of diluted household bleach made up daily (every 24 hours) are also considered appropriate for disinfection of environmental surfaces and for decontamination of sites following initial cleanup (i.e., wiping up) of spills of blood or other potentially infectious materials. Contact time for bleach is generally considered to be the time it takes the product to air dry. Solutions of bleach should not be stored in glass containers, but in material such as the plastic in which the bleach, the consumer product, is packaged in. Household bleach (5.25% sodium hypochlorite) diluted to the appropriate strength for the clean up job at hand is also an effective disinfectant, although bleach may cause damage to some medical instruments and therefore cannot be used in all cases. In addition, gross contamination must be cleaned up first with a soap and water solution, to ensure the disinfectant is completely effective.

Where procedures are performed on a continual basis throughout a shift or a day, as may be the case with a clinical laboratory technician performing blood analyses, it is not the agency's intent for the work surface to be decontaminated before the technician can proceed to the next analysis; rather the intention is for contaminated work surfaces to be decontaminated after the procedures are completed which, in the above example, would include a set of analyses. The completion of procedures might also occur when the employee is going to leave the work area for a period of time.

Decontamination is not automatically required after each patient care procedure, but is required only after procedures resulting in surface contamination.

There may be some instances in which "immediate" decontamination of overt contamination and spills may not be practical as in, for example, an operating table during surgery.

The work surface decontamination is to be performed at the end of the work shift if the work surface may have become contaminated since the last cleaning by, for example, setting down contaminated instruments or specimens on the work surface. This requirement is based upon the existence of a contaminated work surface rather than a particular worksite location. It does not, for example, encompass desks, countertops, and so forth that remain uncontaminated.

The use of protective coverings described in paragraph (d)(4)(ii)(B) is an acceptable alternative for protecting items and surfaces against contamination and is particularly useful in situations in which a piece of equipment would be difficult to decontaminate but could be protected by a cover.

If this option is chosen, the covering must be removed and replaced at the stated minimum intervals, i.e., as soon as feasible following overt contamination or at the end of a workshift if it may have become contaminated during the shift.

More stringent decontamination rules, such as cleaning equipment or changing coverings between patients, may be prudent infection control policy but do not fall under OSHA's mandate to safeguard employee (not patient) health.

24. **Paragraph (d)(4)(ii)(C)** requires both the inspection and decontamination, on a regularly scheduled basis, of cans, bins, pails, and so forth which are intended for reuse.

    Since these containers may be used in a manner which presents the potential for their becoming contaminated with blood or OPIM, they must be cleaned immediately or as soon as feasible upon visible contamination. For example, a reusable metal trash can could have been lined with a disposable plastic regulated waste bag which leaks and contaminates the can. In addition, regular decontamination will prevent the can from leaking, spilling, or contaminating the outside of successive bags. Disinfection of these containers is not necessary to ensure their safety for their intended use; it may be possible to achieve their proper decontamination by means of a soap and water wash.

    Since contaminated broken glass (e.g., glass capillary tubes, lab specimen dishes, phlebotomy tubes) is capable of inflicting percutaneous injury and direct inoculation of bloodborne pathogens into the bloodstream, paragraph (d)(4)(ii)(D) stipulates that broken glassware which may be contaminated must not be picked up directly with the hands. The tools which are used in cleanup (e.g., forceps) must be properly decontaminated or discarded after use and the broken glass placed in a sharps container, and employees must be given specific information and training with respect to this task in accordance with the requirements of paragraph (g)(2). Vacuum cleaners are not appropriate for cleanup of contaminated broken glass.

25. **Paragraph (d)(4)(ii)(E)** prohibits employers from allowing employees to place their hands into containers whose contents include reusable sharps contaminated with blood or OPIM. The intent is to prevent conditions of use in which the contents cannot be seen and safely handled. For example, employees must not reach into sinks filled with soapy water into which sharp instruments have been placed; appropriate controls in such a circumstance would include the use of strainer type baskets to hold the instruments and forceps to remove the items.

The final standard recognizes that proper decontamination of reusable equipment, such as glassware or hand instruments, cannot be achieved in the presence of organic debris (e.g., blood) because it interferes with the efficacy of the disinfecting/sterilizing process, and the number of products which can successfully penetrate a heavy bioburden is limited.

Violations of paragraphs (d)(4)(ii) and (d)(4)(ii)(A)-(E) may result from a failure to adequately train employees in proper housekeeping procedures. If the Compliance Officer determines this is the case, violations should be grouped with the appropriate paragraph(s) of paragraph (g)(2).

26. **Regulated waste (d)(4)(iii).** This paragraph requires regulated waste to be properly contained and disposed of, so as not to become a source of transmission of disease to employees.

    To eliminate the implication that OSHA has determined the "infectivity" of certain medical wastes, the bloodborne pathogens standard uses the term "regulated waste" to refer to the following categories of waste which require special handling, at a minimum: liquid or semi-liquid blood or OPIM; items contaminated with blood or OPIM and which would release these substances in a liquid or semi-liquid state if compressed; items that are caked with dried blood or OPIM and are capable of releasing these materials during handling; contaminated sharps; pathological and microbiological wastes containing blood or OPIM.

    Inspection and citation guidelines: The compliance officer should not use the actual volume of blood to determine whether or not a particular material is to be considered regulated waste, since 10 ml of blood on a disposable bed sheet would appear as a spot (not regulated waste) while the same amount of blood on a cotton ball would likely cause saturation and dripping (regulated waste). Similarly, an item may adequately contain these materials when in a static state yet liberate them when compacted in the waste container. Instead, the compliance officer should consider the potential for generation of bulk blood (i.e through dripping or flaking off of material that may contain either blood or OPIM). Under no circumstances should a bag of waste be squeezed or shaken to determine this. The compliance officer should exercise professional judgment to make a determination based on visual factors such as a pool of liquid in the bottom of the container or dried blood flaking or falling off during handling, or based on employee interviews.

    NOTE: The Compliance Officer should keep in mind that, while OSHA specifies certain features of the regulated waste containers, including appropriate tagging, the ultimate disposal method (landfilling, incinerating, and so forth) for medical waste falls under the purview of the EPA and possibly State and local regulations.

    Lacking information to the contrary, the Compliance Officer should consider a used needle to be contaminated.

27. **Paragraph (d)(4)(iii)(A)*(1).*** This provision should be cited if contaminated sharps are not discarded in containers immediately or as soon as feasible. If containers are located too far away from the point of use, then (d)(4)(iii)(A)*(2)(i)* should be cited. See below.

28. **Paragraph (d)(4)(iii)(A)*(1)(i)-(iv).*** The construction of the sharps containers must meet at least four criteria, two of which will be easily discernible. The Compliance Officer should examine a container, preferably empty, to check that it is closable and color-coded or labeled. Sharps containers are made from a variety of products, from cardboard to plastic. As long as they meet the criteria for a sharps container, the Compliance Officer should consider them to be acceptable no matter what the composition. If questions arise, the Compliance Officer should consult the manufacturer's literature or contact the manufacturer directly to determine if the container is leakproof on the sides and bottom, as well as puncture resistant. The NIOSH publication, "Selecting, Evaluating and Using Sharps Disposal Containers" is also a good resource.

    If the container is considered puncture resistant by the manufacturer, but there is evidence, through observation or employee statements, that sharps have been protruding through a container, paragraph (d)(4)(iii)(A)*(1)(ii)* should be cited.

    The sharps container should not create additional hazards. Some sharps containers have unwinders that are used to separate needles from reusable syringes or from reusable blood tube holders. The use of these are generally prohibited. However, if a medical procedure requires needle re-

moval, the design of the sharps container and the location of the unwinder must allow the needle removal to be accomplished in a safe, one-handed manner. If this situation is encountered, the Compliance Officer should determine if the circumstances warrant needle removal. If they do not, paragraph (d)(2)(vii)(A), which prohibits needle removal unless no alternative is feasible or it is required by a specific medical procedure, should be cited. If needle removal must be accomplished, the employee must be trained in the correct procedure as required by paragraph (g)(2)(vii)(F).

The needle sheath on a self-sheathing needle is not to be considered a "waste container" because it is viewed as a temporary measure. Self-sheathing needle products and other SESIPs, even after activation, must be disposed of in a sharps container which conforms to the requirements of paragraph (d)(4)(iii)(A)*(1)*.

Duct tape may be used to secure a sharps container lid, but tape is not acceptable if it serves as the lid itself.

29. **Paragraph (d)(4)(iii)(A)*(2)(i).*** The Compliance Officer should ensure that the sharps container is as close as feasible to where sharps are used or can be reasonably anticipated to be found.

    If an employee must travel to a remote location to discard a sharp, it will increase the possibility of an accidental needlestick and increase the chances that needles and sharps will be improperly discarded and create potential hazards for other staff members.

    Areas such as correctional facilities, psychiatric units, pediatric units, or residential homes may have difficulty placing containers in the immediate use area. Alternatives include using containers which are lockable or which are designed to prevent removal of syringes while maintaining easy accessibility for discarding. Containers may also be locked onto a mobile cart if one is used by healthcare workers in these units, or they may be brought to the site and removed by the employee upon leaving.

    The determination of whether or not the container is as close as feasible should be made on a case-by-case basis. After interviewing employees, if the Compliance Officer believes there is a better location for the container, management should be given the opportunity to explain the reasons for the present location of the container. The acceptability of the new site should also be discussed. The Compliance Officer should then decide if a violation of this paragraph exists.

    Laundries must also have sharps containers easily accessible because of the high incidence of needles being mixed with laundry. Facilities that handle shipments of waste which may contain contaminated sharps must also have sharps containers available in the event a package accidentally opens and releases sharps.

30. **Paragraph (d)(4)(iii)(A)*(2)(iii).*** The Compliance Officer should ensure that sharps containers are being replaced routinely to prevent overfilling. The Record Summary states that overfilling of sharps containers is an often reported problem. Overfilling is often associated with containers that were too small to accommodate the volume of sharps, limited ability to see the contents in order to determine the remaining capacity, and lax procedures for container maintenance. Examples of methods by which sharps containers can be examined to determine a need for replacement, are the use of sharps containers which have a transparent window or are placed at a height which allows employees to see if the container needs to be replaced. Overfilling of sharps containers should be cited under paragraph (d)(4)(iii)(A)*(2)(iii).* A citation for inadequate training on work practices, paragraph (g)(2)(vii)(F), should be grouped with the citation for this paragraph if the overfilled containers are present because of lack of training.

    NOTE: The Exposure Prevention Information Network (EPINet) study, *Uniform Needlestick and Sharp Object Injury Report (77 Hospitals, 1993-1995)* reports that 717 injuries occurred in this time period when an employee was putting an item into a disposal container. The Compliance Officer should closely inspect sharps disposal containers at the site to ensure containers are not overfilled. Additional information on sharps disposal containers is available in the NIOSH publication, *Selecting, Evaluating and Using Sharps Disposal Containers,* January 1998, DHHS (NIOSH) Publication No. 97-111.

31. **Paragraphs (d)(4)(iii)(A)*(3)(i)* and *(ii)*.** If work practice violations of these paragraphs exist (e.g., not closing the container prior to movement or not placing the container in a secondary container if leakage is possible), the citations should be grouped with paragraph (g)(2)(vii)(F) if employees have not received adequate training.

32. **Paragraph (d)(4)(iii)(A)*(3)(ii)(B)*.** It is reasonable to presume that some sharps containers will contain residual liquids. If the container cannot be sealed to prevent leakage, it must be placed in a secondary container.

33. **Paragraph (d)(4)(iii)(A)*(4)*.** A reusable sharps container system for disposable sharps will be acceptable if it does not expose employees to the risk of percutaneous injury. No system involving the manual opening, emptying, or cleaning of the containers will be allowed. The only acceptable system is a fully automated container cleaning system that eliminates employee exposure to sharps.

34. **Paragraph (d)(4)(iii)(B).** While this paragraph requires that regulated waste containers be closable, simply being closed does not ensure that waste will be contained. Waste-containing bags may break and spill their contents, including liquid blood, while, for example, being loaded onto incinerator hoppers, thus contaminating both the employees and the work area. Also, small medical offices which generate only a small volume of regulated waste may place that waste in a large holding container until the container is filled. In such a case, the design of the container must be such that it is able to retain the waste over an extended period of time between pickups by a specialized waste service. The Compliance Officer should, therefore, check for visual signs of leakage of fluids during handling, storage, transport, or shipping.

    Any failures to comply with the container construction requirements would be cited under this paragraph. If the compliance officer determines that the employee was not properly trained to recognize the problem or use the containers correctly, a citation for the appropriate paragraph of paragraph (g)(2) should be grouped with violations of paragraph (d).

35. **Paragraphs (d)(4)(iii)(B)*(1)(iii)* and *(2)(iii)*.** Regulated waste containers are required to be labeled with the biohazard symbol or color-coded to warn employees who may have contact with the containers of the potential hazard posed by their contents.

    Even if a facility considers all of its waste to be regulated waste, the waste containers must still bear the required label or color-coding in order to protect new employees, employees who would not normally come into contact with wastes, and employees from outside the facility. This requirement is in contrast to the labeling alternative allowed when laundries use universal precautions for the handling of all soiled laundry.

    Regulated waste that has been decontaminated need not be labeled or color-coded. The compliance officer in such a case should verify that the employer's exposure control plan states the decontamination procedures to be followed. In order to ensure that the decontamination process is successful, the employer must monitor factors such as the content, volume, density, configuration, and organic content of the load of waste. The temperature needed for incineration is sufficient to decontaminate regulated waste. Autoclave efficiency can be verified by means of biological or chemical indicators. While most disposal bags used will contain an indicative color strip, if this is not the case a review may be made of the documentation kept for the sterilizer. Such documentation should include (1) date, time, and operator of each run, (2) type and approximate amount of waste tracked, (3) post-treatment reading of temperature-sensitive tape, (4) dates and results of calibration of the sterilizer, and (5) results of routine spore testing. Although these paragraphs contain label requirements, failure to label can also be cited under paragraph (g)(1)(i).

36. **Paragraph (d)(4)(iii)(B)*(2)*.** A second container is required to be used when outside contamination of the first waste container occurs. This provision does not require routine double-bagging but rather requires double-bagging in such circumstances as a waste container being splashed with blood during surgery or autopsy, when a container has been handled by an employee with bloody gloves, or when a waste bag leaks blood or OPIM onto an adjacent bag.

37. **Paragraph (d)(4)(iv).** This paragraph reduces employee exposure to bloodborne pathogens by reducing the amount of manual handling of contaminated laundry. Restricting the sorting to the laundry area will also reduce contamination of additional surfaces.

    Inspection and citation guidelines: Paragraphs (d)(4)(iv)(A) and (A)*(1)* limit the handling of laundry to removal and bagging or containerization. The compliance officer should check the laundry collection program as well as the training of the employees assigned to these tasks.

38. **Paragraph (d)(4)(iv)(A)*(2)*.** The employer has been given the choice, by this paragraph, to either: label or color-code according to paragraph (g)(1)(i), or to utilize universal precautions in the handling of all soiled (i.e., used) laundry.

    If universal precautions are used for handling all soiled laundry, the employer may use an alternative color or label for the bags/containers, as long as all employees are trained to recognize them as containing soiled laundry which requires the use of universal precautions.

    Training violations would be cited under the appropriate paragraph of (g)(2)(vii).

39. **Paragraph (d)(4)(iv)(A)*(3)*.** The material for the bags or containers used in laundry collection must prevent soak-through or leakage of fluids to the exterior, if the contaminated laundry is wet and presents a reasonable likelihood of soak-through or leakage. Not all contaminated laundry must be placed in such bags or containers; only laundry wet enough to leak or soak through and expose workers handling the bags/containers to blood or OPIM, or contaminate other surfaces should be considered contaminated laundry.

40. **Paragraph (d)(4)(iv)(B).** Employees having direct contact with contaminated laundry must wear protective gloves (e.g., utility gloves) and any other appropriate personal protective equipment, in order to prevent or reduce contact exposure to blood or OPIM. Any other personal protective equipment required must be determined on a case-by-case basis. Gowns, aprons, eyewear, and masks may be necessary to prevent employee exposure.

41. **Paragraph (d)(4)(iv)(C).** The employer generating the laundry must have determined if the facility to which it is shipped utilizes universal precautions in the handling of all laundry. If not, all bags or containers of contaminated laundry must be labeled or color-coded in accordance with paragraph (g)(1)(i). In this instance, if the employer generating the laundry chooses to color-code rather than label, the color of the bag must be red.

    Inspection and citation guidelines: The Compliance Officer should check the employer's program to determine if laundry is shipped to another facility for cleaning and should evaluate the methods used to ship contaminated laundry (CL) to a facility that does not utilize universal precautions in the handling of all soiled laundry.

    The following are unacceptable shipment methods and constitute violations of this paragraph:

    - The CL is not shipped labeled or in a red bag, paragraph (d)(4)(iv)(C) would be cited and grouped with the applicable subparagraph of paragraph (g)(1)(i);
    - The CL is shipped with an improper label, paragraph (d)(4)(iv)(C) would be cited and grouped with the applicable subparagraphs of paragraphs (g)(1)(i) (B), (C) and/or (D);
    - The CL is shipped in a bag color-coded for in-house use (in a color other than red), paragraph (d)(4)(iv)(C) would be cited and grouped with citations for paragraph (g)(1)(i)(E).

    CDC has published *Guidelines for Laundry in Health Care Facilities*. Current recommendations for the laundering of contaminated linen stipulate only that normal laundering methods be used according to the manufacturer's recommendations.

OSHA COMPLIANCE MANUAL

HIV and HBV research laboratories and production facilities
§1910.1030(e)

This paragraph includes additional requirements that must be met by research laboratories and production facilities engaged in the culture, production, concentration, and manipulation of HIV and HBV.

Research laboratory: A laboratory which produces or uses research laboratory scale amounts of HIV or HBV. Although research laboratories may not have the volume found in production facilities, they deal with solutions containing higher viral titers than those normally found in patients' blood. Academic research laboratories are included in this definition. Laboratories that conduct research on blood and other body fluids unrelated to HIV or HBV, or that use unconcentrated blood or blood components as the source of HIV or HBV, are not considered research laboratories for the purpose of this paragraph.

Production facilities: Those engaged in industrial scale, large volume, or high concentration production of HIV or HBV.

NOTE: Employers in such facilities remain responsible for complying with the entire standard. Requirements stated elsewhere in the standard are not repeated here. These requirements are based largely on information from published guidelines of the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH). *(*Resource: *Biosafety in Microbiological and Biomedical Laboratories.)*

Inspection and citation guidelines: The compliance officer should review the covered facility's plan, interview a sufficient number of employees, and observe work practices as necessary to determine if the requirements of this paragraph are met. Care should be taken to ensure the compliance officer understands the special practices and precautions in place at the facility so that the compliance officer is not placed at risk. Specific requirements include:

1. **Paragraph (e)(2)(i).** The term "regulated waste" refers to the OSHA definition as found in paragraph (b) of this standard. The purpose of decontaminating regulated waste is to prevent the accidental exposure of other employees to the concentrated virus.

2. **Paragraphs (e)(2)(ii)(A) through (M).** Paragraphs (A), (C), and (D) require employers to limit access to the laboratory and warn of the hazards associated with bloodborne pathogens. They must review the written policies and procedures to determine if they are adequate to ensure that access to the work areas and animal rooms is limited to authorized persons. Interviews with employees should be used to determine if the policies are followed.

3. **Paragraph (e)(2)(ii)(E).** The "other physical containment device" must be sufficient to ensure that virus containing material will be kept away from the worker's mucous membranes, unprotected skin, and breathing zone.

4. **Paragraphs (e)(2)(ii)(H) and (I).** These paragraphs are designed to prevent the spread of contamination to other work areas. Paragraph (I) allows for an alternative to a HEPA filter as long as it is of equivalent or superior efficiency. HEPA filters may be ineffective in humid atmospheres.

   The employer must also have made provisions for routine maintenance and/or replacement of all filters and traps.

   If the compliance officer suspects that the engineering controls are failing to prevent the spread of the virus, the manufacturer should be contacted to establish the limits and required maintenance of the filters and traps.

5. **Paragraph (e)(2)(ii)(J).** The compliance officer should determine if the use of needles and syringes is kept to a minimum and that they are properly handled as required, paying particular attention to establishing if the puncture-resistant containers are properly autoclaved or decontaminated before being discarded, reused, or incinerated.

6. **Paragraph (e)(2)(ii)(M).** This paragraph ensures that any necessary additional procedures are developed to protect employees in situations unique to a research/production facility. The biosafety manual required by this paragraph must be reviewed and updated annually or more often if

necessary. The facility will thus be required to review its procedures and determine if they are adequate to protect workers.

7. **Paragraph (e)(2)(iii).** Specific containment equipment is required by this paragraph to minimize or eliminate exposure to the viruses.

   If the compliance officer determines that biological safety cabinets (BSC) have been chosen as the means of containment, they must be certified (Class I, Class II, or Class III, as appropriate) when installed or moved, and at least annually.

   The compliance officer should check that a dated tag is affixed to the BSC indicating who performed the certification. Alternatively, a certification report attesting to a minimum inward face velocity of at least 75 linear feet per minute and the integrity of the HEPA filters should be reviewed by the compliance officer. The report must be dated and signed by the trained technician performing the measurements and integrity tests.

   In the alternative, appropriate combinations of PPE or physical containment devices (examples listed in the standard) will be accepted.

8. **Paragraphs (e)(3)(i) and (e)(4)(iii).** The hand washing facility must be supplied with at least tepid water, soap, and hand towels. The eyewash must supply a sufficient quantity of water to completely flush the eyes. A 15-minute supply of continuous free-flowing water is acceptable. The hands must be free to hold the eyelids open to aid in the complete flushing of the eyes. Portable facilities are acceptable only if they meet these requirements.

9. **Paragraph (e)(4)** covers additional requirements for production facilities only. The requirement in paragraph (e)(4)(v) minimizes the potential for accidental exposure of other employees from the transport of culture fluids, plastic ware, and other contaminated equipment.

10. **Paragraph (e)(5).** The additional training requirements for employees in HIV/HBV research laboratories are specified in paragraph (g)(2)(ix). Any violations found should be cited under that paragraph of the standard.

Hepatitis B vaccination and post exposure evaluation and follow-up
§1910.1030(f)

This paragraph provides a means to protect employees from infection caused by the hepatitis B virus by requiring employers to make the hepatitis B vaccination available to employees with occupational exposure to blood or OPIM. It also ensures that employees receive appropriate medical follow-up after each specific exposure incident.

1. **General — Paragraph (f)(1).** This paragraph refers to the hepatitis B vaccination as both the hepatitis B vaccine and vaccination series. These are to be made available to all occupationally exposed employees. In addition, a post-exposure evaluation and follow-up procedures are to be made available to all employees who experience an exposure incident. While it is OSHA's intent to have the employer remove, as much as possible, obstacles to the employee's acceptance of the vaccine, the term "made available" emphasizes that the employee has the option to decline participation in the vaccination and follow-up programs.

   Inspection guidelines: The compliance officer should examine the employer's program to determine if the vaccination series and post-exposure follow-up procedures meet the requirements of paragraph (f)(1)(ii).

2. **Paragraph (f)(1)(ii)(A).** The term "no cost to the employee" means, among other things, no "out of pocket" expense to the employee.

   The employer may not permit the employee to use his/her healthcare insurance to pay for the series unless the employer pays all of the cost of the health insurance and unless there is no cost to the employee in the form of deductibles, copayments, or other expenses. Even partial employee contribution to the insurance premium means the employee could be affected by a rise in

the total premium caused by insurance company reaction to widespread hepatitis B vaccinations and is therefore unacceptable. Likewise, any use of a spouse or other family member's insurance plan to provide vaccination would not be considered "at no cost" to the employee.

The employer may not institute a program in which the employee pays the original cost of the vaccine and is reimbursed by the employer if she/he remains employed for a specified period of time.

An "amortization contract" which requires employees to reimburse the employer for the cost of the vaccination should they leave his/her employ prior to a specified period of time is similarly prohibited.

A waiver of liability for any harm caused by the vaccine is also prohibited.

3. **Paragraph (f)(1)(ii)(B).** The term "reasonable time and place" requires the medical procedures and evaluations to be convenient to the employee. They must normally be offered during employees' scheduled work hours. If participation requires travel away from the worksite, the employer must bear the cost.

4. **Paragraph (f)(1)(ii)(C).** The Compliance Officer can contact the National Council of State Boards of Nursing, Inc. at the Board of Nursing Contact Information web site at http://www.ncsbn.org to obtain the most current lists of addresses and phone numbers for each State Board of Nursing, to determine if the State Board of Nursing allows licensed healthcare professionals other than physicians to carry out the procedures and evaluations required by paragraph (f). The National Commission on Certification of Physicians' Assistants can clarify the role of physician assistants in these procedures. They can be reached at (770) 399-9971.

5. **Paragraph (f)(1)(ii)(D).** This paragraph takes into consideration the changing nature of medical treatment relating to Hepatitis B. The CDC is the U.S. Public Health Service (USPHS) agency responsible for issuing guidelines and making recommendations regarding infectious agents. OSHA requires employers to follow the CDC guidelines current at the time of the evaluation or procedure. Copies of the current guidelines and other CDC documents can be obtained on CDC's web site, http://www.cdc.gov. The hepatitis B vaccination must be given in the standard dose and through the standard route of administration as recommended in the USPHS/CDC guidelines.

   The most current CDC guideline regarding Hepatitis B is "Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis" published in *Morbidity and Mortality Weekly Report,* Vol. 50, No. RR-11, June 29, 2001. It states that employees who have ongoing contact with patients or blood and are at ongoing risk for percutaneous injuries are to be tested for antibody to Hepatitis B surface antigen, one to two months after the completion of the three-dose vaccination series. Employees who do not respond to the primary vaccination series must be revaccinated with a second three-dose vaccine series and retested, unless they are HbsAg-positive (infected). Non-responders must be medically evaluated.

   Inspection guidelines: It is important that the compliance officer investigate thoroughly whether the employer knows of the contents of the CDC guidelines. Evidence may include statements from supervisors or managers that they were aware of the guidelines; an interview with the employer, employer's attendance at conferences or seminars where in-service training about the CDC guidelines was provided; knowledge of interactive webpages associated with the CDC guidelines; or actual copies of the MMWR.

   Citation guidelines: Paragraph (f)(1)(ii)(D) should be cited if the employer failed to provide vaccinations, evaluations, or follow-up procedures for Hepatitis B in accordance with the CDC recommendations that were current at the time these procedures took place. Any additional requirements (such as obtaining a written healthcare professional's opinion) specified in paragraph (f) must also be met.

6. **Paragraph (f)(1)(iii)** requires that all laboratory tests be conducted by an accredited laboratory. The Compliance Officer must determine by means of employer documentation (e.g., certificate) that the laboratory is accredited by a national accrediting body (e.g., American Association of Blood Labs, College of American Pathologists, Joint Commission on Accreditation of Healthcare Organizations, etc.) or equivalent State agency which participates in a recognized quality assurance program.

7. **Hepatitis B vaccination — Paragraph (f)(2).** The Compliance Officer should determine whether or not all occupationally exposed employees have had the hepatitis B vaccination series made available to them after the training required by paragraph (g)(2)(vii)(I) and within 10 working days of their initial assignment. The term "made available" includes the healthcare professional's evaluation and arranging for the administration of the first dose of the hepatitis B vaccination series to begin within the 10 days. This includes all employees with occupational exposure, regardless of how often the exposure may occur. Part-time and temporary employees are included in this coverage. The vaccine does not have to be made available if the employer documents the exemption(s) set forth in paragraph (f)(2). It does not have to be administered if the employer can produce the signature of the employee on the mandatory declination form (See Appendix A of §1910.1030.)

8. **Paragraph (f)(2)(i)** states the circumstances under which an employer is exempted from making the vaccination available. If, (a) the complete hepatitis B vaccination series was previously received (three vaccine shots or in the case of a non-responder, six), or (b) antibody testing shows the employee to be immune, or (c) the vaccine cannot be given for medical reasons, the series does not have to be made available. If the employer claims one of these exemptions, it must be documented in the employee's medical record in accordance with paragraph (h)(1)(ii)(B).

   Current USPHS guidelines recommend post-vaccination screening for antibody to HBsAg (anti-HBs) for certain healthcare workers. See discussion of (f)(1)(ii)(D). Periodic antibody tests thereafter are not currently recommended.

   Citation policy for first aid providers. Citations should be issued when designated first aid providers, who have occupational exposure, are not offered the hepatitis B vaccine before they are exposed unless the following conditions are in place:

   a. The primary job assignment of such a designated first aid provider is not the rendering of first aid or other medical assistance, and

   b. Any first aid rendered by such person is rendered only as a collateral duty, responding solely to injuries resulting from workplace incidents, generally at the location where the incident occurred.

      NOTE: This exception does **not** apply to designated first aid providers who render assistance on a regular basis, for example, at a first aid station, clinic, dispensary or other location where injured employees routinely go for assistance; nor does it apply to any healthcare, emergency, or public safety personnel who are expected to render first aid in the course of their work. These employees must be offered the vaccine prior to exposure.

   c. The employer's exposure control plan must specifically address the provision of the hepatitis B vaccine to all unvaccinated first aid providers who render assistance in any situation involving the presence of blood or OPIM (regardless of whether an actual "exposure incident" as defined by the standard occurred) and the provision of appropriate post-exposure evaluation, prophylaxis, and follow-up for those employees who experience an "exposure incident." The plan must include:

      1) Provision for a reporting procedure that ensures that all first aid incidents involving the presence of blood or OPIM will be reported to the employer before the end of the work shift during which the incident occurred. The report must include the names of all first aid providers who rendered assistance, regardless of whether personal protective equipment was used and must describe the first aid incident, including time and date.

         The description must include a determination of whether or not, in addition to the presence of blood or other potentially infectious materials, an "exposure incident," as defined

by the standard, occurred. This determination is necessary in order to ensure that the proper post-exposure evaluation, prophylaxis, and follow-up procedures required by paragraph (f)(3) of the standard are made available immediately, whenever there has been an "exposure incident" as defined by the standard.

2) A report that lists all such first aid incidents, that is readily available, upon request, to all employees and to the Assistant Secretary.

3) Provision for the bloodborne pathogens training program for designated first aiders to include the specifics of this reporting procedure.

4) Provision for the full hepatitis B vaccination series to be made available as soon as possible, but in no event later than 24 hours, to all unvaccinated first aid providers who have rendered assistance in any situation involving the presence of blood or OPIM, regardless of whether or not a specific "exposure incident," as defined by the standard, has occurred.

5) Unless all the requirements of this de minimis policy are met, paragraph (f)(2)(i) should be cited for failure to provide the hepatitis B vaccine.

NOTE: For industries not covered by §1910.1030 or §1915.1030, failure to provide appropriate evaluation of first aid incidents (including the determination of whether an exposure incident occurred) and adequate follow-up of exposure incidents (including the provision of the hepatitis B vaccine series free of charge) should be considered for a possible 5(a)(1) citation.

9. **Paragraph (f)(2)(ii).** Prevaccination screening for antibody status cannot be required of an employee, although if an employer wishes, he/she can make it available at no cost to employees. An employee may decline the prescreening, and the employer must still make the vaccination series available to the employee.

10. **Paragraph (f)(2)(iii).** The signing of the hepatitis B vaccine declination form by the employee, at the time the vaccination is made available, does not relieve the employer from the requirement to provide the vaccine at a later date if the employee so chooses.

11. **Paragraph (f)(2)(iv).** Employers must ensure that employees who decline the vaccine sign a declination form. The language in the declination form is set forth in §1910.1030, Appendix A. An employer's form which conveys the same information as Appendix A, although in different words, should be considered a de minimis violation. However, any additions to that language should be made for the sole purpose of improving employee comprehension. Forms must not add language that would discourage employee acceptance of the vaccine or add liability concerns.

    If the employer has added information that requires the employee to provide confidential medical information, regardless of whether it is physically on the declination form or on a separate form, a citation of (h)(1)(iii) should be considered.

    The standard does not make reference to consent forms for employees accepting the vaccine. Medical informed consent forms are acceptable. However, any waiver of liability for any harm caused by the vaccine violates paragraph (f)(1)(ii)(A), which requires that the vaccine be provided at no cost. Consent forms which require the employee to release his or her test results to the employer violate the confidentiality requirements in paragraph (f)(5)(iii). Consent forms on which the hazards of the vaccine are clearly exaggerated violate paragraph (g)(2)(vii)(I).

12. **Paragraph (f)(2)(v).** At the time of this publication, the provision of routine boosters of the hepatitis B vaccine is still being assessed. There is no requirement to provide boosters unless the USPHS recommends it at a later date.

13. **Post-exposure evaluation and follow-up paragraph (f)(3).** This paragraph requires the employer to make immediately available a confidential medical evaluation and follow-up to an employee reporting an exposure incident.

Bloodborne pathogens are defined by the standard (see the Definitions paragraph of this Directive), to include more than just HIV and HBV. The standard applies to any pathogenic microorganism present in human blood that can cause disease in humans. Paragraph (f)(3) is not specific to HIV and HBV. This paragraph requires that the employer provide post-exposure evaluation and follow-up to employees for bloodborne pathogens, such as hepatitis C (HCV), as recommended by the CDC. The current CDC recommendations for HBV, HIV and HCV are found in the "Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis" in Vol. 50, No. RR-11, published in the June 29, 2001 MMWR.

NOTE: Employees who do not fall within the scope of this standard may still experience a specific exposure incident at work that is unrelated to the performance of their job duties. An example is "Good Samaritan" assistance, voluntarily performed, to an injured co-worker or a member of the public. In such a case, OSHA strongly encourages employers of these employees to offer them the follow-up procedures set forth in this paragraph.

Inspection guidelines: The compliance officer should determine if the employer's plan ensures immediate and confidential post-exposure and follow-up procedures in accordance with the current CDC guidelines. As advised in paragraph (f)(1)(ii)(D), the compliance officer should document the employer's awareness of CDC guidelines. At sites where an exposure incident has occurred it should be determined if the procedures were properly followed through interviews, incident report reviews, and, if necessary, medical records reviews.

Citation guidelines: The word "immediately" is used in the standard to emphasize the importance of prompt medical evaluation and prophylaxis. An exact time was not given in the standard because the time limit on the effectiveness of post-exposure prophylactic measures can vary depending on the infection of concern. OSHA requires the post-exposure evaluation and follow-up to be given as soon as possible after exposure. Where medical practice is an issue, and the compliance officer believes that access to care was delayed or denied or the employer was not following accepted post-exposure procedures, the Regional Bloodborne Pathogens Coordinator shall be contacted. A health care professional in the Directorate of Technical Support will be consulted if necessary. The employer must have established a system that maintains the confidentiality of the employee's identity and test results. If the employer has contracted with a clinic or other healthcare facility to provide the follow-up programs, the confidentiality requirements must be part of the contract.

The boundary between employer and healthcare professional may be blurred in a medical setting in which, for example, the physician is both the employer and the evaluating healthcare professional or where the employer's certified medical laboratory analyzes the serological samples. In such cases, the compliance officer should ensure that requirements for consent and confidentiality have been followed. The medical information is to be confined to the medical department and not to be discussed with or revealed to others (e.g., the personnel department, supervisors, or other healthcare professionals who do not need the information to comply with the standard).

The employer should be cited for violating paragraph (f)(3) provisions (except (iv)) for not providing a confidential medical evaluation and follow-up, e.g., testing. Failure to provide post-exposure prophylaxis should be cited under (f)(3)(iv).

14. **Paragraph (f)(3)(i).** Documentation of the circumstances surrounding an exposure incident will help the employer and the Compliance Officer determine, for example, if PPE is being used or if training is lacking. Percutaneous injuries are primarily associated with the following activities: disposing of needles; administering injections; drawing blood, including use of capillary tubes; recapping needles; and handling trash and dirty linens.

    Following an exposure incident, such as a needlestick or other sharps injury, employers are required to document, at a minimum, "the route(s) of exposure, and the circumstances under which the exposure incident occurred," as per paragraph (f)(3)(i). The documentation of circumstances surrounding an incident by the employer allows identification and correction of hazards. To be useful, the documentation must contain sufficient detail about the incident. There should be information about the following: engineering controls in use at the time, work practices followed, a description of the device in use, protective equipment or clothing that was used at the time of the

exposure incident, location, procedure being performed when the incident occurred, and the employee's training. Additional information might also include a comparison of similar occurrences and recommendations to avoid future incidents, although this information is not mandatory. The Compliance Officer should request copies of the employer's documentation on exposure incidents to determine if they are in compliance with paragraphs (c)(1)(ii)(C) and (f)(3)(i).

Inspection and citation guidelines: The goal of the employer should be to implement a method or device that prevents exposure incidents from recurring. Evaluating the circumstances around an exposure incident as required by paragraph (f)(3)(i) provides the employer with data necessary to make effective decisions about engineering controls and work practices that will reduce the risk of exposure. The compliance officer should review the documentation of incidents available in the facility. The compliance officer should request the Exposure Control Plan and review the procedures for evaluating the circumstances surrounding exposure incidents.

15. **Paragraph (f)(3)(ii).** This paragraph requires the employer to identify the source individual in an exposure incident, unless this is infeasible. The employer must document in writing the identity of, or infeasibility of identifying, the source individual. Examples of when it may not be feasible to identify the source individual include: incidents of needlesticks caused by unmarked syringes left in laundry, or those involving blood samples which are not properly labeled, as well as incidents occurring where State or local laws prohibit such identification.

16. **Paragraph (f)(3)(ii)(A).** This paragraph requires testing of the source individual's blood after consent is obtained. The employer must ask for consent from the source individual or anyone legally authorized to give consent on his/her behalf. If legally-required consent is not obtained, the employer must establish this. This fact should be documented in writing, unless there is other clear evidence that consent could not be obtained. The compliance officer should ensure that the employer's plan includes this provision.

    For those jurisdictions that do not require consent of the individual, available blood may be used for testing rather than redrawing a specimen. The term "if available" applies to blood samples that have already been drawn from the source individual. OSHA does not require redrawing of blood specifically for HBV and HIV testing without the consent of the source individual.

17. **Paragraph (f)(3)(ii)(C).** This paragraph does not authorize the employer to be informed of the results of source individual or exposed employee testing. However, the results of the source individual's testing must be made available to the exposed employee in accordance with applicable State and Federal laws and regulations concerning medical privacy and confidentiality.

18. **Paragraph (f)(3)(iii).** The Compliance Officer must determine if the employer's program offers covered employees all of the listed requirements in the event of an exposure incident. Counseling and evaluation of reported illnesses are not dependent on the employee's electing to have baseline HBV and HIV serological testing.

19. **Paragraph (f)(3)(iii)(A).** The consent of the employee must be obtained before the collection and testing of his or her blood.

20. **Paragraph (f)(3)(iii)(B).** This paragraph allows employees the opportunity for future testing without the need for an immediate decision. Employees involved in an exposure incident have at least 90 days following baseline blood collection to decide if they wish to have their blood tested for HIV.

    To the employee, HIV testing may present adverse ramifications, e.g., confidentiality, employment, prejudice, or lack of medical information. Therefore, the 90-day time frame allows for the opportunity to obtain knowledge about baseline serologic testing after exposure incidents, and to participate in further discussion, education or counseling. This opportunity will, instead of placing a demand on the employee to make an immediate decision, encourage employees to consent to blood collection at the time of exposure.

    Employers are required to preserve the blood the employee consented to have drawn, if it was not tested for HIV initially, for at least the 90-day period. Compliance officers should check that if the

employer contracts for post-exposure follow-up, the contractor has been informed of the 90-day requirement.

21. **Paragraph (f)(3)(iv).** Employers must follow the current guidelines at the time of exposure to determine if post-exposure prophylaxis is medically indicated. See paragraph (f)(3) above.

    Citation guidelines: Failure to offer post-exposure HIV prophylaxis where indicated under the current CDC guidelines should be cited as a violation of paragraph (f)(3)(iv). The guidelines leave decisions about prophylaxis up to the healthcare professional. However, in unusual circumstances involving gross misapplication of the CDC guidelines by the healthcare professional, the employer may be cited. In such cases consultation with the National office is appropriate.

22. **Information provided to the healthcare professional — Paragraph (f)(4).** This paragraph requires the employer to provide information to the healthcare professional responsible for the employee's hepatitis B vaccination and post-exposure incident follow-up.

    Inspection guidelines: The Compliance Officer must determine if the employer's plan includes providing a copy of this standard to the healthcare professional responsible for the employee's hepatitis B vaccination. In the case of an exposure incident, the plan must provide for the transmission of the information required by paragraphs (f)(4)(ii)(A)-(C) and (E) to the healthcare professional. The information required by paragraph (f)(4)(ii)(D) must be provided only if available.

    The employer does not have a specific right to know the actual results of the source individual's blood testing, but must ensure that the information is provided to the evaluating healthcare professional. If the evaluating healthcare professional is also the employer, the information must still be in the employee's record and be made available at the time of a post-exposure incident. All applicable laws and standards of confidentiality apply in this situation.

23. **Healthcare professional's written opinion — Paragraph (f)(5).** The employer is required to obtain a written opinion and provide it to the employee within 15 working days of completion of the original evaluation. The standard specifies the information which is to be included in the written opinion:

    (i) For hepatitis B vaccination: whether hepatitis B vaccination is indicated for the employee, and if the employee received the vaccination;

    (ii) For post-exposure evaluation and follow-up: that the employee has been informed of the results of the evaluation and told about any medical conditions resulting from exposure to blood or OPIMs requiring further evaluation or treatment.

    (iii) All other findings or diagnoses shall remain confidential and shall not be included in the written report. The employer is afforded access to the limited information stated above. Any information regarding the results of the employee's evaluation or medical conditions must be conveyed by the health care professional to the employee alone and not as part of the written opinion that goes to the employer.

24. **Paragraph (f)(5)(i)** limits the healthcare professional's written opinion to very specific information regarding the employee's hepatitis B vaccine status, including indication for vaccine and whether such vaccination was initiated (i.e., the first shot had been given).

25. **Paragraph (f)(5)(ii)** requires documentation that a post-exposure evaluation was performed and that the exposed employee was informed of the results as well as any medical conditions resulting from exposure which require further evaluation and treatment.

Employee information and training §1910.1030(g)

Paragraph (g) ensures that employees receive sufficient warning through labels, signs, and training to eliminate or minimize their exposure to bloodborne pathogens.

1. **Labels, paragraph (g)(1).** Labels must be provided on containers of regulated waste, on refrigerators and freezers that are used to store blood or OPIM, and on containers used to store, transport, or ship blood or OPIM. This requirement alerts employees to possible exposure since the nature of the material or contents will not always be readily identifiable as blood or OPIM.

   NOTE: The labeling requirements do not preempt either the U.S. Postal Service labeling requirements (39 CFR Part III) or the Department of Transportation's Hazardous Materials Regulations (49 CFR Parts 171, 180).

   DOT labeling is required on some transport containers (i.e., those containing "known infectious substances"). It is not required on all containers for which §1910.1030 requires the biohazard label. Where there is an overlap between the OSHA-mandated label and the DOT-required label, the DOT label will be considered acceptable on the outside of the transport container, provided that the OSHA-mandated label appears on any internal containers which may be present. Containers serving as collection receptacles within a facility must bear the OSHA label since these are not covered by the DOT requirements.

   Inspection and citation guidelines: The Compliance Officer should determine that the warning labels in the facility are used as required by paragraphs (g)(1)(i)(A) through (D) and include the term "BIOHAZARD."

2. **Paragraphs (g)(1)(i)(E) through (G).** These paragraphs list exemptions from the labeling requirements which are additional to those exemptions listed for specimens in paragraph (d)(2)(xiii)(A) and for laundry in paragraph (d)(4)(iv)(A)*(2)*.

   Blood and blood products bearing an identifying label as specified by the Food and Drug Administration, which have been screened for HBV and HIV antibodies and released for transfusion or other clinical uses, are exempted from the labeling requirements.

   When blood is being drawn or laboratory procedures are being performed on blood samples, then the individual containers housing the blood or OPIM do not have to be labeled, provided the larger container into which they are placed for storage, transport, shipment, or disposal (e.g., a test tube rack) is labeled.

3. **Paragraph (g)(1)(i)(I).** Regulated waste that has been decontaminated by incineration, autoclaving, or chemical means, prior to disposal is not required to bear the BIOHAZARD warning label. Failure to ensure adequate decontamination procedures prior to removal of the hazard label should be cited under paragraph (g)(1)(i)(A), since the material would still be regulated waste.

4. **Information and training — Paragraph (g)(2).** All employees with occupational exposure must receive initial and annual training on the hazards associated with blood and OPIM, and the protective measures to be taken to minimize the risk of occupational exposure. Retraining must take place when changes in procedures or tasks occur which affect occupational exposure. While the provisions for employee training are performance oriented, with flexibility allowed to tailor the program to, for example, the employee's background and responsibilities, the categories of information listed in paragraph (g)(2)(vii) must be covered, at a minimum. These requirements include some site-specific information.

   Inspection guidelines: The Compliance Officer should verify that the training is provided at the time of initial employment and at least annually thereafter as well as whenever a change in an employee's responsibilities, procedures, or work situation is such that an employee's occupational exposure is affected. "At the time of initial assignment to tasks where occupational exposure may take place" means that employees must be trained prior to being placed in positions where occupational exposure may occur. The annual retraining for these employees must be provided within one year of their original training. This refresher training must cover topics listed in the standard to the extent needed and must emphasize new information or procedures. It does need to be an exact repetition of the previous annual training.

   Part-time and temporary employees, and healthcare employees, known as "per diem" employees, are covered and are also to be trained on company time.

The Compliance Officer should interview a representative number of employees from different work areas to determine that the training (including written material, oral presentations, films, videos, computer programs, or audiotapes) was presented in a manner that was appropriate to the employee's education, literacy level, and language. If an employee is only proficient in a foreign language, the trainer or an interpreter must convey the information in that foreign language.

5. **Paragraphs (g)(2)(vii)(B) and (C).** These paragraphs require that HIV and HBV and other bloodborne diseases be described. The employer must convey the idea that a number of bloodborne diseases other than HIV and HBV exist, such as hepatitis C (HCV) and syphilis. At the same time, the employer need not cover such uncommon diseases as Creutzfeldt-Jakob disease unless it is appropriate, for example, for employees working in a research facility with that particular virus.

   HCV is the most common chronic bloodborne infection in the United States. Persons who are chronically infected with HCV may not be aware of their infection because they may not be clinically ill. The infection may lead to chronic liver disease that develops slowly, often taking two or more decades before it is recognized. It is important that training include information on the transmission and symptoms of HCV.

6. **Paragraph (g)(2)(vii)(F).** This paragraph requires that training include an explanation of the use and limitations of methods that will prevent or reduce exposure, including appropriate engineering controls, work practices, and personal protective equipment.

   This requirement is very important, because the development of safer engineering controls introduces a variety of new techniques and practices to the work environment. Manufacturers market passive safety features, active devices, integrated safety designs, and accessory safety devices. The Record Summary respondents "repeatedly" emphasized the necessity of effective training and education whenever new engineering controls are implemented. Training must include instruction in any new techniques and practices. "Hands-on" training is particularly useful. Employee participation in the selection of new devices, which plays a major part in their acceptance and correct use, is also required. (See above discussion in paragraphs (c)(1)(iv), (c)(1)(v) and (d)(2) on engineering and work practice controls.)

7. **Paragraph (g)(2)(vii)(J).** The word "emergency" in this paragraph refers to blood or OPIM exposure outside the normal scope of work. This does not refer to hospital emergency rooms or emergency medical technicians' work.

8. **Paragraph (g)(2)(vii)(N).** This paragraph requires that there be an opportunity for interactive questions and answers with the person conducting the training session. During training, it is critical that trainees have an opportunity to ask and receive answers to questions where material is unfamiliar to them. Frequently, a trainee may be unable to go further with the training or to understand related training content until a response is received.

   Training the employees solely by means of a film or video without the opportunity for a discussion period would constitute a violation of this paragraph.

   Similarly, a generic computer program, even an interactive one, is not considered appropriate unless the employer supplements such training with the site-specific information required (e.g., the location of the exposure control plan and the procedures to be followed if an exposure incident occurs) and a person is accessible for interaction.

   Trainees must have direct access to a qualified trainer during training. OSHA's requirement can be met if trainees have direct access to a trainer by way of a telephone hot line. The use of an electronic mail system to answer employee questions is not considered direct access to a qualified trainer, unless the trainer is available to answer e-mailed questions at the time the questions arise.

9. **Paragraph (g)(2)(viii).** The person conducting the training is required to be knowledgeable in the subject matter covered by the elements contained in the training program as it relates to the workplace that the training will address. In addition to demonstrating expertise in the area of the

occupational hazard of bloodborne pathogens, the trainer must be familiar with the manner in which the elements in the training program relate to the particular workplace.

The Compliance Officer should verify the competency of the trainer based on the completion of specialized courses, degree programs, or work experience, if he/she determines that deficiencies in training exist.

Possible trainers include a variety of healthcare professionals such as infection control practitioners, nurse practitioners, registered nurses, occupational health professionals, physician's assistants, and emergency medical technicians.

Non-healthcare professionals, such as but not limited to, industrial hygienists, epidemiologists, or professional trainers, may conduct the training provided they are knowledgeable in the subject matter covered by the elements contained in the training program as it relates to the workplace. One way, but not the only way, knowledge can be demonstrated is the fact that the person received specialized training.

In some workplaces, such as dental or physicians' offices, the individual employer may conduct the training, provided he or she is familiar with bloodborne pathogen exposure control and the subject matter required by paragraphs (g)(2)(vii)(A) through (N).

10. **Paragraphs (g)(2)(ix)(A)-(C).** "Standard microbiological practices" as used in these paragraphs refer to procedures outlined in "Biosafety in Microbiological and Biomedical Laboratories." The requirement that "proficiency" be demonstrated means that employees who are experienced laboratory workers may not need to be retrained in accordance with these paragraphs. Education such as a graduate degree in the study of viral diseases, or another closely related subject area with a period of related laboratory research experience, would also constitute "proficiency." The employer is responsible for evaluating the employee's proficiency and for documenting the mechanism used to determine proficiency.

Recordkeeping
§1910.1030(h)

Records are required to be kept for each employee covered by this standard for training, as well as for medical records.

1. Medical records required by paragraph (h)(1) will be of particular importance to the healthcare professional in determining vaccination status and recommendation for treatment in the event of an exposure incident. Although the employer is required to establish and maintain medical records, he/she may contract for the services of a healthcare professional located offsite and that person or company may retain the records.

   The requirements of §1910.1020 apply. In particular, §1910.1020(d)(1)(i)(C) provides that the medical records of employees who have worked for less than one (1) year need not be retained beyond the term of employment if they are provided to the employee upon termination of employment.

   NOTE: While paragraph (h)(1)(iii) requires that medical records are to be kept confidential, paragraph (h)(1)(iii)(B) stipulates that disclosure is permitted when required by this standard or other Federal, State, or local law.

   Inspection guidelines: All medical records required to be kept by this standard are also required to be made available to OSHA. The Compliance Officer must protect the confidentiality of these records. If they are copied for the case file, the provisions of §1913.10 must be followed.

   The Compliance Officer should review the employer's recordkeeping program to ensure that the required information is collected, and provision has been made to ensure the confidentiality of the medical records in accordance with §1910.1020. While §1910.1020(a) makes allowances for its provisions being carried out on behalf of the employer, §1910.1020(b)(3) states that "each employer must ensure that the preservation and access requirements are complied with regardless of the manner in which the records are made or maintained." If the employer has contracted with a

responsible third party to maintain the required records, the employer should only be cited for deficiencies of which she/he knew or could have known with the exercise of reasonable diligence.

2. **Paragraph (h)(2)** requires accurate recordkeeping of training sessions, including titles of the employees who attend. The records are necessary to assist the employer and OSHA in determining whether the training program adequately addresses the risks involved in each job. Additionally, this information is helpful in tracking the relationship between exposure incidents (e.g., needlesticks) and various jobs and the corresponding level of training.

   Training records may be stored onsite where the actual documents will be easily accessible for review. In order to ensure that the employee training is complete, all the components of the program required by paragraph (g)(2)(vii) must be covered.

   Training records are not considered to be confidential. Training records may be stored onsite where the actual documents are readily accessible. They must be retained for three years from the training date.

3. **Paragraph (h)(5)** requires employers to establish and maintain a sharps injury log for the recording of percutaneous injuries from contaminated sharps. This log is separate from the log of injuries and illnesses kept under Part 1904. Employers who are already partially exempt from Part 1904 recordkeeping requirements (See 29 CFR 1904.1 and 1904.2) are not required to keep a sharps injury log, but are encouraged to do so. Federal agencies will be required to keep a sharps injury log by a revision to Part 1960 that is currently under review.

   The log must include the type and brand of device involved in the incident, the department or work area where the exposure incident occurred and an explanation of how the incident occurred so that the intended evaluation of risk and device effectiveness can be accomplished. More information may be included; however the confidentiality of the injured employee must be maintained throughout the process. If the nature of the incident is such that determining the type and brand of the device would increase the potential for additional exposure (e.g., housekeeper stuck through trash bag), the type/brand may be recorded as “Unknown.”

   The purpose of the log is to aid in the evaluation of devices being used in the workplace and to quickly identify problem areas in the facility. Thus, it should be reviewed regularly and during the review and update of the Exposure Control Plan.

   If the data is made available to other parties (e.g., supervisors, safety committees, employees, employee representatives), any information that directly identifies an employee or any information that could reasonably be used to identify the employee must be withheld. Logs must be saved for at least five years following the end of the calendar year that they cover.

   Inspection guidelines: The format of the sharps injury log is not specified. The employer is permitted to determine the format in which the log is maintained (e.g. paper or electronic) and may include information in addition to that required by the standard, so long as the privacy of the injured worker is protected. Many employers already compile reports of percutaneous injuries to comply with paragraph (f)(3). Existing mechanisms for collecting these reports could be considered sufficient to meet the requirements for maintaining a log provided that the information meets the minimum requirements specified by the standard and the confidentiality of the injured employee is protected.

   Citation guidelines: Employers partially exempt from recordkeeping requirements under §1904 are exempt from the requirement of maintaining a sharps injury log, but are encouraged to do so. All employers, however, must still comply with the post-exposure documentation requirements of paragraphs (f)(3) and the annual review documentation requirements of (c)(1)(iv), even when a physical log is not required.

Interface with other standards

A revision to the Recording and Reporting Occupational Injuries and Illnesses rule was published January 19, 2001 and became effective January 1, 2002. Paragraph 1904.8 requires all work-related injuries from needlesticks and cuts, lacerations, punctures and scratches from sharp objects contaminated with another person's blood or OPIM to be recorded on the OSHA 300 as an injury. To protect the employee's privacy, the employees name may not be entered on the OSHA 300. Paragraphs 1904.29(b)(6) thru (b)(9) discuss privacy concerns. Employers must keep a separate confidential list of the case numbers and employee names so they can update the cases or provide them if asked by the government. If the employee develops a bloodborne disease, the entry must be updated and recorded as an illness.

The Hazard Communication standard, §1910.1200, applies only to the hazards of chemicals in the workplace and does not apply to biological hazards such as bloodborne diseases.

Records concerning employee exposure to bloodborne pathogens and records about HIV and/or HBV status are both considered employee medical records within the meaning of §1910.1020. Under §1913.10(b)(4), the Compliance Officer may review these records onsite for verification of compliance with the medical surveillance requirements. If requested, this review shall be conducted under the observation of the medical record holder or other employer designated healthcare professional. The compliance officer should not record or take offsite any information from the medical record other than documentation of the fact of compliance or noncompliance.

Generally, compliance/noncompliance verification requires no additional action (i.e., in-depth review, copying, and/or removal of confidential medical information from the worksite) on behalf of the compliance officer. If additional or more detailed information is required for clarification, or to support a suspected violation, the compliance officer is advised to seek a medical access order (MAO) for obtaining the necessary information from the Director (Medical Records Officer), Office of Occupational Medicine. Also, when a compliance officer anticipates, or if it is known that there may be a problem in gaining access to confidential medical information/medical records, or the employer denies access during the course of the inspection, the compliance officer is advised to obtain an administrative subpoena (from the regional solicitor) in addition to the MAO before looking at any confidential medical information or medical records.

Generally, the Respiratory Protection standard, §1910.134, does not apply. However, placing or storing respirators in areas where they could be contaminated by body fluids constitutes a violation of §1910.134(h)(2)(i) or §1910.139(b)(6), if the respirator is used for protection against tuberculosis.

The Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, §1910.120, covers four groups of employees: workers at uncontrolled hazardous waste remediation sites; workers at Resource Conservation and Recovery Act (RCRA) permitted hazardous waste treatment, storage and disposal facilities; workers performing corrective actions involving cleanup operations at RCRA sites; and those workers expected to respond to emergencies caused by the uncontrolled release of a hazardous substance.

1. The definition of hazardous substance includes any biological agent or infectious material which may cause disease or death. There are potential scenarios where the bloodborne and HAZWOPER standards may interface, such as: workers involved in cleanup operations at hazardous waste sites involving infectious waste; workers at RCRA permitted incinerators that burn infectious waste; workers at RCRA permitted incinerators that burn infectious waste and that are involved in cleanup operations; and workers responding to an emergency caused by the uncontrolled release of infectious material, e.g., a transportation accident.

2. Employers of employees engaged in these types of activities must comply with the requirements in §1910.120 as well as the bloodborne pathogens standard. If there is a conflict or overlap, the provision that is more protective of employee safety and health applies.

This directive provides guidance for enforcement of the Bloodborne Pathogens standard. The agency's application of this policy in any particular matter will, however, depend upon all relevant circumstances. For purposes of providing information and guidance, this directive also restates, clarifies, or explains the provisions of the standard. OSHA's restatement, clarification or explanation of the requirements of the standard does not amend the standard or create new legal duties, obligations or defenses.

OSHA COMPLIANCE MANUAL

Sample exposure control plan

The exposure control plan is a key component of compliance with the Bloodborne Pathogens standard. The plan has to be tailored to the specifications of your facility, but there are certain universal elements that need to be included in any plan. The following sample exposure control plan, which was developed by federal OSHA, will assist you in the format and set-up of a written program.

Bloodborne Pathogens Exposure Control Plan

POLICY

The _____*(Facility name)* is committed to providing a safe and healthful work environment for our entire staff. In pursuit of this endeavor, the following exposure control plan (ECP) is provided to eliminate or minimize occupational exposure to bloodborne pathogens in accordance with OSHA standard 29 CFR 1910.1030, "Occupational Exposure to Bloodborne Pathogens."

The ECP is a key document to assist our firm in implementing and ensuring compliance with the standard, thereby protecting our employees. This ECP includes:

1. Determination of employee exposure,
2. Implementation of various methods of exposure control, including:
   - Universal precautions
   - Engineering and work practice controls
   - Personal protective equipment
   - Housekeeping
3. Hepatitis B vaccination,
4. Post-exposure evaluation and follow-up,
5. Communication of hazards to employees and training,
6. Recordkeeping, and
7. Procedures for evaluating circumstances surrounding an exposure incident.

PROGRAM ADMINISTRATION

_____*(Name/department)* is (are) responsible for the implementation of the ECP. _____*(Name/department)* will maintain, review, and update the ECP at least annually, and whenever necessary to include new or modified tasks and procedures. Contact location/phone number: _____

Those employees who are determined to have occupational exposure to blood or other potentially infectious materials (OPIM) must comply with the procedures and work practices outlined in this ECP.

_____*(Name/department)* will maintain and provide all necessary personal protective equipment (PPE), engineering controls (e.g., sharps containers), labels, and red bags as required by the standard. _____*(Name/department)* will ensure that adequate supplies of this equipment are available in the appropriate sizes.
Contact location/phone number: _____

OSHA COMPLIANCE MANUAL

_____*(Name/department)* will be responsible for ensuring that all medical actions required are performed and that appropriate employee health and OSHA records are maintained. Contact location/phone number: _____

_____*(Name/department)*will be responsible for training, documentating training, and making the written ECP available to employees, OSHA, and NIOSH representatives. Contact location/phone number: _____

EMPLOYEE EXPOSURE DETERMINATION

The following is a list of all job classifications at our establishment in which *all employees* have occupational exposure:

JOB TITLE	DEPARTMENT/LOCATION
(Example: Phlebotomists	*Clincal Lab)*

The following is a list of job classifications in which *some employees* at our establishment have occupational exposure. Included is a list of tasks and procedures, or groups of closely related tasks and procedures, in which occupational exposure may occur for these individuals:

JOB TITLE	DEPARTMENT/LOCATION	TASK/PROCEDURE
(Example: Housekeeper	*Environmental Services*	*Handling regulated waste)*

NOTE: Part-time, temporary, contract, and per diem employees are covered by the standard. How the provisions of the standard will be met for these employees should be described in the ECP.

METHODS OF IMPLEMENTATION AND CONTROL

Universal precautions

All employees will utilize universal precautions.

Exposure control plan

Employees covered by the Bloodborne Pathogens standard receive an explanation of this ECP during their initial training session. It will also be reviewed in their annual refresher training. All employees have an opportunity to review this plan at any time during their work shifts by contacting _____ _____*(Name/department*. If requested, we will provide an employee with a copy of the ECP free of charge and within 15 days of the request.

_____*(Name/department)* is responsible for reviewing and updating the ECP annually or more frequently if necessary to reflect any new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure.

Engineering controls and work practices

Engineering controls and work practice controls will be used to prevent or minimize exposure to bloodborne pathogens. The specific engineering controls and work practice controls used are listed below:

(Examples: Non-glass capillary tubes, biohazard containers, SESIPs, needleless systems)

- _____
- _____

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Sharps disposal containers are inspected and maintained or replaced by _____ _____*(Name/department)* every _____ *(List frequency)* or whenever necessary to prevent overfilling.

This facility identifies the need for changes in engineering control and work practices through *(Examples: Review of OSHA records, employee interviews, committee activities, etc.)*

_____

_____

We evaluate procedures and new products regularly by *(Literature reviews, supplier information, products considered)*

_____

_____

Both front line workers and management officials are involved in this process *(Describe how all employees will be involved)*

_____

_____

_____*(Name/department)* will ensure effective implementation of these recommendations.

Personal protective equipment (PPE)

PPE is provided to our employees at no cost to them. Training is provided by _____ _____*(Name/department)* in the use of the appropriate PPE for the tasks or procedures employees will perform.

The types of PPE available to employees are as follows *(Examples: gloves, eye protection)*

_____

_____

PPE is located _____ *(List location)* and may be obtained through _____*(Name/department) (Specify how employees are to obtain PPE, and who is responsible for ensuring that it is available)*

All employees using PPE must observe the following precautions:

- Wash hands immediately or as soon as feasible after removal of gloves or other PPE.
- Remove PPE after it becomes contaminated, and before leaving the work area.
- Used PPE may be disposed of in _____*(List appropriate containers for storage, laundering, decontamination, or disposal)*
- Wear appropriate gloves when it can be reasonably anticipated that there may be hand contact with blood or OPIM, and when handling or touching contaminated items or surfaces; replace gloves if torn, punctured, contaminated, or if their ability to function as a barrier is compromised.
- Utility gloves may be decontaminated for reuse if their integrity is not compromised; discard utility gloves if they show signs of cracking, peeling, tearing, puncturing, or deterioration.
- Never wash or decontaminate disposable gloves for reuse.
- Wear appropriate face and eye protection when splashes, sprays, spatters, or droplets of blood or OPIM pose a hazard to the eye, nose, or mouth.

- Remove immediately or as soon as feasible any garment contaminated by blood or OPIM, in such a way as to avoid contact with the outer surface.

The procedure for handling used PPE is as follows *(May refer to specific agency procedure by title or number and last date of review) (Example: How and where to decontaminate face shields, eye protection, resuscitation equipment)*

_____

_____

Housekeeping

Regulated waste is placed in containers which are closable, constructed to contain all contents and prevent leakage, appropriately labeled or color-coded, and closed prior to removal to prevent spillage or protrusion of contents during handling.

The procedure for handling sharps disposal containers is *(May refer to specific agency procedure by title or number and last date of review)*

_____

_____

_____

The procedure for handling other regulated waste is *(May refer to specific agency procedure by title or number and last date of review)*

_____

_____

_____

Contaminated sharps are discarded immediately or as soon as possible in containers that are closable, puncture-resistant, leakproof on sides and bottoms, and labeled or color-coded appropriately. Sharps disposal containers are available at _____
(Must be easily accessible and as close as feasible to the immediate area where sharps are used)

Bins and pails *(e.g., wash or emesis basins)* are cleaned and decontaminated as soon as feasible after visible contamination.

Broken glassware which may be contaminated is picked up using mechanical means, such as a brush and dust pan.

Laundry

The following contaminated articles will be laundered by this company:

_____ _____

_____ _____

Laundering will be performed by _____ *(Name/department)* at _____ _____ *(Time and/or location)*

The following laundering requirements must be met:

- Handle contaminated laundry as little as possible, with minimal agitation.

- Place wet contaminated laundry in leak-proof, labeled or color-coded containers before transport. Use _____*(Red bags or bags marked with biohazard symbol)* for this purpose.
- Wear the following PPE when handling and/or sorting contaminated laundry *(List appropriate PPE)*_____

Labels

The following labeling method(s) is used in this facility:

EQUIPMENT TO BE LABELED	***LABEL TYPE (size, color, etc.)***
(Example: Specimens, contaminated laundry	*Red bag, biohazard label)*
_____	_____
_____	_____

_____ *(Name/department)* will ensure warning labels are affixed or red bags are used as required if regulated waste or contaminated equipment is brought into the facility. Employees are to notify _____ if they discover regulated waste containers, refrigerators containing blood or OPIM, contaminated equipment, etc. without proper labels.

Hepatitis B vaccination

_____ *(Name/department)* will provide training to employees on hepatitis B vaccinations, addressing the safety, benefits, efficacy, methods of administration, and availability.

The hepatitis B vaccination series is available at no cost after training and within 10 days of initial assignment to employees identified in the exposure determination section of this plan. Vaccination is encouraged unless: 1) documentation exists that the employee has previously received the series, 2) antibody testing reveals that the employee is immune, or 3) medical evaluation shows that vaccination is contraindicated.

However, if an employee chooses to decline vaccination, the employee must sign a declination form. Employees who decline may request and obtain the vaccination at a later date at no cost. Documentation of refusal of the vaccination is kept at _____*(List location or person responsible for this recordkeeping)*.

Vaccination will be provided by _____*(Licenced healthcare professional (HCP) who is responsible for this part of the plan)* at _____ *(location).*

Following the medical evaluation, the healthcare professional will provide a written opinion to our company. The information in the opinion is limited to whether the employee requires the hepatitis vaccine, and if the vaccine was administered. The opinion letter further acknowledges that the employee has been informed of the medical evaluation results relating to the exposure and whether additional treatment is recommended. We give the employee a copy of the written opinion within 15 days after the evaluation.

Post-exposure evaluation and follow-up

Should an exposure incident occur, contact _____ *(Name)* at the following number _____

An immediately available confidential medical evaluation and follow-up will be conducted by _____ _____ *(Licenced healthcare professional)*. Following the initial first aid *(clean wound, flush eyes or other mucous membrane etc.)*, the following activities will be performed:

- Document the routes of exposure and how the exposure occurred.
- Identify and document the source individual (unless the employer can establish that identification is infeasible or prohibited by state or local law).

- Obtain consent and make arrangements to have the source individual tested as soon as possible to determine HIV, HCV, and HBV infectivity; document that the source individual's test results were conveyed to the employee's healthcare provider.
- If the source individual is already known to be HIV, HCV and/or HBV positive, new testing need not be performed.
- Assure that the exposed employee is provided with the source individual's test results and with information about applicable disclosure laws and regulations concerning the identity and infectious status of the source individual (e.g., laws protecting confidentiality).
- After obtaining consent, collect exposed employee's blood as soon as feasible after exposure incident, and test blood for HBV and HIV serological status.
- If the employee does not give consent for HIV serological testing during collection of blood for baseline testing, preserve the baseline blood sample for at least 90 days; if the exposed employee elects to have the baseline sample tested during this waiting period, perform testing as soon as feasible.

Administration of post-exposure evaluation and follow-up

_____ *(Name/department)* ensures that healthcare professional(s) responsible for employee's hepatitis B vaccination and post-exposure evaluation and follow-up are given a copy of OSHA's Bloodborne Pathogens standard.

_____ *(Name/department).* ensures that the healthcare professional evaluating an employee after an exposure incident receives the following:

- A description of the employee's job duties relevant to the exposure incident,
- Route(s) of exposure,
- Circumstances of exposure,
- If possible, results of the source individual's blood test, and
- Relevant employee medical records, including vaccination status.

_____ *(Name/department)* provides the employee with a copy of the evaluating healthcare professional's written opinion within 15 days after completion of the evaluation.

Procedures for evaluating circumstances surrounding an exposure incident

_____ *(Name/department)* will review the circumstances of all exposure incidents to determine:

- Engineering controls in use at the time;
- Work practices followed;
- A description of the device being used, including type and brand;
- Protective equipment or clothing that was used at the time of the exposure incident *(gloves, eye shields, etc.)*;
- Location of the incident;
- Procedure being performed when the incident occurred; and
- Employee's training.

_____ *(Name/department)* will record all percutaneous injuries from contaminated sharps in the Sharps Injury Log and/or with comparable information on the OSHA 300 Log.

Employee training

All employees who have occupational exposure to bloodborne pathogens receive training conducted by_____ *(Name/department) (Attach a brief description of their qualifications)*

All employees who have occupational exposure to bloodborne pathogens receive training on the epidemiology, symptoms, and transmission of bloodborne pathogen diseases. In addition, the training program covers, at a minimum, the following elements:

- A copy and explanation of the standard;
- An explanation of our ECP and how to obtain a copy;
- An explanation of methods to recognize tasks and other activities that may involve exposure to blood and OPIM, including what constitutes an exposure incident;
- An explanation of the use and limitations of engineering controls, work practices, and PPE;
- An explanation of the types, uses, location, removal, handling, decontamination, and disposal of PPE;
- An explanation of the basis for PPE selection;
- Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine will be offered free of charge;
- Information on the appropriate actions to take and persons to contact in an emergency involving blood or OPIM;
- An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available;
- Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident;
- An explanation of the signs and labels and/or color coding required by the standard and used at this facility; and
- An opportunity for interactive questions and answers with the person conducting the training session.

Training materials for this facility are available at: _____ *(Location of records)*

Recordkeeping

Training records

Training records are completed for each employee upon completion of training. These documents will be kept for at least three years at _____*(Name/location of records)*

The training records include:

- Dates of the training sessions,
- Contents or a summary of the training sessions,
- Names and qualifications of persons conducting the training, and
- Names and job titles of all persons attending the training sessions.

Employee training records are provided upon request to the employee or the employee's authorized representative within 15 working days. Such requests should be addressed to _____ _____(*Name/department*)

Medical records

Medical records are maintained for each employee with occupational exposure in accordance with 29 CFR 1910.1020, "Access to Employee Exposure and Medical Records."

_____ *(Name/department)* is responsible for maintenance of the required medical records. These confidential records are kept at *(List location)* _____ _____ for at least the duration of employment plus 30 years.

Employee medical records are provided upon request of the employee or to anyone having written consent of the employee within 15 working days. Such requests should be sent to _____ _____*(Name/department/address)*

Injury and illness recordkeeping

An exposure incident is evaluated to determine if the case meets OSHA's recordkeeping requirements in 29 CFR 1904. This determination and the recording activities are done by _____ _____*(Name/department)*

Sharps injury log

In addition to the 29 CFR 1904 recordkeeping requirements, a confidential sharps injury log is maintained for recording percutaneous injuries from contaminated sharps.

Each incident record includes the date of the injury, the type and brand of the device involved, the department where the incident occurred, and an explanation of how the incident occurred.

The sharps log is reviewed at least annually as part of the annual evaluation of the program and is maintained for at least five years following the end of the calendar year covered.

If a copy is requested, it must have any personal identifiers removed from the report. The log is kept by _____ _____*(Name/department)*

Exposure control plan evaluation

If it is determined that revisions need to be made, _____ *(Name/department)* will ensure that appropriate changes are made to this ECP. *(Changes may include an evaluation of safer devices, adding employees to the exposure determination list)*

Hepatitis B vaccine declination (mandatory)

When an employee with bloodborne pathogens exposure risks declines the hepatitis B vaccine, he or she must read and sign the following declination form.

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Signed: _____*(Employee name)*

Date: _____

Establishment/Facility: _____

Sample sharps injury log **Year 2** _____

Date	Case/ Report number	Type of device (e.g., syringe, suture needle)	Brand name of device	Work area where injury occurred [e.g., Geriatrics, Lab]	Brief description of how the incident occurred [i.e., procedure being done, action being performed (disposal, injection, etc.), body part injured]

29 CFR 1910.1030, OSHA's Bloodborne Pathogens standard, in paragraph (h)(5), requires an employer to establish and maintain a Sharps Injury Log for recording all percutaneous injuries in a facility occurring from *contaminated* sharps. The purpose of the Log is to aid in the evaluation of devices being used in healthcare and other facilities and to identify problem devices or procedures requiring additional attention or review. This log must be kept in addition to the injury and illness log required by 29 CFR 1904. The Sharps Injury Log should include all sharps injuries occurring in a calendar year. The log must be retained for five years following the end of the year to which it relates. The Log must be kept in a manner that preserves the confidentiality of the affected employee.

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Hazard communication: An employee's right to understand

Introduction

About one in every four workers routinely comes in contact with hazardous chemicals while performing his or her job. In many cases, the chemicals may be no more dangerous than those used at home. But in the workplace, the occurrence of exposure is likely to be greater, concentrations higher, and exposure time longer. Reactions to chemical exposures range from slight skin, eye, or respiratory irritation to life-threatening cancers, blood diseases, and debilitating lung damage.

OSHA developed the Hazard Communication Standard (HCS) to protect workers from these dangerous exposures. The standard was originally based on a simple concept—that employees have both a need and a right to know about the hazards and identities of the chemicals they are exposed to when working. In 2012, OSHA changed the HCS drastically, using the concept that the employees have a "right to understand" about the hazards of chemicals they are exposed to. They also need to know what they can do to protect themselves. Additionally, when employers have information about the chemicals being used, they can take steps to reduce exposures, substitute less hazardous materials, and establish safe work practices to prevent illnesses and injuries caused by these substances.

The HCS establishes uniform requirements to make sure that the hazards of all chemicals imported into, produced, or used in U.S. workplaces are evaluated and classified and that this hazard information is communicated to employers and exposed employees. Basically, the rule incorporates a downstream flow of information. This means that chemical manufacturers have the primary responsibility for generating and disseminating information and chemical users must obtain the information and transmit it to their exposed employees.

Evaluating and classifying chemical hazards involves technical concepts and is a process that requires the professional judgement of experienced experts. That's why the HCS is designed so that employers who simply use chemicals, rather than produce or import them, are not required to evaluate the hazards of those substances.

Hazard classification is the responsibility of the producers and importers of the materials, who must then pass that information to the purchasers and end-users of the products. Employers that don't produce or import chemicals need only focus on those parts of the rule that deal with establishing a workplace program and communicating information to their workers. (**Note**: If employers create mixtures in the workplace, there will be more responsibility and requirements than for employers who simply use chemicals that have already been evaluated and classified.)

Hazcom 2012 and GHS

On March 26, 2012, OSHA published a new rule to align the HCS with a new global system developed by the United Nations, called the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). This important change adapts the HCS into a more uniform way of transmitting information that all chemical manufacturers, importers and distributors, along with employers, must use to communicate the hazards of chemicals to workers.

The rule became effective May 26, 2012; however, there is a phase-in period for certain elements.

Phase-in period for Hazcom 2012		
Date	**Requirement(s)**	**Who**
December 1, 2013	Train employees on the new label elements and safety data sheet (SDS) format.	Employers
June 1, 2015 December 1, 2015	Compliance with all modified provisions of this final rule, except: The Distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label	Chemical manufacturers, importers, distributors and employers
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.	Employers
Transition Period to the effective completion dates noted above	May comply with the March 26, 2012, rule, the old rule, or both.	Chemical manufacturers, importers, distributors, and employers

Because there is a phase-in period, employers can still comply with the older HCS requirements through the dates above. However, in Keller's *OSHA Compliance Manual*, text has been updated to reflect the March 26, 2012, rule.

Responsibilities under the Hazard Communication Standard

The HCS requires information to be prepared and transmitted regarding all hazardous chemicals. It covers both physical hazards (such as flammability), and health hazards (such as irritation, lung damage, and cancer). Most chemicals used in the workplace have some hazard potential and will be covered by the rule.

Chemical manufacturers, importers, and suppliers

Chemical manufacturers and importers have to evaluate the hazards of the chemicals they produce or import. Using that information, they prepare labels for containers and more detailed technical bulletins called safety data sheets (SDSs).

Chemical manufacturers, importers, and distributors of hazardous chemicals are required to automatically provide the appropriate labels and safety data sheets to users when the chemicals are shipped. Every container of hazardous chemicals you receive must be labeled, tagged, or marked with the required information. A properly completed SDS has to accompany the first shipment of the chemical and with the next shipment after the SDS is updated.

Employers

Employers that use hazardous chemicals need to have a program in place to ensure the hazard information is provided to exposed employees. "Use" means to package, handle, react, or transfer. This is an intentionally broad scope, and includes any situation where a chemical is present in such a way that employees may be exposed under normal conditions or in an emergency.

If your employees are exposed to chemicals, you will need to develop a written hazard communication program that covers:

- A chemical inventory list;
- Container labels and other forms of warning;
- Collection and availability of SDSs; and
- Employee information and training.

Hazard communication compliance checklist

- Obtain a copy of the HCS rule
- Make sure to comply with the Hazcom 2012 requirements by the specified timeframes
- Read and understand the rule's requirements
- Prepare a written hazard communication program
- Assign responsibilities
- Prepare a chemical inventory
- Ensure that all chemical containers are labeled
- Ensure that there is an SDS for each chemical
- Provide training for all workers with exposure risks
- Review the program routinely

Responsibilities for communicating hazards

Chemical manufacturers and importers	• Classify the hazards of each product. • Communicate the hazard information and associated safety measures downstream to customers through labels and SDSs.
Distributors	• Communicate the hazard information and associated safety measures downstream to customers (other distributors and end-users) through labels and SDSs.
Employers	• Identify and list hazardous chemicals in the workplaces. • Obtain SDSs and labels for each hazardous chemical. • Develop and implement a written hazard communication program, including labels, SDSs, and employee training, based on the list of chemicals, SDSs and label information. • Communicate hazard information to the employees through labels, SDSs and formal training programs.
Employers in work operations where employees only handle chemicals in sealed containers (warehousing or retail sales)	• Ensure that labels on incoming containers are not removed. • Maintain SDSs that are received. • Provide SDS upon employee request. • Provide training relative to spills and leaks.
Retail distributors	• Provide SDS upon request to commercial customers. • Post a sign to inform customers that SDSs are available.

Hazard classification procedures

The basis for all "hazard communication" is that the chemical has been evaluated and classified as to its hazards. This responsibility generally falls to the chemical manufacturer or importer. OSHA requires that these parties evaluate and classify each substance using pre-determined "Hazard Classes," (e.g., "flammable gas"). After that has been done, the manufacturer or importer must then assign a "Category" to show severity of the hazard. The lower the Category number, the higher the severity within that Class (for example, a Category 1

flammable gas is more flammable than a Category 2). Depending on the Class, there can be up to 5 Categories. As a result of the GHS/Hazcom revisions in 2012, all of this information is standardized, both in the evaluation and classification method, as well as in label elements, SDS elements, and hazard statements. In other words, if a chemical is determined to be a "Category 1 flammable gas" then there is a predefined list of pictograms, label elements, SDS wording, etc., that manufacturers or importers must utilize.

Note: Employers are not required to classify chemicals unless they choose not to rely on the classification performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

Chemical manufacturers, importers, or employers classifying chemicals must identify and consider the full range of available scientific literature and other evidence concerning the potential hazards. There is no requirement to test the chemical to determine how to classify its hazards. OSHA requires chemical manufacturers to consult Appendix A to §1910.1200 for classification of health hazards, and Appendix B to §1910.1200 for the classification of physical hazards.

Mixtures

Chemical manufacturers, importers, or employers evaluating chemical mixtures must follow the procedures described in Appendices A and B to §1910.1200. Under HCS, it is recommended to use the test data for the complete mixture, if available. If not, then, there are other options for classifying the mixture using "bridging principles" based on ingredients and data.

Preparing a written hazard communication program

All workplaces where employees are exposed to hazardous chemicals are required to have a written plan describing how hazard communication will be carried out in that facility. Plan preparation is not just a paper exercise—all of the elements must be implemented in order to be in compliance with the rule. This is one of the most important aspects of your compliance program. It is also one of the first items that an OSHA compliance officer will examine to determine if your hazard communication program is adequate.

The irony is that the area that OSHA checks first is the one that the employer most frequently leaves for last. A large percentage of the OSHA citations have been issued due to the lack of, or an inadequate, written program. In fact, deficiencies to the written hazard communication program requirement has topped the list of federal OSHA violations as the most cited standard for many years.

The plan does not have to be lengthy or complicated. It is intended to be a blueprint for implementation of your program—an assurance that all aspects of the requirements have been addressed. It serves to communicate to your employees and to OSHA exactly what you have done to comply with the HCS. In general, the written program must describe how the requirements for labels and other forms of warning, safety data sheets, employee information, and training are going to be met in your facility.

Remember that the written program needs to reflect what you are doing in your workplace. If you use a generic program, it must be adapted to address the facility it covers. For example, the written plan must list the chemicals present at the site, indicate who is to be responsible for the various aspects of the program in your facility, and indicate where written materials will be made available to employees. Your written program must cover the following topics.

Hazardous chemical inventory list

This is the inventory of chemicals for which you must have SDSs. The list may be compiled for the workplace as a whole or for individual work areas. Remember to include any consumer products that you have determined are covered by the standard as well as any substances you may inadvertently produce, such as carbon monoxide. This list must be made available to employees, upon request.

You need only list the chemical name, but OSHA suggests that for your own use, you include all information that will assist in clearly identifying the substance in question, such as chemical name, common or trade name, manufacturer's product name, and CAS number.

Labels and other forms of warning

Your written program should address the following points regarding labeling:

1. Designate the person responsible for ensuring all in-plant containers are labeled;
2. Designate the person responsible for ensuring all shipped containers are labeled;
3. Describe any labeling system used, either on shipped containers or in-plant (include samples of labels used);
4. Describe written alternatives to labeling of in-plant containers, if used (for example, putting the label information on batch tickets for stationary process tanks, using posters for air emissions);
5. Procedures to review and update label information when necessary and to ensure that labels that fall off or become unreadable are immediately replaced;
6. A copy of posters and other written materials used to inform employees about the HCS, or where the information is located.

Safety data sheets (SDS)

In addition to copies of the SDSs, you should have complete documentation covering the following points:

1. Designate the person responsible for obtaining/maintaining the SDSs;
2. Where the data sheets are kept in your facility and how employees can obtain access to them;
3. The procedure to follow when an SDS is not received at time of first shipment;
4. A list of chemicals received without SDSs and copies of request letters you have sent to manufacturer or supplier;
5. If you generate SDSs, the procedure for updating the SDS when new and significant health information is found;
6. A description of alternatives to actual data sheets used in the workplace, if any; and
7. A copy of the SDS format used (if your company had to generate any SDSs).

Employee training

Be sure the following points are covered in your training program:

1. Designate the person responsible for conducting training;
2. List the criteria used to determine which employees will receive training (if you are training all employees, state this);
3. Discuss the format of the program that is used (audiovisual, classroom instruction, etc.);
4. Procedure to train new employees at the time of their initial assignment;
5. Procedure to retrain employees when a new hazard is introduced (for example, will personnel track the training and retraining, or will area supervisors?);
6. Include certificates signed by employees on completion of their training, if you used such a system.

Hazards of non-routine tasks

To cover all situations of employee exposure, be sure to include the following non-routine procedures in your hazard communication program:

1. Describe the methods you will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels). What procedures do you have to ensure that those jobs that are not part of the weekly or monthly functioning of your facility fall under your employee training system?

2. Describe how will you inform employees of the hazards of chemicals contained in unlabeled pipes in their work areas.

Getting started: Assign responsibility

You will find that developing an adequate hazard communication program requires a comprehensive effort and the cooperation of all departments within the company. The first item on the agenda should be to appoint a coordinator for the program. Without an overall coordinator, critical elements may be overlooked.

The coordinator will have overall responsibility for developing the chemical inventory, organizing the SDSs, setting up employee training, updating files on chemicals present in the workplace, and processing requests for information from employees and OSHA. Most important, the coordinator should know how the program was implemented through careful documentation and be able to answer questions from OSHA.

For any safety and health program, success depends on commitment at all levels. It is particularly true for hazard communication, where success requires a change in behavior. This will only occur if employers understand the program and are committed to its success, and if employees are motivated by the people presenting the information to them.

Developing a hazardous chemical list

As part of a hazard communication written program, you will need to compile a list of all hazardous chemicals used, or present in your workplace. The list will eventually serve as an inventory of every substance that has an SDS. At this point, however, preparing the list will help you complete the rest of the program since it will give you some idea of the scope of the program required for compliance in your workplace.

Assess for workplace hazards

The best way to prepare a comprehensive chemical list is to perform a comprehensive assessment of your facility. This means a department-by-department search for every chemical present. It includes cleaning supplies, such as bathroom and window cleaners; grounds maintenance chemicals, such as weed killers and fertilizer; vendor samples being used on a trial basis; fuels; paints; as well as all chemicals used in your company's daily operations.

The broadest possible perspective should be taken. Sometimes people think of "chemicals" as being only liquids in containers. The HCS covers chemicals in all physical forms—liquids, solids, gases, vapors, fumes, and mists—whether they are "contained" or not. The hazardous nature of the chemical and the potential for exposure are the factors which determine whether a chemical is covered. If it's not hazardous and there is no potential for exposure, it's not covered.

What to look for

Identify chemicals in containers, including pipes, but also think about chemicals generated in the work operations. For example, welding fumes, dusts, and exhaust fumes are all sources of chemical exposures. Some other suggestions include:

- Read labels provided by suppliers for hazard information,
- Make a list of all chemicals that are potentially hazardous,
- Note the storage and use location(s) of the products, and
- Note the hazards as found on the label.

As you are compiling this inventory, consider listing the substances separately by department. You will find that it makes it easier to conduct employee training to know which chemicals are used in which departments.

Types of regulated substances

The following list identifies some types of potentially hazardous chemicals that may be present in your workplace.

Acids
Adhesives
Aerosols
Asbestos
Battery fluids
Benzene
Catalysts
Caustics
Cleaning agents
Coal tar pitch
Coatings
Degreasing agents
Detergents
Dusts
Etching agents
Fiberglass
Flammables
Foaming resins
Fuels
Fungicides
Gasoline
Glues
Greases
Industrial oils
Inks
Insecticides
Herbicides
Janitorial supplies
Kerosene
Lacquers
Lead
Lye
Oxalic Acid
Paints
Pesticides
Plastic resins
Process chemicals
Resins
Sealers
Shellacs
Solders
Solvents
Strippers
Sufactants
Thinners
Varnishes
Water treatments
Wood preservatives
Xylene

Substances not covered by HCS

Certain hazardous substances are regulated by other agencies; therefore, OSHA has exempted them from coverage by the Hazard Communication Standard. HCS does not apply to the following substances:

- Any hazardous waste, as defined and regulated under RCRA.
- Any hazardous substance, as defined and regulated under CERCLA.
- Tobacco or tobacco products.
- Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard the products pose to employees is the potential for combustion.
- Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store or restaurant) and foods intended for personal consumption by employees while in the work-place.
- Any drug as defined by the federal Food, Drug, and Cosmetic Act when it is in solid, final form for direct administration to the patient (e.g., pills), drugs packaged by the chemical manufacturer for sale to consumers (e.g., over-the-counter drugs), and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies).

- Cosmetics packaged for sale to consumers and those intended for personal use by employees in the workplace.
- Any consumer product or hazardous substance as defined in the Consumer Product Safety Act and Federal Hazardous Substances Act respectively, used in the workplace in the same manner as normal consumer use, and which use results in exposure which is not greater than exposures experienced by consumers.
- Nuisance particles when they do not pose any physical or health hazard covered by HCS.
- Ionizing and nonionizing radiation.
- Biological hazards.
- Articles.

If you have exempt substances, you must be able to demonstrate that the substance is subject to other regulations and produce the appropriate label (if required) and any required identification documents, should an OSHA compliance officer inquire.

Weed out non-regulated products

Review the completed inventory list and determine which chemicals are hazardous, as determined by OSHA. This involves checking each chemical against the OSHA-designated lists, reviewing the SDS information sent by the manufacturer, as well as reviewing §1910.1200(b) to determine if any items can be eliminated from your list because they are exempted materials. Weed out those chemicals not regulated by OSHA.

You will also want to assess employee exposure as it relates to consumer products, such as window cleaner. The level of exposure will determine if the substance must be listed on your hazardous chemical inventory. For example, does the employee use window cleaner to wash windows for the most part of each day, or does the employee use window cleaner once every few months to keep the windows clean, as he or she would at home?

When you are done with this assessment, you will have an inventory of hazardous chemicals. Keep this list current as part of your written hazard communication program.

Once you have compiled a list of the potentially hazardous chemicals used in your workplace, the next step is to find out if there are safety data sheets for all of them. Check you files against the inventory you have just compiled. If any are missing, contact your supplier and request one. It is a good idea to document these requests, either by copying the letter or writing a note regarding telephone conversations. If you have SDSs for chemicals that are not on you list, figure out why. Maybe you don't use the chemical anymore. Or maybe you missed it in your survey. Some suppliers do provide SDSs for products that are not hazardous. You do not have to maintain these.

Don't allow employees to use any chemicals for which you have not received an SDS. The SDS provides information you need to ensure proper protective measures are implemented prior to exposure.

What is an "article"?

Items considered "articles" are exempt from the requirements of the HCS. An article is defined as a manufactured item other than a fluid or particle which:

- Is formed to a specific shape or design during manufacture;
- Has end use function(s) dependent in whole or in part upon its shape or design during end use; and
- Must not release more than very small quantities (e.g., minute or trace amounts) of a hazardous chemical, or pose a physical hazard or health risk to employees under normal conditions of use.

It may be difficult to define what is considered "normal conditions of use." You may have a manufactured item that meets the definition of an article, but if it is burned, it produces a hazardous byproduct. The question then becomes, is burning "normal use" for the product? If burning occurs in its normal use, then it cannot be exempted as an article.

If a hazardous chemical can be expected to be released only when the item is repaired, then that is not considered part of its normal condition of use. The item would be considered an article under the HCS, and thus exempted.

Stainless steel tables, vinyl upholstery, and tires are considered articles. Products that are not articles include:

- Metal ingots that will be melted under normal conditions of use;
- Fabric treated with formaldehyde where downstream garment manufacturing employees will be exposed when making clothing; and
- Switches with mercury in them when a certain percentage break under normal conditions of use.

Basically, if the product will be processed in some way after leaving the manufacturing site—heated, welded, glued, sawed, etc.—and a hazardous chemical *could* be emitted, it probably will not qualify for the article exemption.

What about combustible dust?

OSHA does not currently provide a definition for combustible dust in the HCS. However, guidance is being provided through existing documents, including the Combustible Dust National Emphasis Program Directive CPL 03-00-008, which includes an operative definition, as well as provides information about current responsibilities in this area. In addition, there are a number of voluntary industry consensus standards (particularly those of the NFPA) that address combustible dust.

In the HCS, combustible dust hazards must be addressed on labels and SDSs. Label elements are provided for combustible dust in the HCS and include the signal word "warning" and the hazard statement "May form combustible dust concentrations in the air." For chemicals in a solid form that do not present a combustible dust hazard, but may form combustible dusts while being processed in normal downstream uses, the HCS allows the chemical manufacturer some flexibility in labeling requirements. The manufacturer or importer may transmit the label to the customer at the time of the initial shipment, but the label does not need to be included with subsequent shipments unless it changes. This provides the needed information to the downstream users on the potential hazards in the workplace, while acknowledging that the solid metal or other materials do not present the same hazards that are produced when these materials are processed under normal conditions of use.

Labeling or marking all containers

The Hazard Communication Standard requires chemical manufacturers, importers, and distributors to ensure that all containers of hazardous chemicals they ship are appropriately labeled. The label must contain the following elements:

- Pictogram: a symbol plus other graphic elements, such as a border, background pattern, or color that is intended to convey specific information about the hazards of a chemical. Each pictogram consists of a different symbol on a white background within a red square frame set on a point (i.e. a red diamond). There are nine pictograms under the GHS. However, only eight pictograms are required under the HCS.
- Signal words: a single word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for less severe hazards.
- Hazard Statement: a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.
- Precautionary Statement: a phrase that describes recommended measures to be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling of a hazardous chemical.
- Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.

Labels are not intended to be either the sole or the most complete source of information regarding the nature or identity of all hazardous chemicals in the workplace. The chemical identity on the label must be keyed to the chemical's SDS, which contains more extensive information.

Although you may choose to provide additional information, OSHA's requirements are limited to that required to convey the hazards to users. Other data regarding protective measures and first aid are included on the SDS or covered during training. In evaluating the effectiveness of labels, OSHA has found that the more detail that appears on a label, the less likely it is that users will read and act on the information.

Required pictograms under Hazcom/GHS

Note: The following illustration is shown in black and white. On actual container labels, each pictogram is required to have a red border/frame.

	Flame Over Circle		Flame		Exploding Bomb
	• Oxidizers		• Flammables • Self Reactives • Pyrophorics • Self-Heating • Emits Flammable Gas • Organic Peroxides		• Explosives • Self Reactives • Organic Peroxides
	Skull and Crossbones		Corrosion		Gas Cylinder
	• Acute toxicity (severe)		• Corrosives		• Gases Under Pressure
	Health Hazard		Environment		Exclamation Mark
	• Carcinogen • Respiratory Sensitizer • Reproductive Toxicity • Target Organ Toxicity • Mutagenicity • Aspiration Toxicity		• Environmental Toxicity		• Irritant • Dermal Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract • Hazardous to Ozone Layer

Sample Hazcom/GHS label

Note: The following sample label is shown in black and white. On actual container labels, the pictogram is required to have a red border/frame.

ISOPROPYL ALCOHOL

CAS # 67-63-0

DANGER

Highly flammable liquid and vapor.
Causes serious eye irritation.
May cause drowsiness or dizziness.
Precautionary statements:
Keep away from heat/sparks/open flames/hot surfaces. – No smoking/
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing dust/fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

IF ON SKIN: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Call a POISON CENTER or doctor/physician if you feel unwell.
In case of fire: Use for extinction: CO2, powder or water spray.
Store in a well-ventilated place. Keep container tightly closed. Keep cool. Store locked up.
Dispose of contents/container in accordance with local/regional/national/ international regulations.

All-Chem Supply Company, 353 Water Street, Maplewood, NJ 01234 1-888-555-1212

HMIS®III and NFPA labeling systems

While the Hazcom 2012 rule requires shipped containers to conform to the GHS-style labeling system, OSHA still allows employers to use their own workplace labeling systems (for example, HMIS®III and NFPA) for in-house usage. If an employer does choose to continue using an alternative labeling system, the employer must ensure that the system is updated as necessary so that it does not conflict with GHS-style labeling/ classification. **Note**: The NFPA and HMIS labeling systems may use different ratings criteria than does GHS; however, that in and of itself does not constitute "conflicting" with GHS, as the more detailed information would be available to employees via other means, such as SDSs, should they need it; the in-house rating systems are just intended to give a general idea on the hazards.

Employers who use general, nonspecific in-plant labeling systems such as HMIS or NFPA must ensure through their hazard communication program that their employees can correlate the visual warning on the in-plant container with the applicable chemical and its appropriate hazard warnings.

But remember, in-house systems must not conflict with GHS. For example, under the HCS, labels of chemicals that present specific target organ toxicity hazards must display the health hazard symbol; the skull and crossbones symbol is used only for certain acute toxicity hazards. If an in-house label used the skull and crossbones symbol for a specific target organ toxin, it would be in conflict with the revised HCS standard.

Using pictograms with in-house labeling

If the employer chooses to use the pictograms that appear in the HazCom rule's Appendix C on the workplace (or in-plant) labels, these pictograms may have a black border, rather than a red border. Employers may use additional instructional symbols that are not included in OSHA's HCS pictograms on the workplace labels. An example of an instructional pictogram is a person with goggles, denoting that goggles must be worn while handling the given chemical. Including both types of pictograms on workplace labels is acceptable. The same is true if the employer wants to list environmental pictograms or PPE pictograms from the HMIS to identify protective measures for those handling the chemical.

Relabeling containers

While you are never required under the HCS to relabel already labeled containers, there are several situations in which you may need to relabel:

1. If you break down the received quantity of chemical into smaller containers, you need to label these containers.
2. Labels that fall off or become unreadable must be replaced.
3. Relabeling incoming containers for a company-wide uniform labeling system. This also makes training easier because you only need to explain one system of labels. OSHA recommends that if you are using an in-plant labeling system for uniformity, allow the incoming container labels to remain on the original containers rather than removing them when in-plant labels are added.

Labels on solid metal

Many times a solid metal is exempted from labeling because it is considered an article, based on its down-stream use. However, if the end use of the metal results in hazardous chemical exposure to the employees working with it, then it is not an article and must be labeled.

The label information should indicate the chemical hazards released when the metal is worked on. The label should be sent to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same purchaser unless the information on the label changes. The label can be sent with the initial shipment or it can be sent with the SDS.

Labels on fire extinguishers

Fire extinguishers containing hazardous chemicals are required to be labeled under the HCS. The fire extinguisher manufacturer will attach labels to its fire extinguishers identifying the hazards of the contents.

Labels on machinery

Machinery found in the workplace that may contain hazardous chemicals does not fall under the definition of a container; therefore, the machine components do not have to be labeled under HCS. If there is the potential for exposure to the hazardous chemicals associated with these machines, the article exemption does not apply, and these chemicals would be covered by the rule.

Process equipment which incorporates containers, such as mixers and blenders, must be labeled. You may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by the rule.

Portable container exemption

When an employee fills a portable container with a chemical from a labeled container and that same employee uses the substance within one work shift, OSHA does not require the temporary-use container to be labeled. However, problems arise when the shift ends and there is material left in the portable container, or if another employee needs to use the container/substance—many employers require labeling of portable containers to avoid issues such as this

Other labeling exemptions

For years, many government agencies have required labeling on items they regulate. To avoid duplication, OSHA does not require hazard communication labeling for the following chemicals:

- Any pesticide, labeled under the Federal Insecticide, Fungicide, and Rodenticide Act.
- Any chemical substance or mixture labeled under the Toxic Substances Control Act.
- Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device labeled under the Federal Food, Drug, and Cosmetic Act or the Virus-Serum-Toxin Act.

Reserved

- Any beverage alcohols, wine or beer intended for nonindustrial use, labeled under the Federal Alcohol Administration Act.
- Agricultural or vegetable seed treated with pesticides and labeled under the Federal Seed Act.
- Any consumer product or hazardous substance, labeled under the Consumer Product Safety Act.

Bulk shipping containers

Where the shipping container is a tank truck, rail car, similar vehicle, the appropriate label may be posted on the outside of the vehicle or attached to the shipping papers. DOT placards are intended to provide protection for those involved in transportation, while OSHA labels are intended to protect the employees of the downstream recipient.

A label may not be shipped separately, even prior to shipment of the hazardous chemical, since to do so defeats the purpose of providing an immediate hazard warning. Mailing labels directly to purchasers bypasses employees involved in transporting and handling the hazardous chemical.

DOT labels and placards

Packages, containers, rail cars, or similar vessels holding hazardous materials are required to be marked, placarded, or labeled according to hazardous materials regulations (HMR). These containers must retain the labels until the hazardous materials are removed. This requirement comes from §1910.1201, Retention of DOT Markings, Placards, and Labels, an OSHA rule related to the Hazard Communication Standard.

The rule requires employers who receive hazardous materials to retain markings and any other information specified by HMR until the materials have been removed so they no longer pose a health or safety risk. It applies primarily to bulk packages (defined by the Department of Transportation (DOT) as containers with a capacity of more than 119 gallons), but also applies to non-bulk receptacles that are repackaged and reshipped.

The HCS requires that labels, tags, and markings be attached in a way that does not conflict with the HMR. Consequently, the HCS warning labels, tags, or markings do not appear on the outer packagings of combination packagings (*e.g.* bottles in a box). The inner packagings are required to be labeled according to HCS guidelines, while the outside packaging is marked or labeled according to HMR guidelines. Without restricting the regulation to bulk packaging, employers would be faced with confusing, redundant, and sometimes inconsistent labeling requirements between DOT and OSHA.

This requirement applies only to the employer that receives the hazardous materials — not the person responsible for transporting it — unless the materials are still controlled by the transporter at the final destination when it is out of transport.

Labeling is an on-going process

If you are purchasing and using hazardous chemicals, rather than producing or distributing them, you will primarily be concerned with ensuring that every purchased container is labeled. The most important thing to remember is that this is a continuing duty — all in-plant containers of hazardous chemicals must always be labeled.

Since labels can come off, information covered with product or otherwise made unreadable, it's essential to designate someone to be responsible for ensuring that all containers are labeled, that labels are readable, and that newly purchased materials are checked for labels prior to use.

With these requirements in mind, a compliance officer will be looking for the following types of information to ensure that labeling is properly implemented in your facility:

1. Person(s) responsible for ensuring labeling of in-plant containers;
2. Person(s) responsible for ensuring labeling of any shipped containers;
3. Description of labeling system(s) used;

4. Description of written alternatives to labeling of in-plant containers (if used); and,
5. Procedures to review and update label information when necessary.

Managing safety data sheets

The safety data sheet, or SDS, is the primary tool for finding hazard and safety information about the chemicals used in your workplace. The SDS lists the hazardous ingredients of a product, its physical and chemical characteristics, its effect on human health, chemicals with which it can adversely react, handling precautions, the types of measures that can be used to control exposure, emergency and first aid procedures, and methods to contain a spill.

OSHA requires that the SDS be written in English. However, this should not prevent an employer with employees who speak English as a second language from providing data sheets in other languages. SDSs must be readily accessible to employees with exposure risks during each work shift. If employees travel between work locations, SDSs may be kept at a central location, as long as they are accessible.

Your involvement with SDSs will depend on what category your company falls into. If you produce hazardous chemicals, your company is responsible for developing and sending out data sheets for each toxic substance produced. If your company only uses the chemicals, you are responsible for ensuring that there is an SDS for each toxic substance that enters your workplace.

Chain of responsibility for SDSs

OSHA requires chemical manufacturers and importers to obtain or develop a safety data sheet for each hazardous chemical they produce or import. The SDS must either accompany the shipped containers or be sent to the employer prior to or at the time of the shipment, and with the first shipment after a data sheet has be revised. When new information about the safety or hazards of a chemical is learned, the manufacturer has three months to revise the SDS.

Distributors are responsible for ensuring that their customers receive an SDS for each chemical they purchase. Retail distributors that sell chemicals to commercial customers have to post a sign notifying customers that SDSs are available and providing data sheets upon request.

If, under normal conditions of use, employees do not open sealed containers of hazardous chemicals, such as in warehousing or retail sales, the distributor need only maintain the SDSs that are sent with incoming shipments. If an employee requests an SDS and it is not available, the distributor must contact the manufacturer and request one. The primary difference is that the warehouse or hardware store does not have to maintain a complete file of data sheets. This simplifies the paperwork for operations where hundreds of different chemicals pass through, but are never opened or worked with.

Employers that use toxic chemicals in their operations and processes must have an SDS for every hazardous chemical in their facility. Copies of these SDSs must be readily available to employees.

SDSs provide critical information

The role of an SDS is to provide detailed information on each hazardous chemical, including its potential hazardous effects, its physical and chemical characteristics, and recommendations for appropriate protective measures. This information is useful to you as the employer responsible for designing protective programs, as well as to your employees.

As of June 1, 2015, the HCS will require new SDSs to be in a uniform format, and include the section numbers, the headings, and associated information under the headings below:

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*****

Section 13, Disposal considerations*****

Section 14, Transport information*****

Section 15, Regulatory information*****

Section 16, Other information, includes the date of preparation or last revision.

***Note**: Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15.

You (the employer), as the end user, are entitled to receive an SDS for each chemical product you purchase. If you do not receive one automatically, you should request one. If you receive one that is obviously inadequate, with, for example, blank spaces that are not completed, you will need to request an appropriately completed one. If your request for a data sheet or for a corrected data sheet goes unanswered within a reasonable amount of time (OSHA suggests 30 days), you should contact your local OSHA area office for assistance in obtaining the SDS. If you are still unable to get the data sheet, consider purchasing from another vendor.

Sample SDS

SDS Number: **UR-101** * * * * * *Effective Date:* ***05/27/12*** * * * * * *Supercedes:* ***05/08/00***

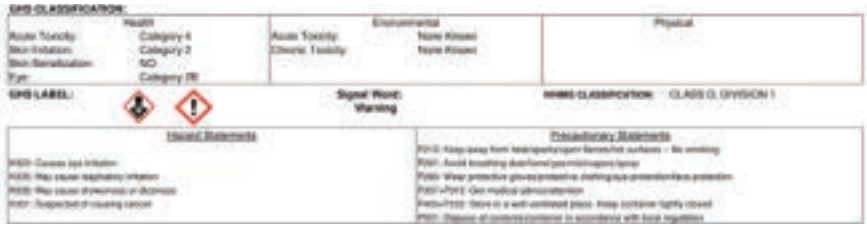
Solvent X (contains Methylene Chloride)

1. Product and Company Identification

Product Name: Solvent X
Synonyms: Machine solvent, industrial solvent, equipment flushing solvent
CAS No.: Not applicable to mixtures
Molecular Weight: Not applicable to mixtures
Emergency Contact: +1-123-555-1212

Product Use: Various industrial uses
Restrictions: Not to be used as a skin cleaner
Chemical Formula: Not applicable to mixtures
Product Codes: UR-101
Manufacturer: U. R. Chemical
Little Hill Dr.
Little Hill, KS 01234
Telephone: +1-123-555-0101
Fax: +1-123-555-0102

2. Hazards Identification



3. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methylene Chloride	75-09-2	40%	Yes
Ethyl Alcohol	64-17-5	30%	Yes
Acetic Acid	64-19-7	15%	Yes
Paraffinic Petroleum Distillates	64742-65-0	15%	Yes

4. First Aid Measures

Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty. If breathing stops, administer artificial respiration.
Ingestion: Do not induce vomiting. Keep individual calm. Obtain medical attention immediately.
Skin Contact: Remove contaminated clothing and shoes. Wash exposed area with soap and water for at least 15 minutes. Get medical advice if irritation develops. Wash contaminated clothing before reuse.
Eye Contact: Flush thoroughly with running water for at least 15 minutes, occasionally lifting the eyelids. Obtain medical attention.

5. Fire Fighting Measures

Fire: Fire is possible if concentrated vapors are exposed to elevated temperatures.
Fire Extinguishing Media: Water spray, dry chemical, alcohol foam, or carbon dioxide.
Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up spill for recovery or disposal and place in a closed container. Keep spilled material away from sewage/drainage systems and waterways.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
methylene chloride = 5000 ppm (TWA);
ethyl alcohol = 1000 ppm;
acetic acid = none established;
paraffinic petroleum distillates = 400 ppm.
- ACGIH Threshold Limit Value (TLV):
methylene chloride = 50 ppm (TWA);
ethyl alcohol = 1000 ppm;
acetic acid = none established;
paraffinic petroleum distillates = 400 ppm.

Ventilation System:
Sufficient to maintain vapor concentration below TLV. Do not use in a closed or confined space.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear an appropriate NIOSH N95 respirator, full-facepiece respirator, or airlined hood.
Skin Protection:
Wear impervious protective clothing, including gloves and apron, to prevent skin contact.
Eye Protection:
Use chemical safety goggles or full face shield when splashing is a concern. Maintain eye-wash fountain and quick-drench facility in the work area.
Other Control Measures:
Protective equipment for laboratory bench use should be chosen using professional judgment based on the size and type of reaction

Notice: Chemical and other data represented in this safety data sheet image is for example purposes only.

9. Physical and Chemical Properties

Appearance:
Clear, yellowish liquid.
Odor:
Sweet, aromatic odor.
Solubility:
1.4 grams per 100 grams at 77ºF
Specific Gravity:
1.2 at 77ºF
pH:
No information found.
% **Volatiles by volume @ 21°C (70ºF)**:
Not available
Boiling Point:
No information found.

Melting Point:
199ºC (390ºF) Decomposes.
Freezing Point:
-96.7ºC (-142.1ºF)
Flash Point:
16ºC (61ºF)
Flammability:
Non-flammable liquid. Vapor will burn at high temperatures.
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides.

Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers and reactive metals.
Conditions to Avoids:
Incompatibles and hot surfaces which can cause thermal decomposition.

11. Toxicological Information

Methylene chloride: oral rat LD50: 16000mg/kg; inhalation rat LC50: 52gm/m3; investigated as a tumorigen, mutagen, reproductive effector.
Ethyl alcohol: oral rat LD50= 7060mg/kg; inhalation rat LC50= 20,000ppm/10H; investigated as a tumorigen, mutagen, reproductive effector.
Acetic acid: No LD50/LC50 information found relating to normal routes of occupational exposure.
Paraffinic petroleum distillates: Not known.

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into air, this material is expected to have a half-life between 10 and 30 days.

Ecotoxicological Data:
96 hr. NOEL (minnow) 110 mg/L
24 hr EC50 (Daphnia Magna) 460 mg/L

13. Disposal Considerations

Recover or recycle if possible. It is the responsibility of the waste generator to determine the proper waste classification and disposal methods in compliance with applicable federal, state, and local regulations. Do not dispose of in the environment, in drains or water courses. Drain container thoroughly. Send to recycler/reclaimer.

14. Transport Information

Transport in accordance with all federal, state, and local regulations.
UN number 2929
UN proper shipping name Toxic liquid, flammable, n.o.s.
Hazards class 6.1; Packing Group III

15. Regulatory Information

----------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Methylene Chloride (75-09-2)	Yes	Yes	Yes	Yes
Ethyl Alcohol (64-17-5)	Yes	Yes	Yes	Yes
Acetic Acid (64-19-7)	Yes	Yes	Yes	Yes
Paraffinic Petroleum Distillates (64742-65-0)	Yes	Yes	No	Yes

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **0**
HMIS Ratings: Health: **3** Flammability: **1** Physical Hazard: **0**
This SDS was prepared by U. R. Chemical.

Revision Information: Revised 05/27/12

Notice: Chemical and other data represented in this safety data sheet image is for example purposes only.

Easy access in the workplace

SDSs must be readily accessible to employees when they are in their work areas. This can be accomplished in many different ways. You will need to decide what is the best format and storage method for your particular workplace.

For example, SDSs can be paper, electronic data, faxed materials, CD ROM, or available from SDS services. You can even find SDSs on the Internet. Because there is no mandatory format that must be used, data sheets are available in a wide variety of formats.

OSHA does not have a specific requirement for storing SDSs. You can choose the best method for your company. Remember, when choosing a format or a storage method, the SDS must be readily available to employees no matter what shift they work.

- Keep SDSs in a binder in a central location, such as on a desk, bookshelf, or in a wall unit; or
- Computerize the information and provide access through terminals.

For computerized data sheets, the employees or key employees have to know how to retrieve the data sheets. This may include training in basic computer skills as well as the software program used for the SDSs. When employees don't understand how to use the equipment, the SDS is considered "not readily available."

Finally, you must ensure the availability of the SDSs in an emergency, such as power outage, fire, spill, or even electronic data equipment failure.

Electronic management of SDSs can be a time, space, and paper saver, but you need to consider the drawbacks to it. Extra personnel training may be required in order for your employees to have ready access to the SDSs. Also, if the electronic equipment is down, provisions will need to be made for a backup system. Nevertheless, SDSs can be effectively managed electronically without affecting their availability to workers by careful review of the software, services, and other electronic equipment and by having an SDS managing system backup.

If you have an off-site SDS service that manages your data sheets, remember that all shifts must have SDSs readily available. This means that employees must be able to contact the service and receive a faxed or hard copy of the requested SDS during their work period. If they cannot, you may have to maintain copies at your facility.

If there is more than one distinct work area or location where hazardous chemicals are present, separate your SDSs by area. Keep a master book with all data sheets in it, and then have departmental books with SDSs for only the chemicals used in that operation. In the event of an emergency, employees won't have to dig through masses of extra sheets to find what they need.

As long as employees can get the information when they need it, any approach may be used. The employees must have access to the SDSs themselves—simply having a system where the information can be read to them over the phone is only permitted under the mobile worksite provision at §1910.1200(g)(9), when employees must travel between workplaces during a shift. In this situation, they have access to the SDSs prior to leaving the primary worksite and when they return, so the telephone system is simply an emergency arrangement.

Don't overlook your own air emissions

Toxic air emissions may be a by-product of a process or procedure in your facility. Areas that often get overlooked involve potentially toxic chemicals produced from welding operations, gasoline-powered forklift vehicles, power tools with internal combustion motors, and vehicle bay exhaust. Employee exposure to any air emissions that are being created in your facility must be accounted for. You may need to contact the supplier of your welding rods for help in tracking down the appropriate SDS.

Also, do not overlook gasoline and carbon monoxide. Safety data sheets do not have to be provided for vehicles such as lift trucks, tractors, or automobiles. However, SDSs are required for the gasoline and other fuels used by the vehicles. Employees should be aware of the potential for exposure to carbon monoxide and associated physical hazards of petroleum fuel products such as fire and explosion.

Retaining your SDSs

OSHA does not specify a particular retention period for SDSs. However, according to the Employee Access to Medical Records at §1910.1020, an employer must retain medical records, air sampling data, and other exposure information for 30 years.

While SDSs are considered "exposure records," OSHA is really only interested in the chemical identity, where the chemical was used, and how long the chemical was used. When developing the list of hazardous chemicals for your workplace, include information on where these chemicals were used and for how long. Storing the lists would take up much less space than storing all of the individual data sheets.

Auditing your SDS program

Keep a master SDS file and check in each SDS, particularly noting the revision date. If an SDS is an update of a sheet that you have, then send out a copy to each department that uses the chemical, so they can update the departmental SDS file. If an SDS is for a new chemical, send copies to each department that will use it.

Also, monitor the SDSs within each department. Sheets get torn out or smudged and need to be replaced. Have a cover sheet listing what SDSs are in the file, along with the revision number. A supervisor can then weekly or monthly check quickly to see if all the SDSs are there and readable. Replace missing data sheets immediately.

You may discard a superseded SDS for a mixture, if the new data sheet includes the same hazardous chemicals as the original formulation. If the formulation is different, then you will have to keep either the SDSs or the critical information for at least 30 years.

What OSHA looks for regarding SDSs

In order to ensure that you have a current SDS for each chemical in your facility and that employee access is provided, OSHA looks at the following types of information in your written program:

1. Person(s) responsible for obtaining and maintaining the SDSs;
2. How data sheets are maintained (*e.g.,* in notebooks in the work area(s) or in a computer with terminal access);
3. How employees can access them when they are in their work area during the work shift;
4. Procedures to follow when the SDS is not received at the time of the first shipment;
5. For producers, procedures to update the SDS when new and significant health information is found; and,
6. Description of alternatives to actual data sheets in the workplace, if used.

For employers using hazardous chemicals, the most important aspect of the hazard communication program in terms of SDSs is to ensure that someone is responsible for obtaining and maintaining the SDSs for every hazardous chemical in the workplace. The list of hazardous chemicals required to be maintained as part of the written program will serve as an inventory. As new chemicals are purchased, the list should be updated. Many companies have found it convenient to include on their purchase orders the name and address of the person designated in their company to receive SDSs.

Training employees

Training is critical to effective hazard communication. It is the forum in which hazard information can best be presented. Under the Hazard Communication Standard, all covered facilities are required to establish an effective training and information program for every employee routinely exposed to hazardous chemicals.

This training serves to explain and reinforce the information presented through labels and data sheets. The use of labels and SDSs will only be successful when workers understand the hazards of chemicals and the actions to take to avoid or minimize chemical exposures.

The key term here is "understanding." Not only do employees have to be trained, but they must walk away from that training understanding what they are working with. Giving an employee a data sheet to read does not satisfy the intent of the HCS. The training should include an opportunity for them to ask questions, thus ensuring that they understand the information.

When to train

Prior to the initial job assignment, each employee who has exposure risks to hazardous chemicals must be provided information and training. Additional training has to be done whenever a new physical or health hazard is introduced into their work area.

"Exposure" or "exposed" means that an employee is subjected to a hazardous chemical in the course of employment through any route of entry, including:

- Inhalation,
- Ingestion,
- Skin contact, or
- Absorption.

Information and training may be done either by individual chemical, or by categories of hazards, such as flammability or carcinogenicity. If there are only a few chemicals in your workplace, then you may want to discuss each one individually. Where there are large numbers of chemicals, or the chemicals change frequently, you will probably want to train generally, based on the hazard categories such as flammable liquids, corrosive materials, or carcinogens. Employees will have access to the substance-specific information on the labels and SDSs in their work areas.

Getting started

The Hazard Communication Standard is performance-oriented, that is, it specifies the results but does not mandate the methods used to get there. You are free to select any method of training that fits into your operation. Additionally, the standard does not state how long the training must take, only that it adequately covers the material.

If you already do some safety training, you may want to include HCS training with your current program. However, if you have different groups of chemicals used in several departments, it may be simpler to do your HCS training on a department level. That way you can train workers in the hazards of only those specific chemicals they use in their work area. This approach will not only shorten the training time, but also keep trainees from becoming bored by having to listen to irrelevant information.

There are a number of different approaches that can be taken. You could use videos, interactive computer programs, classroom instruction, or a combination of methods. The best approach is to set up training which allows employees an opportunity to ask questions to ensure that they understand the information presented to them. Giving an employee a data sheet to read does not satisfy the intent of the standard.

OSHA does not expect that every worker will be able to recite all of the information about each chemical in the workplace. In general, the most important aspects of hazard communication training are to ensure that employees:

- Are aware that they are exposed to hazardous chemicals,
- Know how to read and apply the information on labels and safety data sheets, and
- Are following the appropriate protective measures.

Who can do the training?

It is OSHA's position that training may be provided by the current employer, a past employer, an employee union, or any other entity, so long as the employees receive adequate training according to the HCS. If it is determined that an employee has not received training or is not adequately trained, the current employer will

be held responsible regardless of who trained the employee. It's important to evaluate the employee's level of knowledge against the training and information requirements of the standard.

You may want to split the training into two parts:

- The information section, and
- The chemical-specific training.

Then one trainer can give all employees the information training, and the area supervisor can handle the training for the chemicals used in their work areas.

Be sure that whoever does the chemical-specific training thoroughly understands the safe handling aspects of the chemicals being covered. Many times a supervisor is more production-oriented rather than safety-oriented, and may emphasize shortcuts that are not recommended for the safe use of a hazardous substance. If you have several people, such as supervisors, conducting training for their work areas, sit in on a session or two to observe how the training is being handled and to show your support for safety in the workplace.

NOTE: A temporary agency and the employer (the host) which creates and controls hazards must share responsibility for assuring that leased employees are protected from the host's workplace hazards.

Who should be trained?

All employees with hazard chemical exposure risks must receive training. OSHA defines an "employee" as any worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. It is better to train too many people rather than too few. If you have some employees who are occasionally in an area where chemicals are stored or used and you are undecided whether they are "routinely exposed," include them in your training program.

"Normal operating conditions" are those which employees encounter in performing their job duties in their assigned work areas. For example, if the receptionist in a facility receives and delivers a telephone message for someone in a different work area where hazardous chemicals are present, this does not mean that the receptionist would be covered under the rule by virtue of the one potential exposure from delivering the message.

However, if performance of the receptionist's job entails walking through the production area every day and thus being potentially exposed during the performance of regular duties, that job would be covered under the rule. Moreover, a housekeeping staff member who is expected to handle clean-up of hazardous substances, such as mercury from a broken thermometer, would require training.

How often should refresher training occur?

Under the Hazard Communication Standard, refresher training is not required on a routine basis, such as annually. However, receiving a new SDS or chemical compels the employer to evaluate the information provided in the SDS and decide whether the new product represents a new health or physical hazard to employees. Training needs to be provided to affected employees when new hazards are introduced into the workplace (not necessarily new chemicals).

Realistically, providing training once, then assuming that several years later your employees are still knowledgeable is a risky assumption. It is wise to set up a system for periodic retraining. It does not have to be an annual, full-blown training session. If you have monthly or quarterly safety meetings, interject some quick reminders such as where the SDSs are located or what the information in the red, blue, and yellow bars or squares means on container labels. Any system that works will be satisfactory to OSHA.

The HCS does not require employers to maintain employee training records, but many employers choose to do so. Documenting the training helps you monitor your own program and ensure that all employees are appropriately trained.

What materials are necessary to train?

Prior to beginning any training program, you will need to collect certain information. First, review your hazardous chemical inventory list. The chemicals on this list are the ones for which you will need to provide training.

Unless you deal with a small number of chemicals, you will want to cross-reference the chemical inventory list with a list of employees and the substances they are exposed to in their work area. This cross-reference tells you which chemicals must be included in the training for Area A, for Area B, etc.

Next, make sure that you have all the SDSs for the chemicals that will be discussed during training. Read through them and use them as a primary source of information for the chemical-specific part of the training program. It's a good idea to have a chemical dictionary on hand to look up answers to employees' questions, as well as complete information on the use of safety equipment. Read through all materials so that you are comfortable with what you are going to present.

Elements of your training program

A properly conducted training program will ensure comprehension and understanding. It is not sufficient to either just read material to the trainees, or simply hand them material to read. You want to create a climate where workers feel free to ask questions. This will help you to ensure that the information is understood. Always remember that the underlying purpose of hazard communication is to reduce the incidence of chemical source illnesses and injuries.

Your training program can take any form, as long as the required information is conveyed and understood. You will probably need to make adjustments, depending upon the level of employee you are training. Take into consideration the education and technical background of the trainees. At a minimum, cover the following topics.

Hazard communication standard

Employees must be informed of the existence of the HCS, what the standard requires, and what it will do for them. Explain that the purpose of the HCS is to ensure that the hazards of all chemicals produced are evaluated, and that information concerning these hazards is transmitted to employers and employees.

Terminology—are we speaking the same language?

Before you proceed too far with your training program, clarify the language you will use. Don't assume that workers know what an SDS is, or a hazard warning. The less educated your workers, the more you will need to explain the terminology. Use handouts, diagrams, draw pictures on a chalk board — whatever is necessary to communicate your message.

Safety data sheets

Determine ahead of time how much SDS information you feel is necessary and will be useful and understood. Explain what the SDS is and its purpose. Explain the categories on the SDS, the kind of information found in each section, and what some of the terms mean. Don't overload the employees with terminology. They should just understand what is relevant and important to their interaction with chemicals.

Knowing the effects of overexposure of chemicals they use everyday is extremely important. Their understanding of the value of the information in "routes of entry" can increase PPE use. Emphasize the areas that should matter to them. Bring the information into the "real" world. Use examples of how this information can protect them in their own workplace.

The most vital information in this part of the training is explaining where the data sheets are kept and how to access them. If you are keeping your SDSs in a binder or book, hold it up, pass it around, familiarize the trainees with it. Make sure the book or binder is clearly marked and explain where to find it in the work area. Remember, during an inspection, OSHA will ask employees if they know where to find the SDSs.

Labels

Labels are the most visible and most frequent contact your employees will have with chemical information. Labels are intended to serve as an immediate visual warning of the hazards of the chemical. It is very important that employees have a thorough understanding of how to interpret the information being presented on the label, so that they can modify their handling of the chemical accordingly.

The written program

The written program is your documentation of how you have complied with the Hazard Communication Standard in your company. This program must be made available to your employees. Tell them how they can review the complete written program.

Specific chemicals

This section will comprise the largest part of your training program. You should give specific details on what chemicals the employee has contact with and how to safely handle those chemicals.

Cover how to detect the presence or release of the chemical (visual appearance or odor when being released, monitoring devices, and what they indicate). Thoroughly describe the physical and health hazards of the chemicals in their work area.

You do not need to cover each chemical. Break your chemicals down into groups, such as paints or solvents, and discuss the hazards and precautions of the group as a whole. This saves a lot of time, but also is more effective as a training technique.

Protective equipment

Explain the proper use of protective equipment that is required for the safe handling of the chemicals. Demonstrate how to use the PPE and clearly indicate when the device is to be used, how to care for it, and where it is stored. Explain your company policy regarding the use of protective equipment.

First aid and emergency procedures

Make sure workers understand what first aid and emergency procedures should be used in the event of exposure or overexposure to the hazardous chemicals they work with. Point out where they can find this information on the SDS, if they have questions in an emergency situation.

Employee certification

Although the Hazard Communication Standard does not require that you record that employees have been trained, it's a good idea to document who has been trained and when they received training.

Hazard communication program

The purpose of this program is to inform interested persons, including employees, that _____ is complying with the OSHA Hazard Communication Standard at §1910.1200 by compiling a hazardous chemicals list, by using safety data sheets (SDSs), by ensuring that containers are labeled, and by providing our employees with training and information availability.

This program applies to all work operations in our company where employees may be exposed to hazardous substances under normal working conditions or during an emergency situation.

The safety and health manager, _____, is the program coordinator, acting as the representative of the plant manager, who has overall responsibility for the program. The manager _____ will review and update the program, as necessary. Copies of the written program may be obtained from _____.

All employees, or their designated representatives, can obtain further information on this written program, the hazard communication standard, applicable SDSs, and chemical information lists from _____ or _____. Under this program, our employees will be informed of the contents of the Hazard Communication Standard, the hazardous properties of chemicals with which they work, safe handling procedures, and measures to take to protect themselves from these chemicals. Our employees will also be informed of the hazards associated with nonroutine tasks, such as the cleaning of reactor vessels, and the hazards associated with chemicals in unlabeled pipes.

If after reading this program, you find that improvements can be made, please contact the safety and health manager, _____. We encourage all suggestions because we are committed to the success of our written hazard communication program. We strive for clear understanding, safe behavior, and involvement in the program from every level of the company.

Hazard evaluation procedures

Our chemical inventory is a list of hazardous chemicals known to be present in our workplace. Anyone who comes into contact with the hazardous chemicals on the list needs to know what those chemicals are and how to protect themselves. That is why it is so important that hazardous chemicals are identified, whether they are found in a container or generated in work operations (for example, welding fumes, dusts, and exhaust fumes).

The hazardous chemicals on the list can cover a variety of physical forms including liquids, solids, gases, vapors, fumes, and mists. Sometimes hazardous chemicals can be identified using purchase orders. Identification of others requires an actual inventory of the facility.

_____ updates the inventory as necessary.

The safety and health manager keeps the chemical inventory list, along with related work practices used in our facility located _____ where it is accessible during work hours.

Our company manufactures the following hazardous chemicals: _____.

The company uses the following methods to determine the hazards of the chemicals it manufactures: _____.

After the chemical inventory is compiled, it serves as a list of every chemical for which an SDS must be maintained.

Safety Data Sheets (SDSs)

The SDSs we use are fact sheets for chemicals which pose a physical or health hazard in the workplace. SDSs provide our employees with specific information on the chemicals they use.

_____ is responsible for obtaining/maintaining the SDSs at our facility. He/she will contact the chemical manufacturer or vendor if additional research is necessary. All new procurements for the company must be cleared by _____.

The safety data sheets are kept at the following location(s) in our facility: _____. Employees can obtain access to them by: _____.

The procedures followed if the SDS is not received at time of first shipment is: _____.

Alternatives to SDSs used in the workplace include: _____.

Labels and other forms of warning

Labels list at least the chemical identity, appropriate hazard warnings, and the name and address of the manufacturer, importer or other responsible party. The chemical identity is found on the label, the SDS, and the chemical inventory. Therefore, the chemical identity links these three sources of information. The chemical identity used by the supplier may be a common or trade name, or a chemical name. The hazard warning is a brief statement of the hazardous effects of the chemical (i.e., "flammable," or "causes lung damage").

Labels frequently contain other information, such as precautionary measures (i.e., "do not use near open flame"), but this information is provided voluntarily by our company and is not required by the rule. Our labels are legible and prominently displayed, though their sizes and colors can vary.

_____ is responsible for ensuring that all hazardous chemicals in in-plant containers are properly labeled and updated, and ensures that newly purchased materials are checked for labels prior to use.

_____ is responsible for ensuring the proper labeling of any shipped containers.

_____ will refer to the corresponding SDS to assist employees in verifying label information.

A poster is displayed to inform employees about the hazard communication standard. It is located in the _____.

The labeling system used on in-plant and shipped containers is: _____.

If employees transfer chemicals from a labeled container to a portable container that is intended only for their immediate use, no labels are required on the portable container.

An alternative to labeling of in plant containers for chemicals is to use the following method(s): _____.

The following procedures are used to review and update label information when necessary and to ensure that labels that fall off or become unreadable are immediately replaced: _____.

Training

Everyone who works with or is potentially "exposed" to hazardous chemicals will receive initial training and any necessary retraining on the Hazard Communication Standard and the safe use of those hazardous chemicals by _____.

"Exposure" means that "an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.) and includes potential (e.g., accidental or possible) exposure." Whenever a new hazard is introduced or an old hazard changes, additional training is provided.

Information and training is a critical part of the hazard communication program. We train our employees to read and understand the information on labels and SDSs, determine how the information can be obtained and used in their own work areas, and understand the risks of exposure to the chemicals in their work areas as well as the ways to protect themselves.

Our goal is to ensure employee comprehension and understanding including being aware that they are exposed to hazardous chemicals, knowing how to read and use labels and SDSs, and appropriately following the protective measures we have established.

We ask our employees to ask questions. As part of the assessment of the training program, _____ asks for input from employees regarding the training they have received, and their suggestions for improving it. In this way, we hope to reduce any incidence of chemical source illnesses and injuries.

All employees receive training for hazard communication.

Training content

Training content is organized according to _____. The format of the training program used is _____.

The training plan emphasizes these elements:

- Summary of the standard and this written program, including what hazardous chemicals are present, the labeling system used, and access to SDS information and what it means.
- Chemical and physical properties of hazardous materials (e.g., flash point, reactivity) and methods that can be used to detect the presence or release of chemicals (including chemicals in unlabeled pipes).
- Physical hazards of chemicals (e.g., potential for fire, explosion, etc.).
- Health hazards, including signs and symptoms of exposure, associated with exposure to chemicals and any medical condition known to be aggravated by exposure to the chemical.
- Procedures to protect against hazards (e.g., engineering controls; work practices or methods to assure proper use and handling of chemicals; personal protective equipment required, and its proper use, and maintenance; and procedures for reporting chemical emergencies).

The procedure to train new employees at the time of their initial assignment is _____. We train employees when a new hazard is introduced by _____.

Certificates are signed by employees upon completion of their training and are kept by _____.

Hazards of nonroutine tasks

When employees are required to perform any of the following hazardous nonroutine tasks including _____ that have the potential to expose workers to hazardous chemicals, we inform employees of these hazards by: _____.

Hazards of unlabeled pipes

We inform employees of the hazards of chemicals contained in unlabeled pipes in their work areas by: _____.

Multi-employer facility

When contractors or any other employers' workers (i.e., painters, electricians, or plumbers) will be working at this workplace, the safety and health manager, _____, will:

- Provide the other employer(s) with SDSs for any of our chemicals to which their employees may be exposed in the following manner: _____, and
- Relay necessary label and/or emergency precautionary information to the other employer(s) in the following manner: _____.

Each contractor bringing chemicals on-site must provide _____ with the appropriate hazard information on these substances, including the SDSs, the labels used and the precautionary measures to be taken in working with these chemicals.

Additional information

All employees, or their designated representatives, can obtain further information on this written program, the hazard communication standard, applicable SDSs, and chemical information lists from _____.

Appendix

We have attached to this plan the lists, samples, or procedures that ensure better understanding of our written program.

Hazard communication standard vs. revised hazard communication standard

Side-by-Side Comparison of OSHA's Existing Hazard Communication Standard (HCS 1994) vs. the Revised Hazard Communication Standard (HCS 2012)

This document provides a comparison of the changes from the existing Hazard Communication Standard (the current Hazard Communication Standard, 1910.1200, as published in the Code of Federal Regulations (CFR) on March 11, 1994; herein referred to as HCS 1994) and the final rule revising the Hazard Communication Standard to be consistent with the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (herein referred to as the HCS 2012).

The HCS 1994 is a performance-oriented standard that provides guidance for defining hazards and for performing hazard determinations. However, the current standard does not specify an approach or format to follow. The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) has certain aspects that are performance-oriented, but the key provisions are a *uniformity-oriented* approach for the classification and presentation, through labeling and safety data sheets, of hazard information.

The HCS 2012 is written as a modification to the existing standard, and those parts of the standard that do not relate to the GHS, or are already consistent with it remain unchanged. Additionally, some minor changes to terminology have been made in order to align this rule with language used in the GHS. For example, the term "hazard determination" has been changed to "hazard classification" and "material safety data sheet" has been changed to "safety data sheet."

The following side-by-side comparison shows the changes made to the HCS 1994 as stricken text in the left-hand column. Additions or changes made to the existing HCS (1994) to create the revised HCS (aligning the HCS with the GHS, and effective 2012) are shown as underlined text in the right-hand column.

Purpose.

The Hazard Communication Standard (HCS) 1994 includes a paragraph that describes the purpose of the HCS, and addresses preemption of state and local laws. The Hazard Communication Standard (HCS 2012) includes essentially the same paragraph as the HCS 1994. The primary modification to this paragraph is to state affirmatively that part of the purpose is to harmonize with international requirements. OSHA also clarified the standard's preemptive affect on State laws. Other than terminology, no additional substantive changes have been made in this paragraph of the HCS.	
HCS 1994	**HCS 2012**
(a) *Purpose.* (a)(1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are ~~evaluated~~, and that information concerning the~~ir~~ hazards is transmitted to employers and employees. Th~~is~~ transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, ~~material~~ safety data sheets and employee training.	(a) *Purpose.* (a)(1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this section are intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Revision 3. The transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, safety data sheets and employee training.

(a)(2) This occupational safety and health standard is intended to address comprehensively the issue of ~~evaluating~~ the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any ~~legal requirements~~ of a state, or political subdivision of a state, pertaining to this subject. ~~Evaluating~~ the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of ~~material~~ safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce~~, through any court or agency,~~ any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.	(a)(2) This occupational safety and health standard is intended to address comprehensively the issue of classifying the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legislative or regulatory enactments of a state, or political subdivision of a state, pertaining to this subject. Classifying the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

Scope and Application.

In this paragraph, OSHA has removed reference to Appendix E, which previously provided employers with guidance information regarding the determination of their compliance obligations. Rather than include this information in the Appendix, OSHA will provide separate guidance documents to employers. Additionally, this paragraph in the HCS 2012 will continue to address the many practical accommodations OSHA has made regarding application of the HCS to different types of workplaces, as well as deal with the interface of the HCS to other Federal laws that address similar areas. No changes in these rules are necessary to incorporate the GHS; therefore, only terminology changes have been made in this paragraph of the HCS.	
HCS 1994	**HCS 2012**
(b) *Scope and application.* (b)(1) This section requires chemical manufacturers or importers to ~~assess~~ the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, ~~material~~ safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers. ~~Appendix E of this section is a general guide for such employers to help them determine their compliance obligations under the rule~~.)	(b) *Scope and application.* (b)(1) This section requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers.)

(b)(2) This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.	(b)(2) This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.
(b)(3) This section applies to laboratories only as follows:	(b)(3) This section applies to laboratories only as follows:
(b)(3)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;	(b)(3)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;
(b)(3)(ii) Employers shall maintain any ~~material~~ safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each workshift to laboratory employees when they are in their work areas;	(b)(3)(ii) Employers shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each workshift to laboratory employees when they are in their work areas;
(b)(3)(iii) Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,	(b)(3)(iii) Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,
(b)(3)(iv) Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f)~~(1)~~ of this section, and that a ~~material~~ safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.	(b)(3)(iv) Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f) of this section, and that a safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.
(b)(4) In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:	(b)(4) In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:
(b)(4)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;	(b)(4)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;
(b)(4)(ii) Employers shall maintain copies of any ~~material~~ safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a ~~material~~ safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a ~~material~~ safety data sheet if an employee requests the ~~material~~ safety data sheet, and shall ensure that the ~~material~~ safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,	(b)(4)(ii) Employers shall maintain copies of any safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a safety data sheet if an employee requests the safety data sheet, and shall ensure that the safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,
(b)(4)(iii) Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.	(b)(4)(iii) Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.
(b)(5) This section does not require labeling of the following chemicals:	(b)(5) This section does not require labeling of the following chemicals:

(b)(5)(i) Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency; (b)(5)(ii) Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency; (b)(5)(iii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture; (b)(5)(iv) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, ~~and Firearms~~; (b)(5)(v) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and, (b)(5)(vi) Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture. (b)(6) This section does not apply to (b)(6)(i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency; (b)(6)(ii) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability A~~CT~~ (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with ~~the~~ Environmental Protection Agency regulations.	(b)(5)(i) Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency; (b)(5)(ii) Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency; (b)(5)(iii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture; (b)(5)(iv) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, Firearms and Explosives; (b)(5)(v) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and, (b)(5)(vi) Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture. (b)(6) This section does not apply to: (b)(6)(i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency; (b)(6)(ii) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with Environmental Protection Agency regulations.

(b)(6)(iii) Tobacco or tobacco products; (b)(6)(iv) Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted); (b)(6)(v) Articles (as that term is defined in paragraph (c) of this section); (b)(6)(vi) Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace; (b)(6)(vii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies); (b)(6)(viii) Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace; (b)(6)(ix) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended; (b)(6)(x) Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section; (b)(6)(xi) Ionizing and nonionizing radiation; and, (b)(6)(xii) Biological hazards.	(b)(6)(iii) Tobacco or tobacco products; (b)(6)(iv) Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted); (b)(6)(v) Articles (as that term is defined in paragraph (c) of this section); (b)(6)(vi) Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace; (b)(6)(vii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies); (b)(6)(viii) Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace; (b)(6)(ix) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended; (b)(6)(x) Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section; (b)(6)(xi) Ionizing and nonionizing radiation; and, (b)(6)(xii)Biological hazards.

Definitions.

Several key changes have been made to update the definitions section. This final rule provides more detailed physical and health hazard criteria. However, this information has now been moved from this section into Appendices A and B. Additionally, in order to be consistent with the GHS, OSHA has added, deleted, and modified a number of the definitions. The following changes were made to definitions in the HCS 2012:

Added the following definitions: Classification, Hazard category, Hazard class, Hazard not otherwise classified, Hazard statement, Label elements, Pictogram, Precautionary statement, Product identifier, Pyrophoric Gas, Safety data sheet, Signal word, Simple asphyxiant, and Substance.

Deleted the following definitions: Combustible liquid, Compressed gas, Explosive, Flammable, Flashpoint, Hazard warning, Identity, Material safety data sheet, Organic peroxide, Oxidizer, Pyrophoric, Unstable (reactive), and Water-reactive.

Revised the following definitions: Chemical, Chemical name, Hazardous chemical, Health hazard, Label, Mixture, Physical hazard, and Trade secret.

The definition of Hazardous Chemical was located incorrectly in the HCS 1994 and here in this document it has been properly relocated to where it should have been placed in the correct alphabetical order. While it remains an important definition in both the HCS 1994 and the HCS 2012, the proper relocation in alphabetical order is the reason for this definition being struck.

Refer to the Summary and Explanation of the Final Rule to gain a better understanding of the changes.

HCS 1994	HCS 2012
(c) *Definitions.*	(c) *Definitions.*
"Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.	"Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.
"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.	"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.
"Chemical" means any ~~element, chemical compound~~ or mixture of ~~elements and/or compounds~~.	"Chemical" means any substance, or mixture of substances.
"Chemical manufacturer" means an employer with a workplace where chemical(s) are produced for use or distribution.	"Chemical manufacturer" means an employer with a workplace where chemical(s) are produced for use or distribution.
"Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name ~~which~~ will clearly identify the chemical for the purpose of conducting a hazard ~~evaluation~~.	"Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.
	"Classification" means to identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

~~"Combustible liquid" means any liquid having a flashpoint at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flashpoints of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.~~	
"Commercial account" means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.	"Commercial account" means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.
"Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.	"Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.
~~"Compressed gas" means:~~ ~~(i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 deg. F (21.1 deg. C); or~~ ~~(ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg. C) regardless of the pressure at 70 deg. F (21.1 deg. C); or~~ ~~(iii) A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 deg. C) as determined by ASTM D-323-72.~~	
"Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.	"Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.
"Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.	"Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.
"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.	"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.
"Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.	"Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.
"Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.	"Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.
"Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.	"Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

~~"Explosive" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.~~	
"Exposure or exposed" means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)	"Exposure or exposed" means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)
~~"Flammable" means a chemical that falls into one of the following categories:~~	
~~(i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;~~	
~~(ii) "Gas, flammable" means: (A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or~~	
~~(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;~~	
~~(iii) "Liquid, flammable" means any liquid having a flashpoint below 100 deg. F (37.8 deg. C), except any mixture having components with flashpoints of 100 deg. F (37.8 deg. C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.~~	
~~(iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.~~	
~~"Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:~~	
~~(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 deg. F (37.8 deg. C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or~~	

~~(ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100 deg. F (37.8 deg. C), or that contain suspended solids, or that have a tendency to form a surface film under test; or~~ ~~(iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)).~~ ~~Organic peroxides, which undergo autoaccelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.~~	
"Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.	"Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.
	"Hazard category" means the division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.
	"Hazard class" means the nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.
	"Hazard not otherwise classified (HNOC)" means an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in this section. This does not extend coverage to adverse physical and health effects for which there is a hazard class addressed in this section, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category that has not been adopted by OSHA (e.g., acute toxicity Category 5).
	"Hazard statement" means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.
~~"Hazardous chemical" means any chemical which is a physical hazard or a health hazard.~~	"Hazardous chemical" means any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.
~~"Hazard warning" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for "physical hazard" and "health hazard" to determine the hazards which must be covered.)~~	

"Health hazard" means a chemical ~~for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.~~	"Health hazard" means a chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to §1910.1200 -- Health Hazard Criteria.
~~"Identity" means any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.~~	
"Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.	"Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.
"Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.	"Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.
"Label" means ~~any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.~~	"Label" means an appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging. "Label elements" means the specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.
~~"Material safety data sheet (MSDS)" means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section.~~	
"Mixture" means ~~any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.~~	"Mixture" means a combination or a solution composed of two or more substances in which they do not react.
~~"Organic peroxide" means an organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.~~	
~~"Oxidizer" means a chemical other than a blasting agent or explosive as defined in 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.~~	

"Physical hazard" means a ~~chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.~~	"Physical hazard" means a chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. See Appendix B to §1910.1200 -- Physical Hazard Criteria. "Pictogram" means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category. "Precautionary statement" means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling. "Product identifier" means the name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.
"Produce" means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.	"Produce" means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.
"Pyrophoric" ~~means a chemical that will ignite spontaneously in air at a temperature of 130 deg. F (54.4 deg. C) or below.~~	"Pyrophoric gas" means a chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.
"Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.	"Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary. "Safety data sheet (SDS)" means written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of this section. "Signal word" means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for the less severe. *"Simple asphyxiant"* means a substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.
"Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.	"Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

	"Substance" means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.
"Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. ~~Appendix D~~ sets out the criteria to be used in evaluating trade secrets.	"Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix E to §1910.1200-Definition of Trade Secret, sets out the criteria to be used in evaluating trade secrets.
~~"Unstable (reactive)" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.~~	
"Use" means to package, handle, react, emit, extract, generate as a byproduct, or transfer.	"Use" means to package, handle, react, emit, extract, generate as a byproduct, or transfer.
~~"Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.~~	
"Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.	"Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.
"Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.	"Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.

Hazard classification.

The hazard classification approach in the GHS is quite different from the performance-oriented approach in the HCS 1994. The GHS has specific criteria for each health and physical hazard, along with detailed instructions for hazard evaluation and determinations as to whether mixtures of the substance are covered. OSHA has included the general provisions for hazard classification in paragraph (d) of the revised rule, and added extensive appendixes that address the criteria for each health or physical effect. Mandatory Appendices A and B provide classification guidance for Health Hazards and Physical Hazards, respectively. The hazard classification criteria contained in the HCS 2012 is test method-neutral. That is, the person classifying a chemical or substance should use available data and no additional testing is required to classify a chemical.

Please refer to the Summary and Explanation of the Final Rule to gain a better understanding of the changes.

HCS 1994	**HCS 2012**
(d) *Hazard ~~determination.~~*	(d) *Hazard classification.*

(d)(1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to ~~determine if they are hazardous~~. Employers are not required to ~~evaluate~~ chemicals unless they choose not to rely on the ~~evaluation~~ performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.	(d)(1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to classify the chemicals in accordance with this section. For each chemical, the chemical manufacturer or importer shall determine the hazard classes, and where appropriate, the category of each class that apply to the chemical being classified. Employers are not required to classify chemicals unless they choose not to rely on the classification performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.
(d)(2) Chemical manufacturers, importers or employers ~~evaluating~~ chemicals shall identify and consider the available scientific evidence concerning ~~such~~ hazards. ~~For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section.~~ Appendix A shall be consulted for ~~the scope of health~~ hazards ~~covered~~, and Appendix B shall be consulted for the ~~criteria to be followed with respect to the completeness of the evaluation, and the data to be reported.~~	(d)(2) Chemical manufacturers, importers or employers classifying chemicals shall identify and consider the full range of available scientific literature and other evidence concerning the potential hazards. There is no requirement to test the chemical to determine how to classify its hazards. Appendix A to §1910.1200 shall be consulted for classification of health hazards, and Appendix B to §1910.1200 shall be consulted for the classification of physical hazards.
(d)(3) ~~The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous:~~	(d)(3) Mixtures.
~~(d)(3)(i) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,~~	((d)(3)(i) Chemical manufacturers, importers, or employers evaluating chemicals shall follow the procedures described in Appendices A and B to §1910.1200 to classify the hazards of the chemicals, including determinations regarding when mixtures of the classified chemicals are covered by this section.
~~(d)(3)(ii) "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment," American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition). The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard.~~	d)(3)(ii) When classifying mixtures they produce or import, chemical manufacturers and importers of mixtures may rely on the information provided on the current safety data sheets of the individual ingredients except where the chemical manufacturer or importer knows, or in the exercise of reasonable diligence should know, that the safety data sheet misstates or omits information required by this section.
~~(d)(4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes:~~	
~~(d)(4)(i) National Toxicology Program (NTP), "Annual Report on Carcinogens" (latest edition);~~	
~~(d)(4)(ii) International Agency for Research on Cancer (IARC) "Monographs" (latest editions); or~~	
~~(d)(4)(iii) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.~~	

~~Note: The "Registry of Toxic Effects of Chemical Substances" published by the National Institute for Occupational Safety and Health indicates whether a chemical has been found by NTP or IARC to be a potential carcinogen.~~ ~~(d)(5) The chemical manufacturer, importer or employer shall determine the hazards of mixtures of chemicals as follows:~~ ~~(d)(5)(i) If a mixture has been tested as a whole to determine its hazards, the results of such testing shall be used to determine whether the mixture is hazardous;~~ ~~(d)(5)(ii) If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which is considered to be a carcinogen under paragraph (d)(4) of this section;~~ ~~(d)(5)(iii) If a mixture has not been tested as a whole to determine whether the mixture is a physical hazard, the chemical manufacturer, importer, or employer may use whatever scientifically valid data is available to evaluate the physical hazard potential of the mixture; and,~~ ~~(d)(5)(iv) If the chemical manufacturer, importer, or employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent (or in the case of carcinogens, less than 0.1 percent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees in those concentrations, the mixture shall be assumed to present the same hazard.~~ (d)~~(6)~~ Chemical manufacturers, importers, or employers evaluating chemicals shall ~~describe in writing~~ the procedures ~~they use~~ to ~~determine~~ the hazards of the chemical ~~they evaluate. The written procedures are to be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director. The written description may be incorporated into the written hazard communication program required under paragraph (e) of this section.~~	

Hazard Communication Program.

This section of the HCS 1994 was retained. As the GHS does not include any requirements regarding Hazards Communication Programs, OSHA is maintaining the provisions of the HCS 1994. No substantive changes (only terminology) have been made in this paragraph of the HCS.	
HCS 1994	**HCS 2012**
(e) *Written hazard communication program.*	(e) *Written hazard communication program.*

(e)(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, ~~material~~ safety data sheets, and employee information and training will be met, and which also includes the following:	(e)(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, safety data sheets, and employee information and training will be met, and which also includes the following:
(e)(1)(i) A list of the hazardous chemicals known to be present using ~~an identity~~ that is referenced on the appropriate ~~material~~ safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,	(e)(1)(i) A list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,
(e)(1)(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.	(e)(1)(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.
(e)(2) "Multi-employer workplaces." Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:	(e)(2) "Multi-employer workplaces." Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:
(e)(2)(i) The methods the employer will use to provide the other employer(s) on-site access to ~~material~~ safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;	(e)(2)(i) The methods the employer will use to provide the other employer(s) on-site access to safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;
(e)(2)(ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,	(e)(2)(ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,
(e)(2)(iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.	(e)(2)(iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.
(e)(3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).	(e)(3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).
(e)(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).	(e)(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).
(e)(5) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.	(e)(5) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.

Labels.

This paragraph has been extensively re-written. While, the HCS 1994 had a simple and performance-oriented approach to labels, this final rule sets forth detailed and specific provisions for labeling. Additionally, a new mandatory Appendix C indicates what specific information is to be provided for each hazard class and category once a chemical is classified.

Under this revised paragraph; chemical manufacturers and importers must provide a label that includes: the product identifier, supplier information which is to include name, address and phone number of manufacturer, importer or distributor; and the signal word, pictogram, and hazard statement for each hazard class and category. Precautionary statements must also be provided. The HCS 1994 does not require the use of pictograms, specific signal words, or precautionary statements.

HCS 1994	**HCS 2012**
(f) *Labels and other forms of warning.*	(f) *Labels and other forms of warning.*
(f)(1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked ~~with the following information:~~	(f)(1) Labels on shipped containers. The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag or mark the following information shall be provided:
(f)(1)(i) ~~Identity of the hazardous chemical(s);~~	(f)(1)(i) Product identifier;
(f)(1)(ii) ~~Appropriate hazard warnings; and~~	(f)(1)(ii) Signal word;
(f)(1)(iii) Name ~~and~~ address of the chemical manufacturer, importer, or other responsible party.	(f)(1)(iii) Hazard statement(s);
	(f)(1)(iv) Pictogram(s);
	(f)(1)(v) Precautionary statement(s); and,
	(f)(1)(vi) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.
(f)~~(2)~~(i) For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;	(f)(2) The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(i) through (v) of this section is in accordance with Appendix C to §1910.1200, for each hazard class and associated hazard category for the hazardous chemical, prominently displayed, and in English (other languages may also be included if appropriate).
(f)~~(2)~~(ii) The label may be transmitted with the initial shipment itself, or with the ~~material~~ safety data sheet that is to be provided prior to or at the time of the first shipment; and,	
(f)~~(2)~~(iii) This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).	

(f)~~(3)~~ Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.	(f)(3) The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(ii) through (iv) of this section is located together on the tag, label or mark.
~~(f)(4) If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard.~~	(f)(4) Solid materials (f)(4)(i) For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes; (f)(4)(ii) The label may be transmitted with the initial shipment itself, or with the safety data sheet that is to be provided prior to or at the time of the first shipment; and, (f)(4)(iii) This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).
(f)~~(5)~~ Except as provided in paragraphs (f)~~(6)~~ and (f)~~(7)~~ of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with ~~the following information:~~	(f)(5) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.
(f)~~(5)~~(i) ~~Identity of the hazardous chemical(s) contained therein; and,~~ (f)~~(5)~~(ii) ~~Appropriate hazard warnings, or alternatively,~~ words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.	

(f)~~(6)~~ The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)~~(5)~~ of this section to be on a label. The written materials ~~shall be~~ readily accessible to the employees in their work area throughout each work shift.	(f)(6) Workplace labeling. Except as provided in paragraphs (f)(7) and (f)(8) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with either: (f)(6)(i) The information specified under paragraphs (f)(1)(i) through (v) of this section for labels on shipped containers; or, (f)(6)(ii) Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.
(f)~~(7)~~ The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.	(f)(7) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(6) of this section to be on a label. The employer shall ensure the written materials are readily accessible to the employees in their work area throughout each work shift.
(f)~~(8)~~ The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.	(f)(8) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.
(f)~~(9)~~ The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.	(f)(9) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.
~~(f)(10)The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.~~	(f)(10) The employer shall ensure that workplace labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

(f)(11) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within ~~three~~ months of becoming aware of the new information. Labels on containers of hazardous chemicals shipped after that time ~~shall~~ contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importers, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.	(f)(11) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within six months of becoming aware of the new information, and shall ensure that labels on containers of hazardous chemicals shipped after that time contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

HCS Pictograms and Hazards

Health Hazard

- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

Flame

- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

Exclamation Mark

- Irritant (skin and eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer (Non-Mandatory)

Gas Cylinder

- Gases Under Pressure

Corrosion

- Skin Corrosion/Burns
- Eye Damage
- Corrosive to Metals

Exploding Bomb

- Explosives
- Self-Reactives
- Organic Peroxides

Flame Over Circle

- Oxidizers

Environment

(Non-Mandatory)

- Aquatic Toxicity

Skull and Crossbones

- Acute Toxicity (fatal or toxic)

Safety Data Sheets.

Safety Data Sheets, previously referred to as Material Safety Data Sheets, will now require a 16section format that is essentially the same as the ANSI standard for *Hazardous Workplace Chemicals-Hazard Evaluation and Safety Data Sheets and Precautionary Labeling Preparation* (ANSI Z400.1 & Z129.1 - 2010), already familiar to U.S. employers. Paragraph (g) lists the sections in the order they are to be provided on the Safety Data Sheets.

This paragraph is supplemented by new mandatory Appendix D, which details the information to be included under each heading. The HCS 1994 requires similar information, but allows any format to be used. This final rule is designed more in-line with the GHS, which has a uniform approach. This uniformity will improve the effectiveness of the safety data sheet, as well as make it easier for employers to comply.

The appendix to this side-by-side analysis compares the requirements of the new mandatory Appendix D of the final rule to the current requirements of the HCS 1994.

HCS 1994	HCS 2012
(g) ~~*Material*~~ *safety data sheets.*	(g) *Safety data sheets.*
(g)(1) Chemical manufacturers and importers shall obtain or develop a ~~material~~ safety data sheet for each hazardous chemical they produce or import. Employers shall have a ~~material~~ safety data sheet in the workplace for each hazardous chemical which they use.	(g)(1) Chemical manufacturers and importers shall obtain or develop a safety data sheet for each hazardous chemical they produce or import. Employers shall have a safety data sheet in the workplace for each hazardous chemical which they use.
(g)(2) ~~Each material~~ safety data sheet shall be in English (although the employer may maintain copies in other languages as well), and ~~shall contain at least the following information~~:	(g)(2) The chemical manufacturer or importer preparing the safety data sheet shall ensure that it is in English (although the employer may maintain copies in other languages as well), and includes at least the following section numbers and headings, and associated information under each heading, in the order listed (See Appendix D to §1910.1200--Safety Data Sheets, for the specific content of each section of the safety data sheet):
~~(g)(2)(i) The identity used on the label, and, except as provided for in paragraph (i) of this section on trade secrets:~~	(i) Section 1, Identification;
~~(g)(2)(i)(A) If the hazardous chemical is a single substance, its chemical and common name(s);~~	(ii) Section 2, Hazard(s) identification;
~~(g)(2)(i)(B) If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or,~~	(iii) Section 3, Composition/information on ingredients;
~~(g)(2) (i)(C) If the hazardous chemical is a mixture which has not been tested as a whole:~~	(iv) Section 4, First-aid measures;
~~(g)(2)(i)(C)(1) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d) of this section shall be listed if the concentrations are 0.1% or greater; and,~~	(v) Section 5, Fire-fighting measures;
~~(g)(2)(i)(C)(2) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees; and,~~	(vi) Section 6, Accidental release measures;
~~(g)(2)(i)(C)(3) The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;~~	(vii) Section 7, Handling and storage;
~~(g)(2)(ii) Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);~~	(viii) Section 8, Exposure controls/personal protection;
~~(g)(2)(iii) The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;~~	(ix) Section 9, Physical and chemical properties;
~~(g)(2)(iv) The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;~~	(x) Section 10, Stability and reactivity;

~~(g)(2)(v) The primary route(s) of entry;~~	(xi) Section 11, Toxicological information.
~~(g)(2)(vi) The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;~~	(xii) Section 12, Ecological information;
~~(g)(2)(vii) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA;~~	(xiii) Section 13, Disposal considerations;
~~(g)(2)(viii) Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;~~	(xiv) Section 14, Transport information;
~~(g)(2)(ix) Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;~~	(xv) Section 15, Regulatory information; and
~~(g)(2)(x) Emergency and first aid procedures;~~	(xvi) Section 16, Other information, including date of preparation or last revision.
~~(g)(2)(xi) The date of preparation of the material safety data sheet or the last change to it; and,~~	Note 1 to paragraph (g)(2): To be consistent with the GHS, an SDS must also include the headings in paragraphs (g)(2)(xii) through (g)(2)xv) in order.
~~(g)(2)(xii) The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.~~	Note 2 to paragraph (g)(2): OSHA will not be enforcing information requirements in sections 12 through 15, as these areas are not under its jurisdiction.
(g)(3) If no relevant information is found for any ~~given category~~ on the ~~material~~ safety data sheet, the chemical manufacturer, importer or employer preparing the ~~material~~safety data sheet shall mark it to indicate that no applicable information was found.	(g)(3) If no relevant information is found for any sub-heading within a section on the safety data sheet, the chemical manufacturer, importer or employer preparing the safety data sheet shall mark it to indicate that no applicable information was found.
(g)(4) Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one ~~material~~safety data sheet to apply to all of these similar mixtures.	(g)(4) Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one safety data sheet to apply to all of these similar mixtures.

(g)(5) The chemical manufacturer, importer or employer preparing the ~~material~~ safety data sheet shall ensure that the information ~~recorded~~ accurately reflects the scientific evidence used in making the hazard ~~determination.~~ If the chemical manufacturer, importer or employer preparing the ~~material~~ safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the ~~material~~ safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the ~~material~~ safety data sheet before the chemical is introduced into the workplace again.	(g)(5) The chemical manufacturer, importer or employer preparing the safety data sheet shall ensure that the information provided accurately reflects the scientific evidence used in making the hazard classification. If the chemical manufacturer, importer or employer preparing the safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the safety data sheet before the chemical is introduced into the workplace again.
(g)(6)(i) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate ~~material~~ safety data sheet with their initial shipment, and with the first shipment after a ~~material~~ safety data sheet is updated;	(g)(6)(i) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate safety data sheet with their initial shipment, and with the first shipment after a safety data sheet is updated;
(g)(6)(ii) The chemical manufacturer or importer shall either provide ~~material~~ safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;	(g)(6)(ii) The chemical manufacturer or importer shall either provide safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;
(g)(6)(iii) If the ~~material~~ safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,	(g)(6)(iii) If the safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,
(g)(6)(iv) The chemical manufacturer or importer shall also provide distributors or employers with a ~~material~~ safety data sheet upon request.	(g)(6)(iv) The chemical manufacturer or importer shall also provide distributors or employers with a safety data sheet upon request.
(g)(7)(i) Distributors shall ensure that ~~material~~ safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a ~~material~~ safety data sheet is updated;	(g)(7)(i) Distributors shall ensure that safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a safety data sheet is updated;
(g)(7)(ii) The distributor shall either provide ~~material~~ safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;	(g)(7)(ii) The distributor shall either provide safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;
(g)(7)(iii) Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a ~~material~~ safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a ~~material~~ safety data sheet is available;	(g)(7)(iii) Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a safety data sheet is available;
(g)(7)(iv) Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide ~~material~~ safety data sheets upon the request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a ~~material~~ safety data sheet is available;	(g)(7)(iv) Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide safety data sheets upon the request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a safety data sheet is available;

(g)(7)(v) If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have ~~material~~ safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a ~~material~~ safety data sheet can be obtained;	(g)(7)(v) If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a safety data sheet can be obtained;
(g)(7)(vi) Wholesale distributors shall also provide ~~material~~ safety data sheets to employers or other distributors upon request; and,	(g)(7)(vi) Wholesale distributors shall also provide safety data sheets to employers or other distributors upon request; and,
(g)(7)(vii) Chemical manufacturers, importers, and distributors need not provide ~~material~~ safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.	(g)(7)(vii) Chemical manufacturers, importers, and distributors need not provide safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.
(g)(8) The employer shall maintain in the workplace copies of the required ~~material~~ safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access~~, microfiche,~~ and other alternatives to maintaining paper copies of the ~~material~~ safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)	(g)(8) The employer shall maintain in the workplace copies of the required safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access and other alternatives to maintaining paper copies of the safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)
(g)(9) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the ~~material~~ safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.	(g)(9) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.
(g)(10) ~~Material~~ safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in in their work area(s).	(g)(10) Safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).
(g)(11) ~~Material~~ safety data sheets shall also be made readily available, upon request, to designated representatives ~~and to~~ the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.1020(e). ~~The Director shall also be given access to material safety data sheets in the same manner.~~	(g)(11) Safety data sheets shall also be made readily available, upon request, to designated representatives, the Assistant Secretary, and the Director, in accordance with the requirements of 29 CFR 1910.1020(e).

Training and Information.

The provisions in paragraph (h) indicate that the new label, safety data sheet formats and presentation of information must be discussed in training. All employers will be required to conduct additional training to ensure that their employees are familiar with the new standardized labels and safety data sheets. Otherwise, the training provisions remain the same as the HCS 1994.

HCS 1994	**HCS 2012**
(h) *Employee information and training.*	(h) *Employee information and training.*
(h)(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new ~~physical or health hazard~~ the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and ~~material~~ safety data sheets.	(h)(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets.
(h)(2) Information. Employees shall be informed of:	(h)(2) Information. Employees shall be informed of:
(h)(2)(i) The requirements of this section;	(h)(2)(i) The requirements of this section;
(h)(2)(ii) Any operations in their work area where hazardous chemicals are present; and,	(h)(2)(ii)Any operations in their work area where hazardous chemicals are present; and,
(h)(2)(iii) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and ~~material~~ safety data sheets required by this section.	(h)(2)(iii) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and safety data sheets required by this section.
(h)(3) Training. Employee training shall include at least:	(h)(3) Training. Employee training shall include at least:
(h)(3)(i) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);	(h)(3)(i) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
(h)(3)(ii) The physical ~~and~~ health ~~hazards~~ of the chemicals in the work area;	(h)(3)(ii) The physical, health, simple asphyxiation, combustible dust and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area;
(h)(3)(iii) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,	(h)(3)(iii) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,
(h)(3)(iv) The details of the hazard communication program developed by the employer, including an explanation of the labeling system ~~and~~ the ~~material~~ safety data sheet, and how employees can obtain and use the appropriate hazard information.	(h)(3)(iv) The details of the hazard communication program developed by the employer, including an explanation of the labels received on shipped containers and the workplace labeling system used by their employer; the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information.

Trade secrets.

The trade secret provisions of the GHS are consistent with the HCS 1994 and therefore only a few changes were made to this section. The GHS, unlike the current HCS, requires disclosure of the percentage composition of mixtures on the SDS. This final rule adopts this requirement, but allows the manufacturer to claim trade secret protection for this requirement. This is the only substantive change to the existing standard's trade secret protections.

HCS 1994	**HCS 2012**
(i) *Trade secrets.*	(i) *Trade secrets.*
(i)(1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name ~~and~~ other specific identification of a hazardous chemical, from the ~~material~~ safety data sheet, provided that:	(i)(1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name, other specific identification of a hazardous chemical, or the exact percentage (concentration) of the substance in a mixture, from the safety data sheet, provided that:
(i)(1)(i) The claim that the information withheld is a trade secret can be supported;	(i)(1)(i) The claim that the information withheld is a trade secret can be supported;
(i)(1)(ii) Information contained in the ~~material~~ safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;	(i)(1)(ii) Information contained in the safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;
(i)(1)(iii) The ~~material~~ safety data sheet indicates that the specific chemical identity is being withheld as a trade secret; and,	(i)(1)(iii) The safety data sheet indicates that the specific chemical identity and/or percentage of composition is being withheld as a trade secret; and,
(i)(1)(iv) The specific chemical identity is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph.	(i)(1)(iv) The specific chemical identity and percentage is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph (i).
(i)(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.	(i)(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity and/or specific percentage of composition of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity or percentage composition of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.
(i)(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:	(i)(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity or percentage composition, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:
(i)(3)(i) The request is in writing;	(i)(3)(i) The request is in writing;
(i)(3)(ii) The request describes with reasonable detail one or more of the following occupational health needs for the information:	(i)(3)(ii) The request describes with reasonable detail one or more of the following occupational health needs for the information:

(i)(3)(ii)(A) To assess the hazards of the chemicals to which employees will be exposed; (i)(3)(ii)(B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels; (i)(3)(ii)(C) To conduct pre-assignment or periodic medical surveillance of exposed employees; (i)(3)(ii)(D) To provide medical treatment to exposed employees; (i)(3)(ii)(E) To select or assess appropriate personal protective equipment for exposed employees; (i)(3)(ii)(F) To design or assess engineering controls or other protective measures for exposed employees; and, (i)(3)(ii)(G) To conduct studies to determine the health effects of exposure.	(i)(3)(ii)(A) To assess the hazards of the chemicals to which employees will be exposed; (i)(3)(ii)(B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels; (i)(3)(ii)(C) To conduct pre-assignment or periodic medical surveillance of exposed employees; (i)(3)(ii)(D) To provide medical treatment to exposed employees; (i)(3)(ii)(E) To select or assess appropriate personal protective equipment for exposed employees; (i)(3)(ii)(F) To design or assess engineering controls or other protective measures for exposed employees; and, (i)(3)(ii)(G) To conduct studies to determine the health effects of exposure.
(i)(3)(iii) The request explains in detail why the disclosure of the specific chemical identity is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section: (i)(3)(iii)(A) The properties and effects of the chemical; (i)(3)(iii)(B) Measures for controlling workers' exposure to the chemical; (i)(3)(iii)(C) Methods of monitoring and analyzing worker exposure to the chemical; and, (i)(3)(iii)(D) Methods of diagnosing and treating harmful exposures to the chemical;	(i)(3)(iii) The request explains in detail why the disclosure of the specific chemical identity or percentage composition is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section: (i)(3)(iii)(A) The properties and effects of the chemical; (i)(3)(iii)(B) Measures for controlling workers' exposure to the chemical; (i)(3)(iii)(C) Methods of monitoring and analyzing worker exposure to the chemical; and, (i)(3)(iii)(D) Methods of diagnosing and treating harmful exposures to the chemical; (i)(3)(iii)(iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and, (i)(3)(iii)(v) The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.
(i)(3)(iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,	

(i)(3)(v) The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.	
(i)(4) The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:	(i)(4) The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:
(i)(4)(i) May restrict the use of the information to the health purposes indicated in the written statement of need;	(i)(4)(i) May restrict the use of the information to the health purposes indicated in the written statement of need;
(i)(4)(ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,	(i)(4)(ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,
(i)(4)(iii) May not include requirements for the posting of a penalty bond.	(i)(4)(iii) May not include requirements for the posting of a penalty bond.
(i)(5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.	(i)(5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.
(i)(6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.	(i)(6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.
(i)(7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must:	(i)(7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity or percentage composition, the denial must:
(i)(7)(i) Be provided to the health professional, employee, or designated representative, within thirty days of the request;	(i)(7)(i) Be provided to the health professional, employee, or designated representative, within thirty days of the request;
(i)(7)(ii) Be in writing;	(i)(7)(ii) Be in writing;
(i)(7)(iii) Include evidence to support the claim that the specific chemical identity is a trade secret;	(i)(7)(iii) Include evidence to support the claim that the specific chemical identity or percent of composition is a trade secret;
(i)(7)(iv) State the specific reasons why the request is being denied; and,	(i)(7)(iv) State the specific reasons why the request is being denied; and,
(i)(7)(v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the ~~specific chemical identity~~.	(i)(7)(v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the trade secret.
(i)(8) The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.	(i)(8) The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.

(i)(9) When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:	(i)(9) When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:
(i)(9)(i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret;	(i)(9)(i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity or percentage composition is a trade secret;
(i)(9)(ii) The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,	(i)(9)(ii) The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,
(i)(9)(iii) The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.	(i)(9)(iii) The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.
(i)(10)(i) If OSHA determines that the specific chemical identity requested under paragraph (i)(3) of this section is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.	(i)(10)(i) If OSHA determines that the specific chemical identity or percentage composition requested under paragraph (i)(3) of this section is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.
(i)(10)(ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret ~~specific chemical identity~~, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.	(i)(10)(ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

(i)(11) If a citation for a failure to release ~~specific chemical identity~~ information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.	(i)(11) If a citation for a failure to release trade secret information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.
(i)(12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.	(i)(12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.
(i)(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process ~~or percentage of mixture~~ information, which is a trade secret.	(i)(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process information which is a trade secret.

OSHA's final rule requires employers to train employees on the new label elements and safety data sheet format by December 1, 2013. All other provisions are to be in effect by June 1, 2015, with two exceptions. First, distributors will be given an extra six months to ensure all manufacturer labels are updated. Second, all employers will have an additional year to ensure that updated workplace signs, hazard communication program, and auxiliary training necessary for newly identified physical or health hazards, as provided in (h)(1), are in place.	
HCS 1994	**HCS 2012**
(j) *Effective dates.* Chemical manufacturers, importers, distributors, and employers shall be in compliance with all ~~provisions of this section by March 11, 1994.~~	(j) *Effective dates.*
~~Note: The effective date of the clarification that the exemption of wood and wood products from the Hazard Communication standard in paragraph (b)(6)(iv) only applies to wood and wood products including lumber which will not be processed, where the manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility, and that the exemption does not apply to wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut generating dust has been stayed from March 11, 1994 to August 11, 1994.~~	(j)(1) Employers shall train employees regarding the new label elements and safety data sheets format by December 1, 2013.
	(j)(2) Chemical manufacturers, importers, distributors, and employers shall be in compliance with all modified provisions of this section no later than June 1, 2015, except:

	(j)(2)(i) After December 1, 2015, the distributor shall not ship containers labeled by the chemical manufacturer or importer unless the label has been modified to comply with paragraph (f)(1) of this section. (j)(2) (ii) All employers shall, as necessary, update any alternative workplace labeling used under paragraph (f)(6) of this section, update the hazard communication program required by paragraph (h)(1), and provide any additional employee training in accordance with paragraph (h)(3) for newly identified physical or health hazards no later than June 1, 2016. (j)(3) Chemical manufacturers, importers, distributors, and employers may comply with either §1910.1200, revised as of October 1, 2011, or the current version of this standard or both during the transition period.

Appendix

Section-By-Section Comparison of the Changes to Safety Data Sheets to the Requirements of the 1994 Hazard Communication Standard

Section 1. Identification: The requirements in this section are not new except for format and the requirement to list recommended uses and restrictions on use.

HCS 1994	HCS 2012
· Product identity same as on label and common names **(g)(2)(i)(A) - (C)** · Name address and telephone number of the manufacturer, distributor, employer or other responsible party **(g)(2)(xii)**	1. Identification (a) Product identifier used on the label; (b) Other means of identification; (c) Recommended use of the chemical and restrictions on use; (d) Name, address, and telephone number of the manufacturer, importer, or other responsible party; (e) Emergency phone number.

Section 2. Hazard(s) identification: In this section, the employer must identify the hazards according to the new classification criteria in Appendices A and B. Pictograms, standardized hazard statements, signal words, and precautionary statements are now required.

HCS 1994	HCS 2012
· Physical hazards **(g)(2)(iii)** · Health hazards **(g)(2)(iv)**	**2. Hazard(s) identification** (a) Classification of the chemical in accordance with paragraph (d) of §1910.1200; (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200. (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones); (c) Describe any hazards not otherwise classified that have been identified during the classification process;

	(d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration ≥ 1% and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required.

Section 3. Composition/information on ingredients. This section contains no new requirements other than format.

HCS 1994	HCS 2012
· Chemical and common name of ingredients contributing to known hazards **(g)(2)(i)(A), (B)** · For untested mixtures, the chemical and common name of ingredients at 1% or more that present a health hazard and those that present a physical hazard in the mixture **(g)(2)(i)(C)(1), (3)** · Ingredients at 0.1% or greater, if listed carcinogens**(g)(2)(i)(C)(2)**	**3. Composition/information on ingredients** Except as provided for in paragraph (i) of §1910.1200 on trade secrets: **For Substances** (a) Chemical name; (b) Common name and synonyms; (c) CAS number and other unique identifiers; (d) Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance. **For Mixtures** In addition to the information required for substances: (a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1910.1200 and (1) are present above their cut-off/concentration limits; or (2) present a health risk below the cut-off/concentration limits. (b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with §1910.1200(i), when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (*See* A.0.5.1.2) with similar chemical composition. In these cases, concentration ranges may be used. **For All Chemicals Where a Trade Secret is Claimed** Where a trade secret is claimed in accordance with paragraph (i) of §1910.1200, a statement that the specific chemical identity and/or exact percentage of composition (concentration) has been withheld as a trade secret is required.

Section 4. First-aid measures. This section contains no new requirements other than format.

HCS 1994	HCS 2012
4. First-aid measures · Emergency and first-aid procedures **(g)(2)(x)** · Signs and symptoms of exposure **(g)(2)(iv)**	(a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion; (b) Most important symptoms/effects, acute and delayed. (c) Indication of immediate medical attention and special treatment needed, if necessary.

Section 5. Fire-fighting measures. This section contains no new requirements other than format.

HCS 1994	HCS 2012
· Physical hazards (potential for fire, explosion) **(g)(2)(iii)** · Emergency procedures**(g)(2)(x)**	**5. Fire-fighting measures** (a) Suitable (and unsuitable) extinguishing media. (b) Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products).

Section 6. Accidental release measures. This section contains no new requirements other than format.

HCS 1994	HCS 2012
· Procedures for cleanup of spills and leaks **(g)(2)(viii)** · Protective measures during maintenance and repair of contaminated equipment **(g)(2)(viii)**	**6. Accidental release measures** (a) Personal precautions, protective equipment, and emergency procedures. (b) Methods and materials for containment and cleaning up.

Section 7. Handling and storage. This section contains no new requirements other than format

HCS 1994	HCS 2012
· Precautions for safe handling and use, including appropriate hygienic practices **(g)(2)(viii)**	**7. Handling and storage** (a) Precautions for safe handling. **Section 8. Exposure controls/personal protection.** This section contains no new requirements other than format.

HCS 1994	HCS 2012
· General applicable control measures, such as appropriate engineering controls, work practices, and personal protective equipment **(g)(2)(ix)** · Protective measures during maintenance and repair of contaminated equipment **(g)(2)(viii)** · **(g)(2)(ix)** · Permissible exposure levels, threshold limit values, listed by OSHA, ACGIH, and other limit recommended or used by the MSDS preparer **(g)(2)(vi)**	**8. Exposure controls/personal protection** (a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available. (b) Appropriate engineering controls.

Section 9. Physical and chemical properties. This section contains no new requirements other than format.

HCS 1994	HCS 2012
· Physical and chemical properties such as vapor pressure, flash point, etc. **(g)(2)(ii)**	9. Physical and chemical properties (a) Appearance (physical state, color, etc.); (b) Odor; (c) Odor threshold; (d) pH; (e) Melting point/freezing point; (f) Initial boiling point and boiling range; (g) Flash point; (h) Evaporation rate; (i) Flammability (solid, gas); (j) Upper/lower flammability or explosive limits; (k) Vapor pressure; (l) Vapor density; (m) Relative density; (n) Solubility(ies); (o) Partition coefficient: n-octanol/water; (p) Auto-ignition temperature; (q) Decomposition temperature; (r) Viscosity.

Section 10. Stability and reactivity. Although the information on conditions to avoid and hazardous decomposition products is new to HCS, it has been required in the ANSI Z400.1 standard for a number of years.

HCS 1994	HCS 2012
· Physical hazards (potential for fire, explosion, reactivity) **(g)(2)(iii)** · Organic peroxides, pyrophoric, unstable(reactive), or water-reactive hazards **(g)(2)(iii), definitions in (c)**	10. Stability and reactivity (a) Reactivity; (b) Chemical stability; (c) Possibility of hazardous reactions; (d) Conditions to avoid (e.g., static discharge, shock, or vibration); (e) Incompatible materials; (f) Hazardous decomposition products.

Section 11. Toxicological information. This section contains no new requirements other than format.

HCS 1994	HCS 2012
· Health hazards, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical **(g)(2)(iv)** · Primary routes of entry **(g)(2)(iv)**	11. Toxicological information Description of the various toxicological (health) effects and the available data used to identify those effects, including:

· Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA. **(g)(2)(vi)**	(a) Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact); (b) Symptoms related to the physical, chemical and toxicological characteristics; (c) Delayed and immediate effects and also chronic effects from short- and long-term exposure; (d) Numerical measures of toxicity (such as acute toxicity estimates). (e) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA.

Section 12. Ecological information (Non-mandatory). To be GHS-compliant the requirements for this section are provided.

HCS 1994	HCS 2012
· No present requirements	**12. Ecological information (Non-mandatory)** (a) Ecotoxicity (aquatic and terrestrial, where available); (b) Persistence and degradability; (c) Bioaccumulative potential; (d) Mobility in soil;

Section 13. Disposal considerations (Non-mandatory). To be GHS-compliant the requirements for this section are provided, but OSHA will not enforce. However, OSHA may enforce provisions associated with safe handling and use, including appropriate hygienic practices. See Section 7 above.

HCS 1994	HCS 2012
· See Section 7 · No present requirements	13. Disposal considerations (Non-mandatory) Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

Section 14. Transport information (Non-mandatory). To be GHS-compliant the requirements for this section are provided, but OSHA will not enforce.

HCS 1994	HCS 2012
· No present requirements	14. Transport information (Non-mandatory) (a) UN number; (b) UN proper shipping name; (c) Transport hazard class(es); (d) Packing group, if applicable; (e) Environmental hazards (e.g., Marine pollutant (Yes/No)); (f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code);

	(g) Special precautions, which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises.

Section 15. Regulatory information (Non-mandatory). To be GHS-compliant the requirements for this section are provided, but OSHA will not enforce.

HCS 1994	**HCS 2012**
· No present requirements	15. Regulatory information (Non-mandatory) Safety, health and environmental regulations specific for the product in question.

Section 16. Other information, including date of preparation or last revision. This section contains no new requirements other than format.

HCS 1994	**HCS 2012**
· Date of preparation of MSDS or date of last change **(g)(2)(xi)**	16. Other information, including date of preparation or last revision. The date of preparation of the SDS or the last change to it.

Minimum training required by Dec. 1, 2013

The first compliance date of the revised Hazard Communication standard is December 1, 2013. By that time employers must have trained their workers on the new label elements and the SDS format. This training is needed early in the transition process since workers are already beginning to see the new labels and SDSs on the chemicals in their workplace. To ensure employees have the information they need to better protect themselves from chemical hazards in the workplace during the transition period, it is critical that employees understand the new label and SDS formats. The list below contains the minimum required topics for the training that must be completed by December 1, 2013.

Training on label elements must include::

- Type of information the employee would expect to see on the new labels, including the:
  - **Product identifier: how the hazardous chemical is identified**. This can be (but is not limited to) the chemical name, code number or batch number. The manufacturer, importer or distributor can decide the appropriate product identifier. The same product identifier must be both on the label and in Section 1 of the SDS (Identification).
  - **Signal word**: used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. There are only two signal words, "Danger" and "Warning." Within a specific hazard class, "Danger" is used for the more severe hazards and "Warning" is used for the less severe hazards. There will only be one signal word on the label no matter how many hazards a chemical may have. If one of the hazards warrants a "Danger" signal word and another warrants the signal word "Warning," then only "Danger" should appear on the label.
  - **Pictogram**: OSHA's required pictograms must be in the shape of a square set at a point and include a black hazard symbol on a white background with a red frame sufficiently wide enough to be clearly visible. A square red frame set at a point without a hazard symbol is not a pictogram and is not permitted on the label. OSHA has designated eight pictograms under this standard for application to a hazard category.
  - **Hazard statement(s)**: describe the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard. For example: "Causes damage to kidneys through prolonged or repeated exposure when absorbed through the skin." All of the applicable hazard statements must appear on the label. Hazard statements may be combined where appropriate to reduce redundancies and improve readability. The hazard statements are specific to the hazard classification categories, and chemical users should always see the same statement for the same hazards, no matter what the chemical is or who produces it.
  - **Precautionary statement(s)**: means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling.
  - **Name, address and phone number** of the chemical manufacturer, distributor, or importer.
- How an employee might use the labels in the workplace. For example:
  - Explain how information on the label can be used to ensure proper storage of hazardous chemicals.
  - Explain how the information on the label might be used to quickly locate information on first aid when needed by employees or emergency personnel.
- General understanding of how the elements work together on a label. For example:
  - Explain that where a chemical has multiple hazards, different pictograms are used to identify the various hazards. The employee should expect to see the appropriate pictogram for the corresponding hazard class.

- Explain that when there are similar precautionary statements, the one providing the most protective information will be included on the label.

Training on the format of the SDS must include information on::

- Standardized 16-section format, including the type of information found in the various sections:
  - For example, the employee should be instructed that with the new format, Section 8 (Exposure Controls/Personal Protection) will always contain information about exposure limits, engineering controls and ways to protect yourself, including personal protective equipment.
- How the information on the label is related to the SDS:
  - For example, explain that the precautionary statements would be the same on the label and on the SDS.

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Machine guarding

Introduction

Practical solutions to safeguarding moving machine parts are as numerous as the people working on them. The machine guarding approaches discussed in this chapter are not the only solutions which meet OSHA's requirements — no publication could keep pace with all of these solutions or attempt to depict them all.

That said, use the technical information provided in this chapter as a guide in protecting workers against the hazards of moving machine parts. It offers an overview of the machine safeguarding problem in the industrial setting, an assortment of solutions, and a challenge to all whose work involves machines. You will find information about the major mechanical motions and the general principles of safeguarding them.

The methods described here may be transferred, with due care, to different machines with similar hazards. To determine whether or not your safeguarding meets the requirements of OSHA's Machine Guarding standard at §1910.211-.219, any mechanical motion that threatens a worker's safety should be guarded.

Why is guarding machines so important?

Crushed hands and arms, severed fingers, blindness — the list of possible machinery-related injuries is as long as it is horrifying. There seem to be as many hazards created by moving machine parts as there are types of machines. Safeguards are essential for protecting workers from needless and preventable injuries.

A good rule to remember is:

Any machine part, function, or process which may cause injury must be safeguarded.

When the operation of a machine or accidental contact with it can injure the operator or others in the vicinity, the hazards must be either controlled or eliminated. In addition to techniques for protecting workers from the various hazards of mechanical motion presented in this chapter, you will find specific information related to preventing amputations — one of the most severe and disabling workplace injuries. These injuries result from using stationary machines such as saws, presses, conveyors, and bending, rolling, or shaping machines. They also occur from using powered and non-powered hand tools, forklifts, doors, trash compactors, and during materials handling activities.

What to look for

To prevent worker injuries, both the employer and employees operating the equipment must be able to recognize the contributing factors, such as:

- Mechanical components of machinery,
- Mechanical motion that occurs at or near these components, and
- Specific worker activities performed with the mechanical operation.

Machine safeguarding is the primary way to control crushing and amputation hazards associated with stationary machinery. Work practices, employee training, and administrative controls also play an important role in preventing and controlling these workplace hazards.

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The Fair Labor Standards Act (FLSA) designates certain non-farm jobs as particularly hazardous for employees younger than 18. Generally, this worker group is prohibited from operating:

- Band saws
- Circular saws
- Guillotine shears
- Punching and shearing machines
- Meatpacking or meat processing machines
- Power-driven paper products machines
- Power-drive woodworking machines
- Power-driven metal forming machines
- Power-driven meat slicers

Are your machines safe?

If you are responsible for safeguarding machines, you need to consider guards when purchasing machinery. Most new machinery is available with safeguards installed by the manufacturer, but used equipment may not be.

In cases where machinery has no safeguards, you can purchase safeguards from the original machine manufacturer or an after-market manufacturer. You can also build and install the safeguards in-house. Safeguarding equipment should be designed and installed only by technically qualified professionals. In addition, the original equipment manufacturer should review the safeguard design to ensure that it will protect employees without interfering with the operation of the machine or creating additional hazards.

Regardless of the source of safeguards, the guards and devices you use should be compatible with a machine's operation and designed to ensure safe operator use. The selection of safeguards should be based on:

- Type of operation,
- Size and shape of stock,
- Method of feeding,
- Physical layout of the work area, and
- Production requirements all affect the selection of safeguards.

Also, safeguards should be designed with the machine operator in mind. To ensure effective and safe operator use, guards and devices should suit the operation. For example, if an operation is prone to jamming, installing a fixed guard may not work. An interlocked guard or presence-sensing device may be a more practical solution.

Identify mechanical hazards

Anyone working around stationary equipment should be able to identify potential crushing and amputation hazards. Understanding the mechanical components of machinery, the mechanical motion that occurs at or near these components, and specific worker activities performed in conjunction with machinery operation will help workers avoid injury.

Dangerous moving parts in three basic areas require safeguarding:

1. **Point of operation** — that area of the machine where work is performed on the material. Mechanical actions that occur at point of operation include cutting, shaping, boring, or forming of stock.
2. **Power transmission apparatus** — all components of the mechanical system that transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears.
3. **Other moving parts** — all parts of the machine which move while the machine is operating. These can include reciprocating, rotating, and transverse moving parts, as well as lead mechanisms and auxiliary parts of the machine.

Hazardous mechanical motions and actions

A wide variety of mechanical motions and actions may present hazards to the worker. These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any parts that impact or shear. These different types of hazardous mechanical motions and actions are basic in varying combinations to nearly all machines, and recognizing them is the first step toward protecting workers from the danger they present.

The basic types of hazardous mechanical motions and actions are:

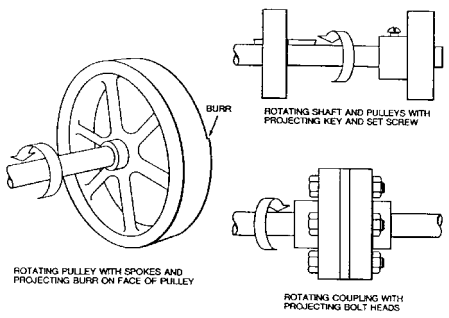
Motions	Actions
Rotating (including in-running nip points)	Cutting
Reciprocating	Punching
Transversing	Shearing
	Bending

Motions

Rotating motion can be dangerous; even smooth, slowly rotating shafts can grip clothing, and through mere skin contact force an arm or hand into a dangerous position. Injuries due to contact with rotating parts can be severe.

Collars, couplings, cams, clutches, flywheels, shaft ends, spindles, meshing gears, and horizontal or vertical shafting are some examples of common rotating mechanisms which may be hazardous. The danger increases when projections such as set screws, bolts, nicks, abrasions, and projecting keys or set screws are exposed on rotating parts (Figure 1).

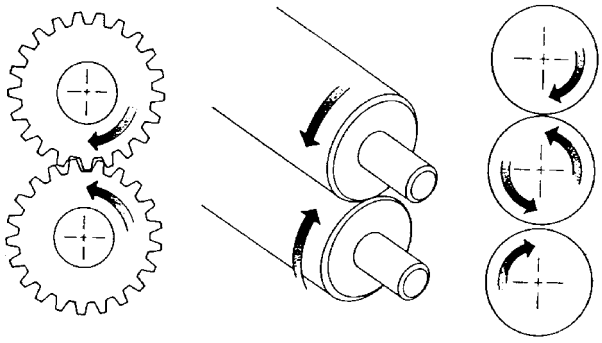
Figure 1. Examples of hazardous projections on rotating parts



In-running nip point hazards are caused by the rotating parts on machinery. There are three main types of in-running nips.

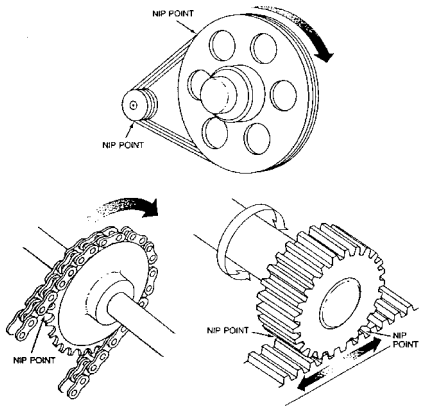
Parts can rotate in opposite directions while their axes are parallel to each other. These parts may be in contact (producing a nip point) or in close proximity. In the latter case the stock fed between the rolls produces the nip points. This danger is common on machines with intermeshing gears, rolling mills, and calenders (Figure 2).

Figure 2. Common nip points on rotating parts



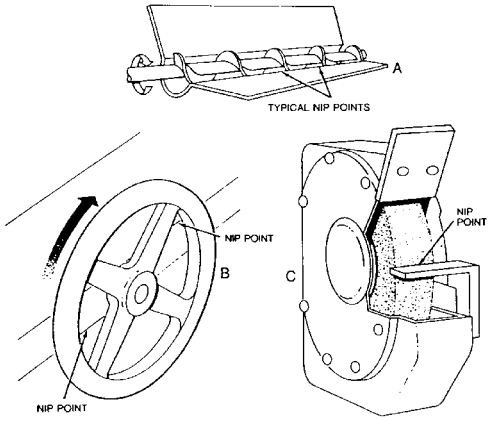
Nip points are also created between rotating and tangentially moving parts. Some examples would be: the point of contact between a power transmission belt and its pulley, a chain and a sprocket, and a rack and pinion (Figure 3).

Figure 3. Nip points between rotating elements and parts with longitudinal motions



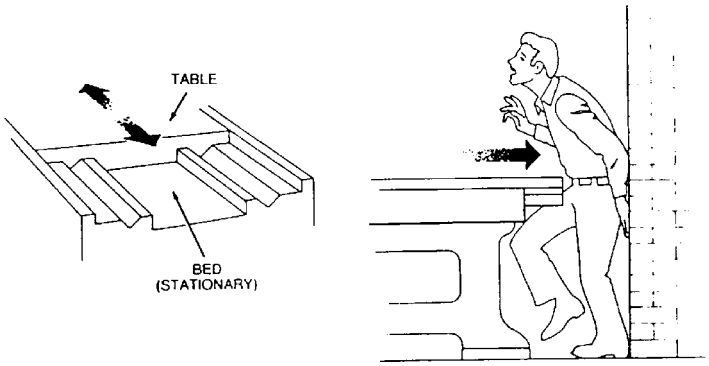
Nip points can occur between rotating and fixed parts which create a shearing, crushing, or abrading action. Examples are: spoked handwheels or flywheels, screw conveyors, or the periphery of an abrasive wheel and an incorrectly adjusted work rest (Figure 4).

Figure 4. Nip points between rotating machine components (A - cover removed for clarity.)



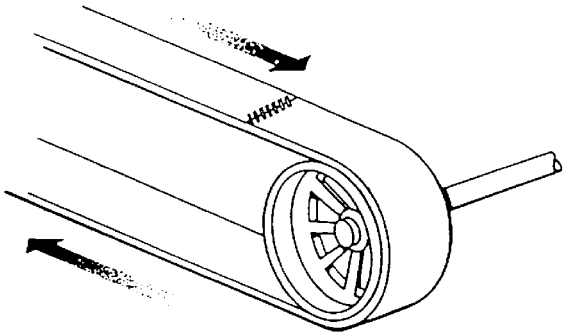
Reciprocating motions may be hazardous because, during the back-and-forth or up-and-down motion, a worker may be struck by or caught between a moving and a stationary part (Figure 5).

Figure 5. Hazardous reciprocating motion



Transverse motion (movement in a straight, continuous line) creates a hazard because a worker may be struck or caught in a pinch or shear point by the moving part (Figure 6).

Figure 6. Example of transverse motion

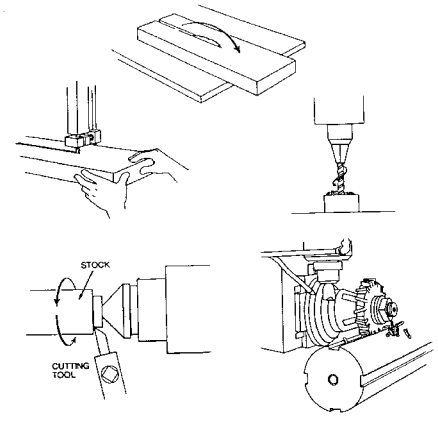


Actions

Cutting action may involve rotating, reciprocating, or transverse motion. The danger of cutting action exists at the point of operation where finger, arm and body injuries can occur and where flying chips or scrap material can strike the head, particularly in the area of the eyes or face. Such hazards are present at the point of operation in cutting wood, metal, or other materials.

Examples of mechanisms involving cutting hazards include bandsaws, circular saws, boring or drilling machines, turning machines (lathes), or milling machines (Figure 7).

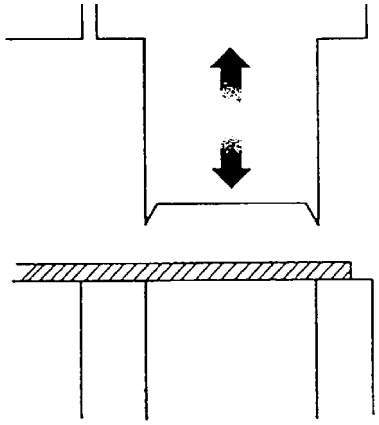
Figure 7. Examples of dangerous cutting hazards



Punching action results when power is applied to a slide (ram) for the purpose of blanking, drawing, or stamping metal or other materials. The danger of this type of action occurs at the point of operation where stock is inserted, held, and withdrawn by hand.

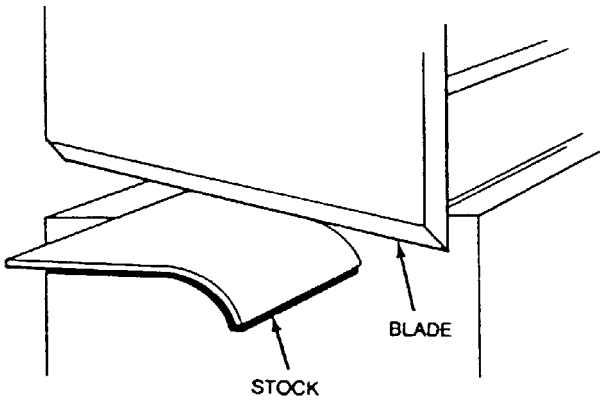
Typical machines used for punching operations are power presses and iron workers (Figure 8).

Figure 8. Typical punching operation



Shearing action involves applying power to a slide or knife in order to trim or shear metal or other materials. A hazard occurs at the point of operation where stock is actually inserted, held, and withdrawn. Examples of machines used for shearing operations are mechanically, hydraulically, or pneumatically powered shears (Figure 9).

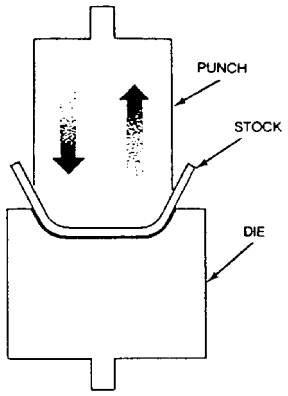
Figure 9. Shearing



Bending action results when power is applied to a slide in order to draw or stamp metal or other materials. A hazard occurs at the point of operation where stock is inserted, held, and withdrawn.

Equipment that uses bending action includes power presses, press brakes, and tubing benders (Figure 10).

Figure 10. Bending



Worker risks

Workers operating stationary machinery perform various activities that present the following potential hazards:

- Machine set-up/threading/preparation,
- Normal operations,
- Clearing jams,
- Machine adjustments,
- Cleaning machines,
- Lubricating machine parts, and
- Scheduled and unscheduled maintenance.

When evaluating activities for potential hazards, consider the entire operation, individual activities associated with the operation, and the potential for injury to workers nearby.

Machine safeguarding is the primary means of controlling crushing and amputation hazards associated with stationary machinery during normal operations. In addition, work practices, employee training, and administrative controls play an important role in the prevention and control of workplace amputations. OSHA requires adequate safeguards for all machines and equipment generating hazardous mechanical movement.

Criteria for machine safeguards

There are two basic methods used to safeguard machines — guards and devices.

- **Guards** provide physical barriers that prevent access to danger areas.
- **Devices** function by interrupting the machine's operating cycle to prevent workers from reaching or entering the danger area while the machine is cycling.

Both types of safeguards should be designed and installed to ensure worker protection.

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What are guards?

Guards are physical barriers that enclose dangerous machine parts and prevent worker contact with them. Guards must be secure and strong. Workers should not be able to bypass, remove, or tamper with guards. To prevent tampering, guards typically require a tool to unfasten and remove them. Guards should not create additional hazards such as pinch points or shear points between guards and other machine parts. Guards should not obstruct the operator's view or prevent workers from doing a job. Metal bars, Plexiglass™, or similar guards are suitable. Guard openings should be small enough to prevent workers from accessing danger areas. (See Table 1 and Figures 11 through 14 for commonly used machine guards.)

Table 1. Commonly used machine guards

Types of machine guards			
Type	**Safeguarding action**	**Advantages**	**Limitations**
Fixed	Barrier that allows for stock feeding but does not permit operator to reach the danger area.	• Can be constructed to suit many applications. • Permanently encloses the point of operation or hazard area. • Provides protection against machine repeat. • Allows simple, in-plant construction, with minimal maintenance.	• Sometimes not practical for changing production runs involving different size stock or feeding methods. • Machine adjustment and repair often require guard removal. • Other means of protecting maintenance personnel often required (lockout/ tagout).
Adjustable	Barrier that adjusts for a variety of production operations.	• Can be constructed to suit many applications. • Can be adjusted to admit varying stock sizes.	• May require frequent maintenance or adjustment. • Operator may make guard ineffective.
Self-adjusting	Barrier that moves according to the size of the stock entering point of operation. Guard is in place when machine is at rest and pushes away when stock enters the point of operation.	• Off-the-shelf guards are often commercially available.	• Does not provide maximum protection. • May require frequent maintenance and adjustment.
Interlocking	Shuts off or disengages power and prevents machine start-up when guard is open. Should allow for inching of machine. Replacing the guard should not automatically restart the machine.	• Allows access for machine set-up, adjustment, or jam removal without time-consuming removal of fixed guards when used with hand tools or safety blocks.	• May require periodic maintenance or adjustment. • Movable sections cannot be used for manual feeding. • Some designs may be easy to defeat.

Figure 11. Fixed guard on a power press

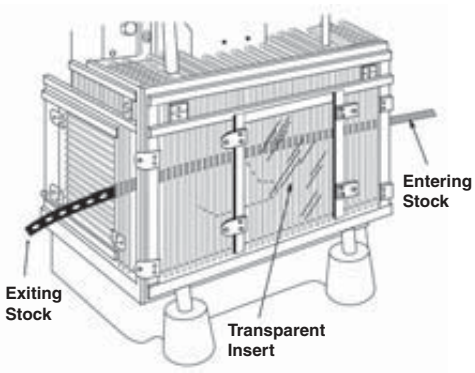


Figure 12. Power press with adjustable barrier guard

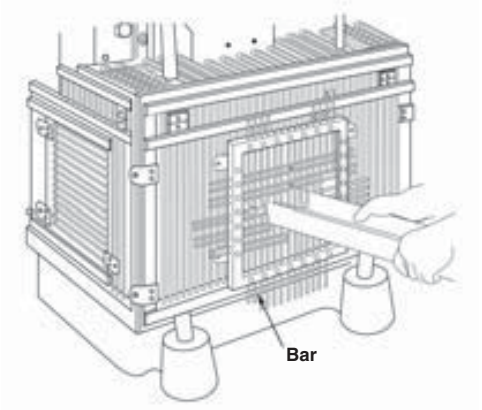


Figure 13. Self-adjusting guard on a radial saw

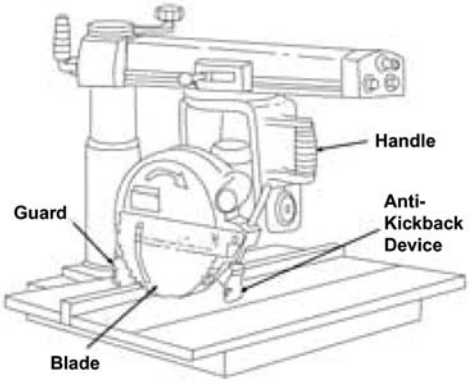
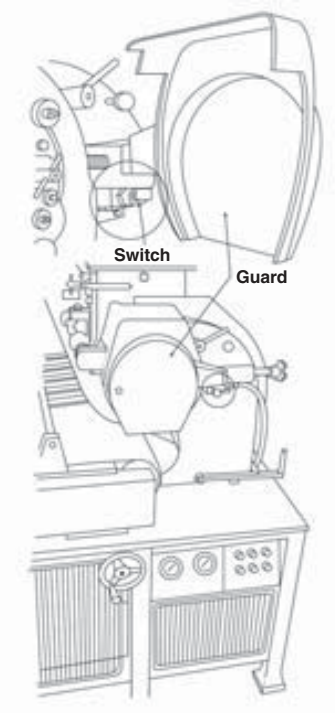


Figure 14. Interlocked guard on roll make-up machine



Minimum requirements for guards

In order to provide machine operator's with adequate protection against mechanical hazards, guards must meet the following minimum general requirements.

Prevent contact. The guard must prevent hands, arms, and any other part of a worker's body from making contact with dangerous moving parts. A good safeguarding system eliminates the possibility of the operator or another worker placing parts of their bodies near hazardous moving parts.

Secure. Workers should not be able to easily remove or tamper with the guard, because a guard that can easily be made ineffective is no safeguard at all. Guards and safety devices should be made of durable material that will withstand the conditions of normal use. They must be firmly secured to the machine.

Protect from falling objects. The guard should ensure that no objects can fall into moving parts. A small tool which is dropped into a cycling machine could easily become a projectile that could strike and injure someone.

Create no new hazards. A guard defeats its own purpose if it creates a hazard of its own such as a shear point, a jagged edge, or an unfinished surface which can cause a laceration. The edges of guards, for instance, should be rolled or bolted in such a way that they eliminate sharp edges.

Create no interference. Any guard that impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded. Proper safeguarding can actually enhance efficiency since it can relieve the worker's apprehensions about injury.

Allow safe lubrication and maintenance. If possible, one should be able to lubricate the machine without removing the guards. Locating oil reservoirs outside the guard, with a line leading to the lubrication point, will reduce the need for the operator or maintenance worker to enter the hazardous area.

What are devices?

Safeguarding devices typically help prevent operator contact with the point of operation. They may be used in place of guards or as a supplemental control when guarding alone does not adequately enclose the hazard. Safeguarding devices either:

- Interrupt the normal cycle of the machine if the operator's hands are at the point of operation,
- Prevent the operator from reaching into the point of operation, or
- Withdraw the operator's hands if they are located in or near the point of operation when the machine cycles.

(See Table 2 and Figures 15 through 20 for the types of safeguarding devices.)

Table 2. Types of safeguarding devices

Types of machine devices			
Type	**Method of safeguarding**	**Advantages**	**Limitations**
Pullback devices	Cords connected to operator's wrists and linked mechanically to the machine automatically withdraw the hands from the point of operation during the machine cycle.	• Allows the hands to enter the point of operation for feeding and removal. • Provides protection even in the event of mechanical repeat.	• Close supervision ensures proper use and adjustment. Must be inspected prior to each operator change or machine set-up. • Limits operator's movement and may obstruct their work space. • Operator may easily make device ineffective by not adjusting the device properly.
Restraint devices	Wrists are connected by cords and secured to a fixed anchor point which limit operator's hands from reaching the point of operation at any time.	• Simple, few moving parts; requires little maintenance. • Operator cannot reach into the danger area. • Little risk of mechanical failure; provides protection even in the event of mechanical repeat.	• Close supervision required to ensure proper use and adjustment. Must be inspected prior to each operator change or machine set-up. • Operator must use hand tools to enter the point of operation. • Limits the movement of the operator; may obstruct work space around operator. • Operator may easily make device ineffective by disconnecting the device.

Table 2. Types of safeguarding devices, Continued

Types of machine devices			
Type	**Method of safeguarding**	**Advantages**	**Limitations**
Presence-sensing devices	Interlock into the machine's control system to stop operation when the sensing field (photoelectric, radio frequency, or electromagnetic) is disturbed.	• Adjusts to fit different stock sizes. • Allows access to load and unload the machine. • Allows access to the guarded area for maintenance and set-up activities.	• Restricted to machines that stop operating cycle before operator can reach into danger area (e.g., machines with partial revolution clutches or hydraulic machines). • Must be carefully maintained and adjusted. • Does not protect operator in the event of a mechanical failure. • Operator may make device ineffective.
Presence-sensing mats	Interlock into machine's control system to stop operation when a predetermined weight is applied to the mat. A manual reset switch must be located outside the protected zone.	• Full visibility and access to the work area. • Install as a perimeter guard or over an entire area. • Configure for many applications.	• Restricted to machines that stop operating cycle before operator can reach into danger area (e.g., machines with part-revolution clutches or hydraulic machines). • Some chemicals can degrade the mats. • Does not protect operator during mechanical failures.
Safety trip controls (pressure-sensitive body bar, safety triprod, safety tripwire)	Stops machine when tripped.	• Simple to use.	• Must be manually activated. • May be difficult to activate due to location. • Protects operator only. • May require a machine brake.
Two-hand control	Requires concurrent and continued use of both hands, preventing them from entering the danger area.	• Operator's hands are at a predetermined location. • Operator's hands are free to pick up new parts after completion of first part of cycle.	• Requires a partial cycle machine with a brake and anti-repeat feature. • Operator may make devices without anti-tie-down ineffective. • Protects the operator only.

Table 2. Types of safeguarding devices, Continued

Types of machine devices			
Type	**Method of safeguarding**	**Advantages**	**Limitations**
Two-hand trip	Requires concurrent use of both hands, prevents them from being in danger area when machine cycle starts.	• Operator's hands are at a predetermined location. • Can be adapted to multiple operations. • No obstruction to hand feeding.	• Operator may make devices without anti-tie-down ineffective. • Protects the operator only. • Sometimes impractical because distance requirements may reduce production below acceptable level. • May require adjustment if tooling changes. • Requires anti-repeat feature.
Type "A" gate (moveable barrier)	Applicable to mechanical power presses. Provides barrier between danger area and operator (or other workers) until completion of machine cycle.	• Prevents operator from reaching into danger area during machine cycle. • Provides protection from machine repeat.	• May require frequent inspection and regular maintenance. • May interfere with operator's ability to see work.
Type "B" gate (moveable barrier)	Applicable to mechanical power presses and press brakes. Provides a barrier between danger area and operator (or other workers) during the downstroke.	• May increase production by allowing the operator to remove and feed the press on the upstroke.	• Can only be used on machines with a part-revolution clutch or hydraulic machines. • May require frequent inspection and regular maintenance. • May interfere with the operator's ability to see work.

Figure 15. Pullback device on a power press

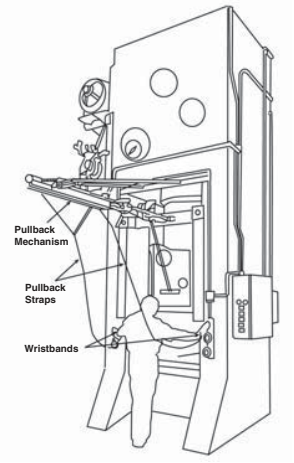


Figure 16. Restraint device on power press

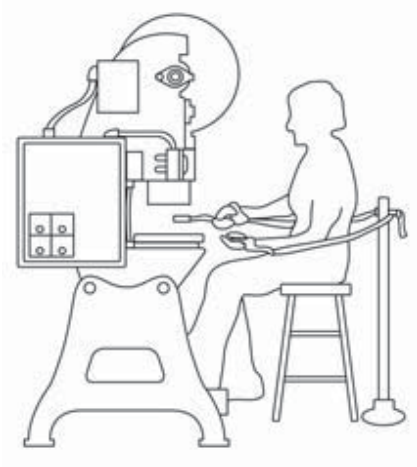


Figure 17. Photoelectric presence-sensing device on power press

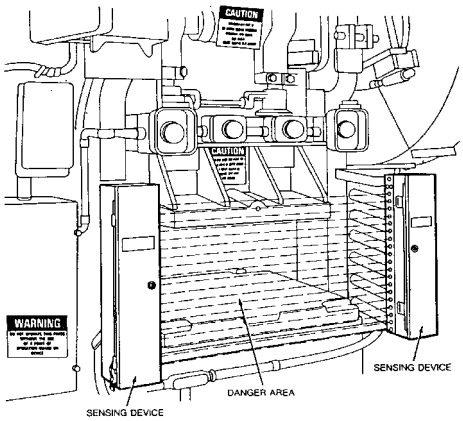


Figure 18. Safety tripod on a rubber mill

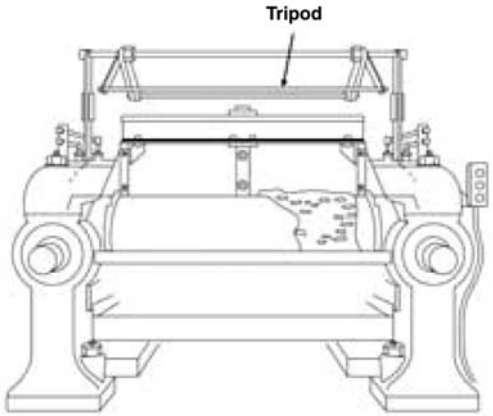


Figure 19. Fixed guards on veneer clipper

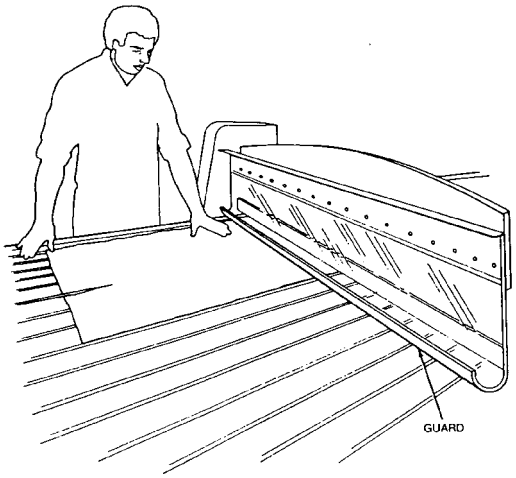
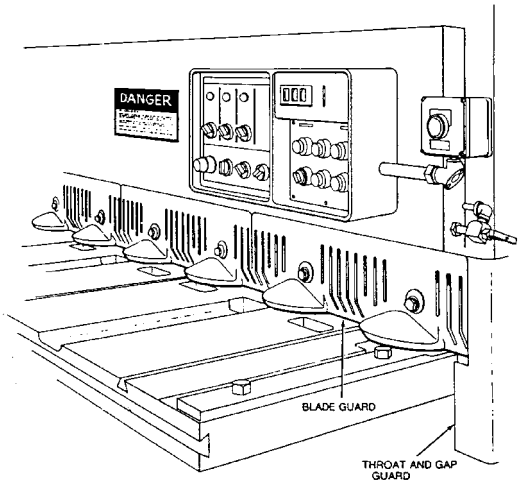


Figure 20. Fixed guard on a power squaring shear



Other safeguarding methods

Other methods for safeguarding machines include guarding by location or distance and by feeding methods that prevent operator access to the point of operation.

Guarding by location

Safeguarding by location involves positioning or designing a machine so that the hazardous parts are away from areas where employees work or walk, or alternatively, installing enclosure walls or fences that restrict access to machines.

Guarding by feeding methods

The feeding process can be safeguarded by distance if the operators maintain a safe distance between their hands and the point of operation. For instance, if the stock is several feet long and only one end of the stock is being worked on, the operator may be able to hold the opposite end while performing the work. Safeguarding by distance is sometimes used during power press brake operations to ensure its effectiveness. This method of safeguarding requires close supervision and training.

Automatic and semiautomatic feeding and ejection methods can protect the worker by minimizing or eliminating direct contact with machinery. These methods typically require frequent maintenance, however, and are only protective for normal machine operation. Examples of semiautomatic feeding methods include:

- Gravity feeds, where the part slides down a chute into the point of operation, and
- Magazine feeding, where the worker places the part in a magazine which is then fed into the point of operation.

Automatic and semiautomatic ejection methods include pneumatic (jet of air), magnetic, mechanical (such as an arm), or vacuum.

Hand-feeding tools

Operators can use tools to feed work pieces into equipment to keep their hands away from the point of operation, but this should be done only in conjunction with the guards and devices described previously. Using hand tools requires close supervision to ensure that the operator does not bypass their use to increase production. Tools should be stored near the operation to encourage their use. To prevent repetitive trauma disorders, hand-feeding tools should be ergonomically designed for the specific task being performed.

Foot controls

Foot controls are not safeguards because they do not keep the operator's hands out of the danger area. If you use them, they will need some type of guard or device, such as barriers or pullouts with interlocks capable of controlling the start up of the machine cycle. Using foot controls may increase productivity, but the freedom of hand movement allowed while the machine is operating increases the risk of a point of operation injury.

Foot controls must be guarded to prevent accidental activation by another worker or by falling material and not allow continuous cycling. They work best when the operator is in a sitting position. Always avoid the hazard of riding the pedal (keeping the foot on the pedal while not actively depressing it.)

Machines with clutches

Certain machines can be categorized based on the type of clutch they use — full-revolution or part-revolution. Differing modes of operation for these two clutches determine the type of guarding that can be used.

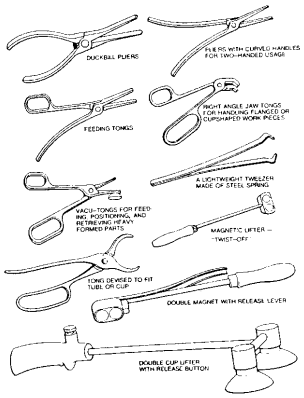
Once activated, full-revolution clutches complete a full cycle of the slide (lowering and raising of the slide) and cannot be disengaged until the cycle is complete. So, presence-sensing devices may not work and a

worker must maintain a safe distance when using two-hand trips. Machines incorporating full-revolution clutches, such as power presses, must also incorporate a single-stroke device and anti-repeat feature.

The part-revolution clutch can be disengaged at any time during the cycle to stop the cycle before it completes the down stroke. For example, part-revolution presses can be equipped with presence-sensing devices, but full-revolution presses cannot. Likewise, hydraulic presses can be stopped at any point in the cycle, and their safeguarding is similar to guarding for part-revolution clutch presses.

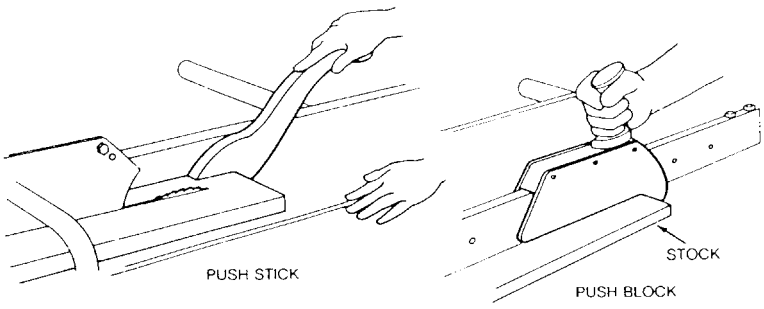
Special hand tools may be used to place or remove stock, particularly from or into the point of operation of a machine. A typical use would be for reaching into the danger area of a press or press brake. Figure 21 shows an assortment of tools for this purpose. Holding tools should not be used instead of other machine safeguards; they are merely a supplement to the protection that other guards provide.

Figure 21. Holding tools



A push stick or block, such as those in Figure 22, may be used when feeding stock into a saw blade. When it becomes necessary for hands to be in close proximity to the blade, the push stick or block may provide a few inches of safety and prevent a severe injury. In the illustration, the push block fits over the fence.

Figure 22. Use of push stick or push block



Non-mechanical hazards

In addition to safeguarding mechanical motions, machines present a variety of other hazards which cannot be ignored.

Power sources

All power sources for machines are potential sources of danger. When using electrically powered or controlled machines, for instance, the equipment as well as the electrical system itself must be properly grounded. Replacing frayed, exposed, or old wiring will also help to protect the operator and others from electrical shocks or electrocution.

High pressure systems need careful inspection and maintenance to prevent possible failure from pulsation, vibration, or leaks. Such a failure could cause, among other things, explosions or flying objects.

Noise

Machines often produce noise (unwanted sound) which can result in a number of hazards to workers. Noise can startle and disrupt concentration, and can interfere with communications, thus hindering the worker's safe job performance. Research has linked noise to a whole range of harmful health effects, from hearing loss and aural pain to nausea, fatigue, reduced muscle control, and emotional disturbance. Engineering controls such as the use of sound-dampening materials, and personal protective equipment, such as ear plugs and muffs, can help control the harmful effects of noise. Also, administrative controls that involve removing the worker from the noise source can be an effective measure when feasible.

Machine fluids

Because some machines require the use of cutting fluids, coolants, and other potentially harmful substances, operators, maintenance workers, and others in the vicinity may need protection. These substances can cause ailments ranging from dermatitis to serious illnesses and disease. Specially constructed safeguards, ventilation, and protective equipment and clothing are possible temporary solutions to the problem of machinery-related chemical hazards until these hazards can be better controlled or eliminated from the workplace.

Guard construction

Many builders of single-purpose machines provide point-of-operation and power transmission safeguards as standard equipment. However, not all machines in use have built-in safeguards provided by the manufacturer.

Guards designed and installed by the builder offer two main advantages:

- They usually conform to the design and function of the machine.
- They can be designed to strengthen the machine in some way or to serve some additional functional purposes.

User-built guards are sometimes necessary for a variety of reasons. They have these advantages:

- They may be the only choice for mechanical power transmission apparatus in older plants, where machinery is not powered by individual motor drives.
- They permit options for point-of-operation safeguards when skilled personnel design and make them.
- They can be designed and built to fit unique and even changing situations.
- They can be installed on individual dies and feeding mechanisms.
- Design and installation of machine safeguards by plant personnel can help to promote safety consciousness in the workplace.

However, they also have disadvantages:

- User-built guards may not conform well to the configuration and function of the machine.
- There is a risk that user-built guards may be poorly designed or built.

Guard material

Under many circumstances, metal is the best material for guards. Guard framework is usually made from structural shapes, pipe, bar, or rod stock. Filler material generally is expanded or perforated or solid sheet metal or wire mesh. It may be feasible to use plastic or safety glass where visibility is required.

Guards made of wood generally are not recommended because of their flammability and lack of durability and strength. However, in areas where corrosive materials are present, wooden guards may be the better choice.

Point-of-operation guards

Point-of-operation safeguarding is complicated by the number and complexity of machines and also by the different uses for individual machines. For these reasons, not all machine builders provide point-of-operation guards on their products. In many cases a point-of-operation guard can only be made and installed by the user after a thorough hazard analysis of the work requirements. Poorly designed, built or installed guards may create a hazard rather than eliminate one. To be effective they must safeguard the employee while allowing the work to continue with minimum disruption to the production process.

Mechanical power transmission apparatus guarding

A significant difference between power transmission guards and point-of-operation guards is that the former type needs no opening for feeding stock. The only openings necessary for power transmission guards are those for lubrication, adjustment, repair, and inspection. These openings should be provided with interlocked covers that cannot be removed except by using tools for service or adjustment.

To be effective, power transmission guards should cover all moving parts in such a manner that no part of the operator's body can come in contact with them.

Machinery maintenance and repair

Good maintenance and repair procedures contribute significantly to the safety of the maintenance crew as well as that of machine operators. The variety and complexity of machines to be serviced, the hazards associated with their power sources, the special dangers that may be present during machine breakdown, and the severe time constraints often placed on maintenance personnel all make safe maintenance and repair work difficult.

Training and aptitude of people assigned to these jobs should make them alert for the intermittent electrical failure, the worn part, the inappropriate noise, the cracks or other signs that warn of impending breakage or that a safeguard has been damaged, altered, or removed. By observing machine operators at their tasks and listening to their comments, maintenance personnel may learn where potential trouble spots are and give them early attention before they develop into sources of accidents and injury. Sometimes all that is needed to keep things running smoothly and safely is machine lubrication or adjustment.

Any damage observed or suspected should be reported to the supervisor; if the condition impairs safe operation, the machine should be out of service for repair. Safeguards that are missing, altered, or damaged also should be reported so appropriate action can be taken to insure against worker injury.

If possible, machine design should permit routine lubrication and adjustment without removal of safeguards. But when safeguards must be removed, and the machine serviced, the lockout procedure of §1910.147

must be adhered to. The maintenance and repair crew must never fail to replace the guards before the job is considered finished and the machine released from lockout.

Is it necessary to oil machine parts while a machine is running? If so, special safeguarding equipment may be needed solely to protect the oiler from exposure to hazardous moving parts. Maintenance personnel must know which machines can be serviced while running and which cannot. "If in doubt, lock it out." Obviously, the danger of accident or injury is reduced by shutting off and locking out all sources of energy.

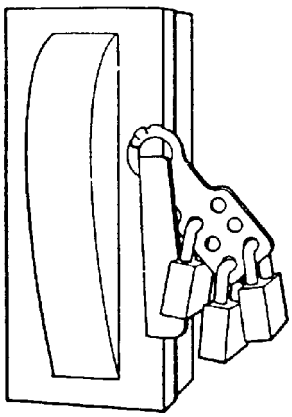
In situations where the maintenance or repair worker would necessarily be exposed to electrical elements or hazardous moving machine parts in the performance of the job, there is no question that all power sources must be shut off and locked out before work begins. Warning signs or tags are inadequate insurance against the untimely energizing of mechanical equipment.

Thus, one of the first procedures for the maintenance person is to disconnect and lock out the machine from all of its power sources, whether the source is electrical, mechanical, pneumatic, hydraulic, or a combination of these. Energy accumulation devices must be "bled down."

Electrical

Unexpected energizing of any electrical equipment that can be started by automatic or manual remote control may cause electric shock or other serious injuries to the machine operator, the maintenance worker, or others operating adjacent machines controlled by the same circuit. For this reason, when maintenance personnel must repair electrically powered equipment, they should open the circuit at the switch box and padlock the switch (lock it out) in the "off" position. This switch should be tagged with a description of the work being done, the name of the maintenance person, and the department involved. When more than one worker is to be engaged in the servicing/maintenance function, a typical lockout hasp to which each may affix a personal lock is shown in Figure 23.

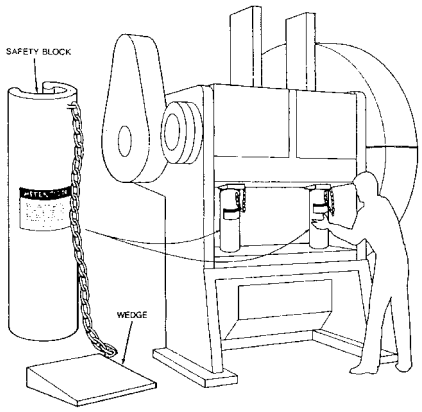
Figure 23. Lockout hasp



Mechanical

Figure 24 shows safety blocks being used as an additional safeguard on a mechanical power press, even though the machine has been locked out. The safety blocks prevent the ram from coming down under its own weight.

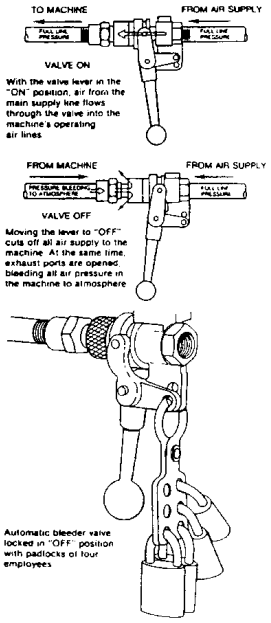
Figure 24. Safety blocks installed on power press



Pneumatic and hydraulic

Figure 25 shows a lockout valve. The lever-operated air valve used during repair or shutdown to keep a pneumatic-powered machine or its components from operating can be locked open or shut. Before the valve can be opened, everyone working on the machine must use his or her own key to release the lockout. A sliding-sleeve valve exhausts line pressure at the same time it cuts off the air supply. Valves used to lock out pneumatic or hydraulic-powered machines should be designed to accept locks or lockout adapters and should be capable of "bleeding off" pressure residues that could cause any part of the machine to move.

Figure 25. Lockout valve



In shops where several maintenance persons might be working on the same machine, multiple lockout devices accommodating several padlocks are used. The machine cannot be reactivated until each person removes his or her lock. As a matter of general policy, lockout control is gained by the procedure of issuing

personal padlocks to each maintenance or repair person; no one but that person can remove the padlock, thereby each worker controls the power systems.

Whenever machines or equipment are serviced, there are hazards encountered by the employees performing the servicing or maintenance which are unique to the repair or maintenance procedures being conducted. These hazards may exist due to the failure of the employees doing the servicing or maintenance to stop the machine being worked on. Even if the machine has been stopped, the machine can still be hazardous due to the possibility of the machine becoming reenergized or restarting.

Lockout/tagout procedure

In order to prevent these hazards, each machine or piece of equipment should be safeguarded during the conduct of servicing or maintenance by:

1. Notifying all affected employees (usually machine or equipment operators or users) that the machine or equipment must be shut down to perform some maintenance or servicing;
2. Stopping the machine;
3. Isolating the machine or piece of equipment from its energy source;
4. Locking out or tagging out the energy source;
5. Relieving any stored or residual energy; and
6. Verifying that the machine or equipment is isolated from the energy source.

Although this is the general rule, there are exceptions when the servicing or maintenance is not hazardous for an employee, when the servicing which is conducted is minor in nature, done as an integral part of production, and the employer utilizes alternative safeguards which provide effective protection as is required by §1910.212 or other specific OSHA standards.

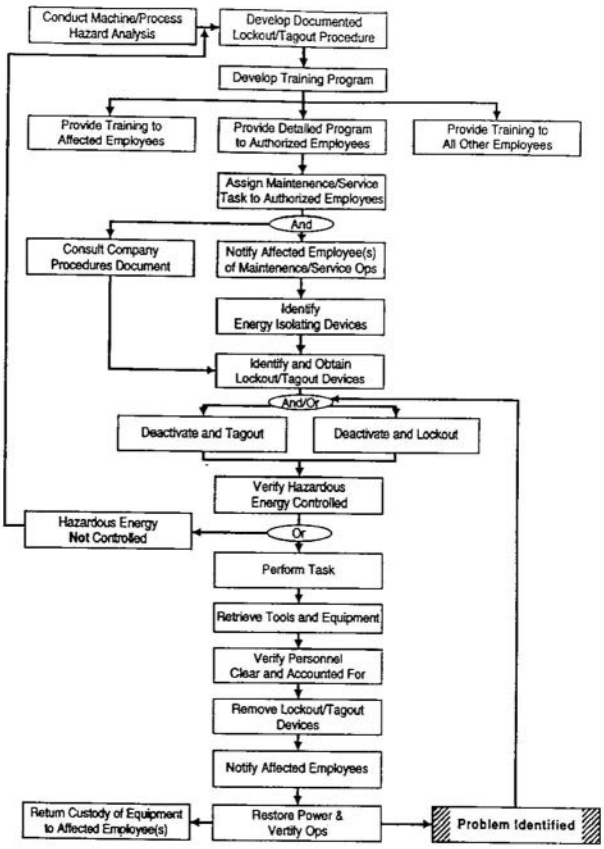
When the servicing or maintenance is completed, there are specific steps which must be taken to return the machine or piece of equipment to service. These steps include:

- Inspection of the machine or equipment to ensure that all guards and other safety devices are in place and functional,
- Checking the area to ensure that energization and start up of the machine or equipment will not endanger employees,
- Removal of the lockout devices,
- Reenergization of the machine or equipment, and
- Notification of affected employees that the machine or equipment may be returned to service.

The steps to lockout described above are only a part of the total energy control program which must exist in the workplace. In addition, the employee should have written procedures for all machines and equipment, employees must be trained in their duties and responsibilities under the energy control program, and periodic inspections must be conducted to maintain the effectiveness of the program.

Figure 26 provides a functional flow diagram of the functions necessary during the conduct of a viable servicing/maintenance operation during which the equipment must be isolated and locked out.

Figure 26. Functional flow diagram for implementation of lockout/tagout requirements



The maintenance and repair facility in the plant deserves consideration here. Are all the right tools on hand and in good repair? Are lubricating oils and other common supplies readily available and safely stored? Are commonly used machine parts and hardware kept in stock so that the crews are not encouraged (even obliged) to improvise, at the risk of doing an unsafe repair, or to postpone a repair job? And don't overlook the possibility that maintenance equipment itself may need guarding of some sort. The same precaution applies to tools and machines used in the repair shop. Certainly, the maintenance and repair crew are entitled to the same protection that their service provides to the machine operators in the plant.

Housekeeping

Don't forget to consider housekeeping practices, employee apparel, and employee training. Implement good housekeeping practices to promote safe working conditions around machinery by doing the following:

- Remove slip, trip, and fall hazards from the areas surrounding machines;
- Use drip pans when oiling equipment;
- Remove waste stock as it is generated;
- Make the work area large enough for machine operation and maintenance; and
- Place machines away from high traffic areas to reduce worker distraction.

Anchoring machinery

OSHA requires, in 1910.212(b), that machines that are "designed for a fixed location" must be "securely anchored" to prevent walking or moving.

While there are no OSHA Letters of Interpretation on the issue, OSHA has said that the general thought is that "machinery designed for a fixed location" refers to large machinery that is not easy to relocate.

But, what is meant by "not easy to relocate"? While there is no recognized rule of thumb, OSHA has said that employers can clearly exclude "portable" equipment (i.e., equipment that is designed to be moved around fairly frequently), except that such portable equipment that would move during operation would need to be secured.

Employers should talk with the manufacturer (and/or look to see if the equipment has mounting brackets, etc.) In addition, employers should conduct a hazard assessment; if the machine could move during operation, then it must be secured.

Reserved

Training

Even the most elaborate safeguarding system cannot offer effective protection unless the worker knows how to use it and why. Specific and detailed training is therefore a crucial part of any effort to provide safeguarding against machine-related hazards. Thorough operator training should involve instruction or hands-on training in the following:

1. A description and identification of the hazards associated with particular machines.
2. The safeguards themselves, how they provide protection, and the hazards for which they are intended.
3. How to use the safeguards and why.
4. How and under what circumstances safeguards can be removed, and by whom (in most cases, repair or maintenance personnel only).
5. What to do (e.g., contact the supervisor) if a safeguard is damaged, missing, or unable to provide adequate protection.

This kind of safety training is necessary for new operators and maintenance or setup personnel, when any new or altered safeguards are put in service, or when workers are assigned to a new machine or operation.

Protective clothing and personal protective equipment

Engineering controls, which eliminate the hazard at the source and do not rely on the worker's behavior for their effectiveness, offer the best and most reliable means of safeguarding. Make engineering controls your first choice to eliminating machine hazards. But whenever engineering controls are not available or are not fully capable of protecting the employee, ensure that protective clothing or personal protective equipment is worn.

For adequate protection, the clothing and equipment selected must always be:

- Appropriate for the particular hazards;
- Maintained in good condition;
- Properly stored when not in use, to prevent damage or loss; and
- Kept clean, fully functional, and sanitary.

Protective clothing is, of course, available for different parts of the body. Hard hats can protect the head from the impact of bumps and falling objects when the worker is handling stock; caps and hair nets can help keep the worker's hair from being caught in machinery. If machine coolants could splash or particles could fly into the operator's eyes or face, then face shields, safety goggles, glasses, or similar kinds of protection might be necessary.

Hearing protection may be needed when workers operate noisy machines. To guard the trunk of the body from cuts or impacts from heavy or rough-edged stock, there are certain protective coveralls, jackets, vests, aprons, and full-body suits. Workers can protect their hands and arms from the same kinds of injury with special sleeves and gloves. Safety shoes and boots, or other acceptable foot guards, can shield the feet against injury in case the worker needs to handle heavy stock which might drop.

It is important to note that protective clothing and equipment can create additional hazards. A protective glove can be caught in rotating parts, or a respirator facepiece may hinder the wearer's vision. For these reasons, selecting the appropriate equipment is essential.

Other parts of the worker's clothing may present additional safety hazards. For example, loose-fitting shirts may get entangled in rotating spindles or other kinds of moving machinery. Jewelry, such as bracelets and

rings, or a belt buckle could catch on machine parts or stock and lead to serious injury by pulling a hand or the body into the danger area.

Safeguarding for specific types of machinery

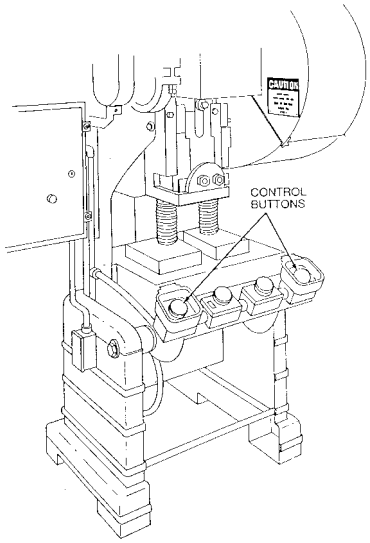
There are many ways to safeguard machines. The type of operation, the size or shape of stock, the method of handling, the physical layout of the work area, the type of material, and production requirements or limitations play an important role in determining the appropriate guarding method for an individual machine. On the following pages, you will find hazard information and safeguarding guidelines for a variety of machines.

Mechanical power presses

Although there are three major types of power presses — mechanical, hydraulic, and pneumatic — the machinery that accounts for a large number of workplace amputations are mechanical power presses.

In mechanical power presses, tools or dies are mounted on a slide, or ram, which operates in a controlled, reciprocating motion toward and away from the stationary bed or anvil containing the lower die. When the upper and lower dies press together on the workpiece, a re-formed piece is produced. Once the downstroke is completed, the re-formed workpiece is removed either automatically or manually, a new workpiece is fed into the die, and the process is repeated.

Figure 27. Two-hand control buttons on part-revolution clutch power press



Power press hazards

Amputations occurring from point of operation hazards are the most common types of injuries associated with mechanical power presses. Inadequate safeguarding allows the operators to inadvertently activate the power press tripping mechanism while their fingers are in the die (point of operation). For example, amputations can occur when an operator instinctively reaches into the point of operation to adjust a misaligned part or release a jam.

Amputations also occur when an operator's normal feeding rhythm is interrupted, resulting in inadvertent placement of the operator's hands in the point of operation. Such injuries typically happen while the operator is riding the foot pedal. Inadequate or ineffective safeguarding include:

- Guards and devices disabled to increase production, to allow the insertion of small piece work, or to allow better viewing of the operation.

- Two-hand trips/controls bridged or tied down to allow initiation of the press cycle using only one hand.
- Devices such as pullbacks or restraints improperly adjusted to fit the specific operator.
- Controls of a single-operator press bypassed by having a coworker activate the controls while the operator positions or aligns parts in the die, or repairs or troubleshoots the press.
- Failure to properly lockout/tagout presses or to have a special method in place for making adjustments, clearing jams, performing maintenance, installing or aligning dies, or cleaning the machine.

Some amputations are linked to machine failure, such as failure of a single-stroke linkage resulting in a "double cycle," electronic failure of two-hand controls, brake failure resulting in the slide falling, and jammed relays in light curtains.

Power press safeguards

Mechanical power presses are extremely versatile, and selecting appropriate safeguarding methods depends on the specific press design and use. You should consider the press, the type of clutch used, the stock size, the length of production runs, and the method of feeding.

You can use engineering controls such as guards to prevent injuries. For example, §1910.217 requires employers to provide and ensure the use of point of operation guards or properly installed devices on every operation performed on a press when the die opening is greater than 1/4 inch. If the dies of a power press can be adjusted so that they never open more than 1/4 inch, there is no need for a point of operation guard. This is referred to as "stroke limitation" and is a good choice when practical.

In addition, guards must conform to the maximum permissible openings of Table O-10 of §1910.217. Guards must prevent entry of hands or fingers into the point of operation through, over, under, or around the guard.

Case history

While using an unguarded, foot pedal-operated, full-revolution mechanical power press that made trip collars for wood stoves, an employee used his hands to feed and remove finished parts and scrap metal. He placed the completed part to the left side of the press, then turned to place the scrap in the bin behind him. As he turned back to face the press, he inadvertently stepped on the foot pedal and activated the press while his hand was in the die area. His left hand was amputated at the wrist.

Work practices and administrative controls

The types of work practices and administrative controls you provide can make a big difference in reducing the potential for amputation hazards. For example, if workers operate presses under a "no hands in die" policy using feeding methods such as hand-tool feeding, safeguarding (two-hand trip, Type A and B gates, or presence-sensing device) you still must protect operators. Hand-tool feeding alone does not ensure that the operator's hands cannot reach the danger area. (Figure 28 illustrates the use of hand feeding tools in conjunction with pullbacks on a power press.)

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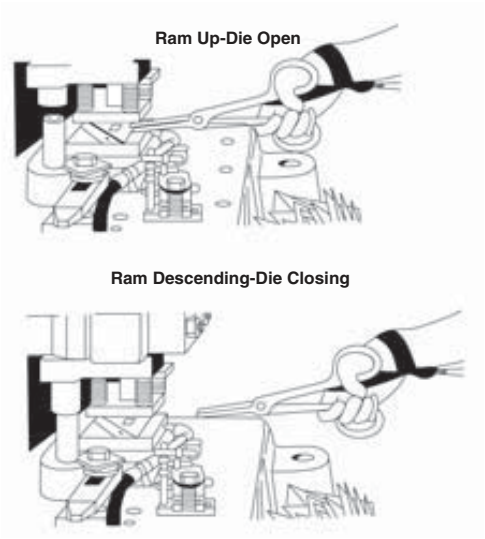
Figure 28. Hand feeding tools used in conjuction with pullbacks on a power press



Removing scrap or stuck work with tools is required even when hand feeding is allowed according to §1910.217(d)(1)(ii). You must furnish and enforce the use of hand tools for freeing or removing work or scrap pieces from the die to reduce the amount of time an operator's hand is near the point of operation.

In addition, work practices such as regular mechanical power press inspection, maintenance, recordkeeping, and reporting are essential.

- §1910.217(e)(1)(i) requires a program of periodic and regular inspections of mechanical power presses. You must inspect and test the condition of the clutch/brake mechanism, antirepeat feature, and single-stroke mechanism and maintain records of these inspections and the maintenance performed.
- §1910.217(g), requires the reporting of all point of operation injuries within 30 days to OSHA.

Goals for power press point of operation safeguards

1. Prevent or stop the normal press stroke if the operator's hands are in the point of operation; or
2. Prevent the operator from reaching into the point of operation as the die closes; or
3. Withdraw the operator's hands if inadvertently placed in the point of operation as the die closes; or
4. Prevent the operator from reaching the point of operation at any time; or
5. Require the operator to use both hands for the machine controls that are located at such a distance that the slide completes the downward travel or stops before the operator can reach into the point of operation; or
6. Enclose the point of operation before a press stroke can be started to prevent the operator from reaching into the danger area before die closure or enclose the point of operation prior to cessation of the slide motion during the downward stroke.

Other controls for die set-up and maintenance

Additional controls pertaining to mechanical power press die set-up and maintenance include the following:

- Control point of operation hazards created when guards are removed for set-up and repair by operating the machine in the inch mode. This involves using two-hand controls to gradually inch the press through a stroke when the dies are being tested on part-revolution clutch presses.
- Avoid making machine repairs or modifications while the machine can be stroked.
- Prevent stroking by using die blocks or interlocked barrier guards.
- Disconnect or remove foot controls while die work is being performed if they are used to initiate the stroke.

Training

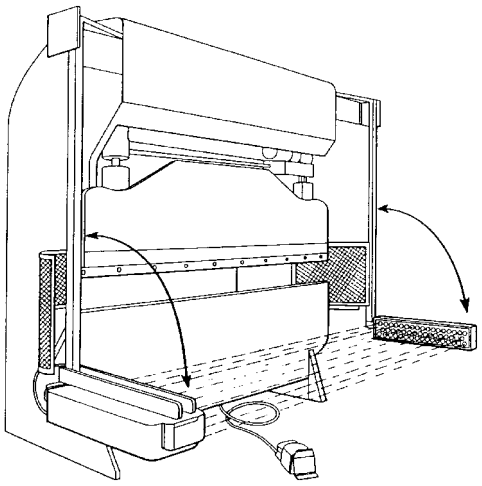
Training is essential for worker protection. As an employer, you should train operators in safe mechanical press operation procedures and techniques before they begin work on the press. Additionally, supervise operators to ensure that correct procedures and techniques are being followed.

Power press brakes

Power press brakes are similar to mechanical power presses in that they use vertical reciprocating motion and are used for repetitive tasks. Press brake operation is either mechanical or hydraulic. Press brakes are either general-purpose or special-purpose brakes, according to ANSI B11.3, *Safety Requirements for the Construction, Care, and Use of Power Press Brakes.*

General-purpose press brakes have a single operator control station. A servo-system activates the special-purpose brake which may be equipped with multiple operator/helper control stations. (See Figure 29 for a power press brake presence-sensing device.)

Figure 29. Photoelectric presence-sensing device on press brake



Power press brakes hazards

As with mechanical power presses, point of operation injuries are the most common type of injury associated with power press brakes. Here are some frequent causes of amputations from power press brakes:

- Foot controls being inadvertently activated while the operator's hand is in the point of operation. The likelihood of this type of injury increases as the size of stock decreases and brings the operator's hands closer to the point of operation.

- Parts of the body caught in pinch points created between the stock and the press brake frame while the bend is being made.
- Controls of a single-operator press bypassed by having a coworker activate the controls while the operator positions or aligns stock or repairs or troubleshoots the press.
- Failure to properly lockout/tagout presses or to have an alternative measure that provides effective protection for safety during the necessary tasks of making adjustments, clearing jams, performing maintenance, installing or aligning dies, or cleaning the machine.

Case history

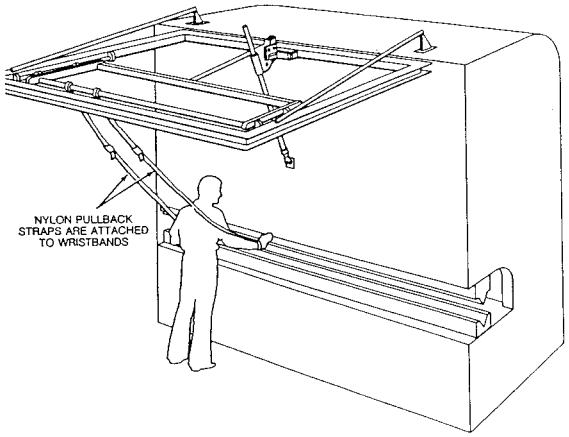
An operator was bending small parts using an 80-ton unguarded press brake. This required the employee's fingers to be very close to the point of operation and consequently, the operator lost three fingers when his hand entered the point of operation. The operator on the previous shift had reported to the supervisor that the operator placed his fingers close to the point of operation, but was told nothing could be done but that the operator should be careful.

Power press brakes safeguards

Engineering controls, work practices, and administrative controls can be used to effectively guard power press brakes. Engineering controls such as presence-sensing devices are sometimes used to safeguard power press brakes. When installed on special-purpose press brakes, these devices may require muting or balancing to allow the bending material to move through the protected zone. Always ensure that these devices are properly adjusted for the specific stock and task to be performed. Failure to adjust the device could leave it "blanked out" in certain areas and expose operators to point of operation hazards.

Be sure to safeguard general-purpose power press brakes by location, or by barrier guard, pullbacks, or restraints when operated by a single operator and helper. Other forms of helper safeguarding are ineffective and not applicable to general-purpose power press brakes. Special-purpose power press brakes are equipped with advanced control systems that are adaptable to all forms of safeguarding concepts and devices, such as two-hand controls and multiple operator/helper actuating controls. Use anti-repeat devices to protect operators at the point of operation on special-purpose power press brakes to comply with ANSI B11.3.

Figure 30. Pullback device on press brake



Under some conditions, absolute safeguarding of power press brakes may be impractical. This is especially true for press brakes used to process small-quantity runs involving the fabrication of unique pieces. When absolute physical guarding is impractical or infeasible for small quantity runs, OSHA recognizes the use of a "safe distance" as an alternative safeguarding method.

Work practices and administrative controls

Implement the following work practices to ensure safe operation of power press brakes with foot pedals, especially when the operator is working with small parts:

- Use foot pedals only with other guards or devices but keep a safe distance between the operator's hand and the point of operation when the use of such safeguards is not feasible.
- Be certain that the stock size is large enough to ensure that the operator is unable to reach into the point of operation during the down stroke when a foot control is used to stroke the press brake.
- Don't ride the foot pedal.
- Protect foot pedals from accidental activation and continuous cycling.
- Use hand-feeding tools for operations when the operator's hands come closer to the point of operation as the size of stock decreases.

Ensure that all power press brake operators receive appropriate training from experienced operators and supervision until they can work safely on their own.

Develop and implement safe operating procedures for power press brakes and conduct periodic inspections to ensure compliance.

Require workers to perform servicing and maintenance activities under an energy control program in accordance with §1910.147.

Conveyors

Conveyors are used in many industries to transport materials horizontally, vertically, at an angle, or around curves. Types include non-powered and powered, live roller, slat, chain, screw, and pneumatic. Conveyors eliminate or reduce manual material handling tasks, but they present amputation hazards associated with mechanical motion.

Conveyor hazards

Conveyor-related injuries typically involve a worker's hands or fingers becoming caught in nip points or shear points on conveyors and may occur in these situations:

- Cleaning and maintaining a conveyor especially when it is still operating.
- Reaching into an in-going nip point to remove debris or to free jammed material.
- Allowing a cleaning cloth or an employee's clothing to get caught in the conveyor and pull the worker's fingers or hands into the conveyor.

Other conveyor-related hazards include improperly guarded sprocket and chain drives. Overhead conveyors warrant special attention because most of the conveyor's drive train is exposed. Employees have also been injured while stepping or walking on or near conveyors.

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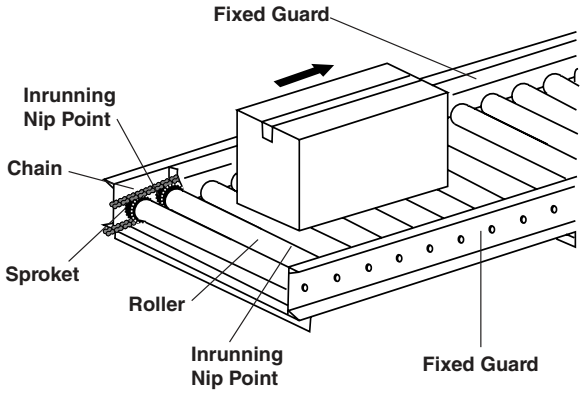
Case history

While removing a cleaning rag from the ingoing nip point between the conveyor belt and its tail pulley (non-powered end of the conveyor), an employee's arm became caught in the pulley, which amputated his arm below the elbow.

Figure 31. Chain driven live roller conveyor



Engineering controls

Some general controls you might use for conveyors include the following:

- Install guards for all sprockets, chains, rollers, belts, and other moving parts. Guarding by location — locating moving parts away from employees to prevent accidental contact with the hazard point — is one option for guarding conveyors. It is particularly difficult, however, to use this method when guarding the in-going nip points on certain conveyors such as roller conveyors because the exposed rollers are crucial to the function of the conveyor.
- Use prominent warning signs or lights to alert workers to the conveyor operation when it is to install guarding devices because they interfere with the conveyor's operation.
- Ensure that all conveyor openings such as wall and floor openings, and chutes and hoppers, have guards when the conveyor is not in use.
- Ensure that start buttons have guards to prevent accidental operation.
- Ensure that conveyor controls or power sources can accept a lockout/tagout device to allow safe maintenance practices.

For crossovers, aisles, passageways, you need to do the following:

- Ensure that all accesses and aisles that cross over or under or are adjacent to the conveyor have adequate clearance and hand rails or other guards.
- Place crossovers in areas where employees are most likely to use them.
- Ensure that all underpasses have protected ceilings.
- Post appropriate hazard warning signs at all crossovers, aisles, and passageways.
- Considering emergency egress when determining placement of crossovers, aisles, and passageways.

For emergency stops or shut-offs, you will need these engineering controls:

- Equip conveyors with interlocking devices that shut them down during an electrical or mechanical overload such as product jam or other stoppage. When conveyors are arranged in a series, all should automatically stop whenever one stops.
- Equip conveyors with emergency stop controls that require manual resetting before resuming conveyor operation.
- Install clearly marked, unobstructed emergency stop buttons or pull cords within easy reach of workers.
- Provide continuously accessible conveyor belts with emergency stop cables that extend the entire length of the conveyor belt to allow access to the cable from any point along the belt.

Typical conveyor hazards and safeguarding methods

Belt conveyors

Hazards: Conveyor take-up and discharge ends, where the belt or chain enters or exits the in-going nip point; where the belt wraps around pulleys; where the belt changes direction, such as take-ups; or where multiple conveyors are adjoined.

Controls: Guarding of belt conveyors is not always feasible because guarding devices interfere with normal operation. Options for hazard control include guarding by distance as well as installing hazard warning signs and signals.

Screw conveyors

Hazards: In-going nip points of turning helical flights for the entire length of the screw conveyor when the housing is opened.

Controls: Screw conveyor housing should completely enclose the moving elements of the conveyor except for the loading and discharge points. If such guarding is not feasible, the entire conveyor should be guarded by railing unless it is guarded by location — the hazardous areas cannot be easily accessed by employees. Permanently affixed grids or Plexiglass™ can be installed to allow the operator to inspect the operation. Open troughs can be used if such covers are not feasible; but they should be guarded by location. Alternatively, the trough side walls should be high enough to prevent employees from reaching over falling into the trough.

Chain conveyors

Hazards: Moving chains since the chains can not be enclosed without impairing the function of the conveyor.

Controls: Guarding of chain conveyors is not always feasible because guarding devices interfere with normal operation. Options for hazard control include guarding by distance and installing hazard warning signs and signals.

Roller conveyors

Hazards: In-going nip points between the drive chain and sprockets; nip points between belt and carrier rollers; and nip points at terminals, drives, take-ups, idlers, and snub rollers.

Controls: Roller conveyors should have permanent guards that can be adjusted as necessary to protect the worker. For example, when transporting small items on a roller conveyor that does not require the use of the entire roller width, the unused section of rollers closest to the workers should be guarded.

Work practices and administrative controls

- Develop and implement safe operating procedures for conveyors and conduct periodic inspections to ensure compliance.
- Allow only trained individuals to operate conveyors and only trained, authorized staff maintenance.
- Train employees working with or near conveyors regarding the location and use of emergency stopping devices and the proper procedures for conveyor operation.
- Forbid employees to ride on conveyors.
- Instruct employees to cross over or under conveyors only at properly designed and safeguarded passageways.
- Instruct employees to lubricate, align, and maintain conveyors when the conveyor is stopped. If this is impractical, advise workers to perform this work at a safe distance from any ingoing nip points or pinch points. Installing extended oiler tubes and adjusting screws will help in these instances.
- Prohibit employees working with or near conveyors from wearing loose clothing or jewelry, and require them to secure long hair with nets or caps.
- Perform servicing and maintenance under an energy control program in accordance with §1910.147.

Printing presses

Printing presses vary by type and size, ranging from relatively simple manual presses to the complex large presses used for printing newspapers, magazines, and books. Printing presses are often part of a larger system that also includes cutting, binding, folding, and finishing equipment. Many modern printing presses rely on computer controls, and the high speeds of such equipment often require rapid machine adjustments to avoid waste.

Printing press hazards

This section discusses amputation hazards associated with two common types of printing presses: web-fed and sheet-fed printing press systems. Web-fed printing presses are fed by large continuous rolls of substrate such as paper, fabric or plastic; sheet-fed printing presses, as their name implies, are fed by large sheets of substrate. In both types, the substrate typically feeds through a series of cylinders containing printing plates and supporting cylinders moving in the opposite direction.

As with other machines, many printing press-related amputations occur during cleaning and maintenance activities. For example, amputations frequently occur when workers get their fingers or hands caught in the in-going nip points created between two rollers while performing these tasks:

- Cleaning or attempting to free material from the rollers.
- Hand-feeding substrate into the in-running rollers during press set-up while the machine is operating.

Case history

An employee was adding ink at the top of a printing press when he spotted a small piece of wood in the area of the moving rollers. He caught his hand in the moving rollers as he attempted to remove the wood and had to have his forearm surgically amputated.

Source: OSHA IMIS Accident Investigation Database

Printing press safeguards

As with most machinery, you can rely on engineering, work practice, and administrative controls to protect employees against injuries when using printing presses. For example, some basic engineering controls include the following:

- Install guarding on all hazard points, including all accessible in-going nip points between rollers and power-transmission apparatus (such as chains and sprockets), that are accessible during normal operation.
- Safeguard nip point hazards with barrier guards or nip guards. Nip guards should be designed and installed without creating additional hazards. For example, the distance between the nip guard and the adjacent roller/cylinder should be minimized. Additionally, to prevent wedging, the angle between the nip guard and the surface the roller should not be less than 60 degrees.
- Install fixed barrier guards at rollers that do not require operator access.
- Use fixed guards that can only be opened with tools (to prevent tampering) at points requiring operator access once per shift or less.
- When you need more frequent access to the press, use interlocked guards, which are designed to stop the printing press when opened or moved, instead of fixed guards. Interlocked guards should not allow normal operation of the press while open.
- Use an inch or reverse function to perform actions such as substrate feeding, machine adjustment, and lubrication when one or more interlocked guards is moved to allow operator access. The speed and distance of the inch function should be designed to ensure that it does not pose a hazard if not otherwise guarded.
- Require press operators to perform normal startup procedures before the press can be operated. Replacing an interlocked guard should not automatically trigger machine operation.
- Use additional safeguarding methods such by location as well as devices for stopping the printing press such as trip bars and pull cords.
- Remember that interlocks and stops do not stop the press immediately and that non-driven idler rollers may continue to rotate when the press is stopped and can cause injury.

All printing presses should incorporate a signaling system in accordance with ANSI B65.1-1995 as follows:

- Make sure that printing presses attended by more than one operator or ones outside of the operator's viewing area be equipped with visual and audible warning devices to alert workers regarding the press's operational status — in operation, safe mode, or impending operation.
- Install visual warning devices of sufficient number and brightness and locate them so that they are readily visible to press personnel.
- Ensure that audible alarms are loud enough to be heard above background noise.
- Provide a warning system that activates for at least two seconds prior to machine motion.

Work practices and administrative controls

Work practices and administrative controls recommended for printing presses include the following:

- Develop and implement safe operating procedures for printing presses and conduct periodic inspections to ensure compliance.
- Ensure that all press operators receive appropriate training and supervision until they can work safely on their own.
- Instruct workers to lubricate, align, and maintain printing presses only when presses are stopped. If this is impractical, advise employees to maintain a safe distance from any in-going nip points. Installing extended oiler tubes and adjusting screws will help in these instances.

- Prohibit employees working with or near printing presses from wearing loose clothing and require them to secure long hair with a net or cap.
- Perform servicing and maintenance activities under an energy control program in accordance with §1910.147.

In addition, perform minor servicing tasks using the Inch-Safe-Service procedure specified in ANSI B65.1. These include the following tasks: types of paper jams; minor cleaning, lubricating, and adjusting operations; certain platechanging and blanket-changing tasks; and, in some cases, webbing and paper roll changing. The Inch-Safe-Service procedure, at a minimum, calls for the use of a stop/safe drive push-button control. Under this procedure, the stop/safe function cannot serve as the energy control device when you are performing lockout.

Roll-forming and roll-bending machines

Roll-forming and roll-bending machines primarily perform metal bending, rolling, or shaping functions. Roll forming is the process of bending a continuous strip of metal to gradually form a predetermined shape using a self-contained machine. Roll-forming machines may also perform other processes on the metal, including piercing holes, or notches; stamping; flanging; and stretchbending. Roll bending is essentially the same process, except that the machine produces a bend across the width of flat or pre-formed metal to achieve a curved or angular configuration. Roll-forming and roll-bending machines frequently are set up and operated by one person.

Roll-forming and roll-bending machine hazards

The most common type of amputation hazard associated with roll-forming and roll-bending machines are point of operation hazards created by in-running nip points. Amputations occur when the hands of the operator feeding material through get caught and are then pulled into the point of operation. Causes of amputations related to roll-forming and roll-bending machines can occur from the following:

- Having an unguarded or inadequately guarded point of operation;
- Locating the operator control station too close to the process;
- Activating the machine inadvertently; and
- Performing cleaning, clearing, changing, or inspecting tasks while the machine is operating or is not properly locked or tagged out.

Case history

An employee wearing gloves caught his left hand in a roll-forming machine, resulting in partial amputation of two fingers. The employee was standing close to the moving rollers, feeding flat steel sheet from behind and catching it on the front side. There was no point of operation guard on the front roller and the foot operating pedal was very close to the machine.

Engineering controls

Roll-forming and roll-bending machines are available in a wide variety of sizes and designs, and safeguarding methods must be tailored for each machine. Several factors affect the ways to safeguard the equipment, including machine size, operating speed, thickness of product, length of production runs, required production accuracy, sheet feeding methods, and part removal methods. Depending on the size and type of machine, a number of different safeguarding devices and methods may be required to adequately protect the operator as well as other workers nearby. For example, you can do the following:

- Install fixed or adjustable point of operation guards at the in-feed and out-feed sections of machines. If the stock or end-product does not differ greatly from run to run, a fixed guard may be preferable. If the stock or end-product is variable, however, an adjustable guard may be more suitable.
- Install fixed point of operation guards to cover the sides of the rollers to prevent an employee from reaching into the in-going nip points of the rollers.
- Install fixed or interlocked guards to cover any other rotating parts, such as a power- transmission apparatus.
- Install safety trip controls, such as a pressure-sensitive body bar or safety tripwire cable on the in-feed section of the machine to shut down the machine if an employee gets too close to the point of operation.
- Install emergency stop controls that are readily accessible to the operator.
- Use an awareness barrier guard with an interlocking gate around the perimeter of the machine to prevent unauthorized entry.
- Locate foot pedal controls away from the point of operation and guard them in such a way as to prevent inadvertent activation.
- Allow only one control station to operate at any one time when a single machine has more than one set of operator controls, this does not apply to the emergency stop controls which must be operable from all locations at all times.
- Position operating stations in a way that ensures operators are not exposed to the machine's point of operation.
- Safeguard operator control stations to prevent inadvertent activation by unauthorized employees.

Work practice and administrative controls

You can also prevent hazards from this equipment by doing the following:

- Develop and implement safe operating procedures for roll-forming and roll-bending machines and conduct periodic inspections of the operation to ensure compliance.
- Ensure that all operators receive appropriate on-the-job training under direct supervision of experienced operators until they can work safely on their own.
- Ensure that operators use the jog mode during feeding operations if appropriate and that they maintain a safe distance from the machine's rollers.
- Require workers to perform servicing and maintenance activities under an energy control program in accordance with §1910.147.

Shearing machines

Mechanical power shears contain a ram for their shearing action. The ram moves a non-rotary blade at a constant rate past the edge of a fixed blade. Shears may be mechanically, hydraulically, hydramechanically, pneumatically, or manually powered and are used to perform numerous functions such as squaring, cropping, and cutting to length.

In the basic shear operation, stock is fed into the point of operation between two blades. A hold-down may then be activated that applies pressure to the stock to prevent movement. One complete cycle consists of a downward stroke of the top blade until it passes the lower fixed blade followed by an upward stroke to the starting position.

Shears can be categorized as stand-alone manual shears, stand-alone automatic shears, and process-line shears.

Stand-alone manual shears. An operator controls them from a control station. The operator feeds the shear either by hand or the automatic loading mechanism and activates the equipment using

hand or foot controls or a tripping device on the back side of the shear. An example is an alligator shear.

Stand-alone automatic shears. These feed and stroke automatically and continuously. The operator uses hand-activated or foot-activated controls to initiate the operation requiring limited additional operator interaction. An example is a guillotine shear.

Process-line shears. These are integrated into an automated production process and are controlled automatically as part of the process. Examples include crop shears and cut-to-length shears.

Shearing machine hazards

The primary hazard associated with shears is the shearing action at the point of operation. Amputations may occur in the following situations:

- The foot control inadvertently activates while the operator's hands are in the point of operation. Such amputations usually relate to foot-activated, stand-alone manual shears that require the use of both hands to feed the stock.
- A tripping device located on the back side of the shear's mouth operates the shear but does not prevent the operator from reaching into the hazard area. Such tripping devices, commonly found on stand-alone manual shears, may increase productivity but must be used in conjunction with appropriate safeguards.
- When there is no hold-down and stock being fed into a stand-alone manual shear kicks out and strikes the operator's hands or fingers.
- The shear is not equipped with either a full-revolution or a part-revolution clutch. Even after it is shut down, a shear that is not equipped with either type of clutch continues to cycle until its energy is exhausted.

Case history

An employee was cutting material with a 50-inch guillotine shear equipped with two buttons to prevent employees from reaching into the blade area. He had taped up one of the buttons and used his knee to trip the other button. With both hands under the blade he inadvertently hit the free button with his knee. This activated a stroke of the blade, which amputated both of his hands just below the wrists.

Source: OSHA IMIS Accident Investigation Database

Shearing machines safeguards

Because shears have a wide variety of applications, safeguarding methods must be determined individually for each machine based on its use. A number of different safeguarding methods may be necessary to adequately protect the operator as well as other workers nearby. For example, you will need to consider the machine size, operating speed, size and type of material, length of production runs, required accuracy of the work, methods for material feeding and removal, operator controls, and clutch type.

Here are some engineering controls you should use:

- Use automatic-feeding devices such as conveyors with stand-alone manual shears when the material is uniform in size and shape.
- Equip mechanical shears with either a part-revolution or full-revolution clutch. Methods of safeguarding depend on the type of clutch in use. Shears equipped with full-revolution clutches used in single-stroke operations must be equipped with an anti-repeat feature.

The following recommendations apply to safeguarding the shear's point of operation during feeding activities at the front of the machine:

- Install a fixed or adjustable point of operation guard at the in-feed of the shearing machine to prevent operator contact with the shear's point of operation as well as the pinch point of the hold-down. The guard's design should prevent the employee from reaching under or around it.
- Install a safety trip control device — such as a pressure-sensitive body bar, safety tripod, or safety tripwire cable — at the in-feed section of the shear.
- Install a presence-sensing device, such as a light curtain, near the in-feed area of a stand- alone automatic or process-line shear.
- Install hold-down devices that prevent the work piece from kicking up and striking the operator.
- Install and arrange two-hand trips and controls so that the operator must use both hands to initiate the shear cycle. Two-hand trips and controls should be designed so they cannot be defeated easily. The ANSI B11.4 *Safety Requirements for Construction, Care, and Use of Shears* standard recommends the installation of additional safeguarding when two-hand controls are used on part-revolution shears, based on the nature of the shearing operation. ANSI specifies the use of guards on full-revolution shears.
- Use restraints for stand-alone manual shears when other guarding methods are not feasible or do not adequately protect employees. These devices may not be appropriate if the job requires employees mobility.
- Install guarded operating stations at a safe distance from the shear's point of operation to prevent inadvertent activation.
- Mount guarded foot pedal controls at a safe distance away from the point of operation to prevent accidental activation.

The following recommendations apply to safeguarding for operations performed at the rear of the shear:

- Install fixed guards on the back side of shears.
- Install an awareness barrier guard with an interlocking gate, a presence-sensing device (light curtain), or a safety trip control (safety tripwire cable or safety tripod) on the back the shear.

Work practice and administrative controls

Here are some work practices and administrative controls for shearing machines you can follow:

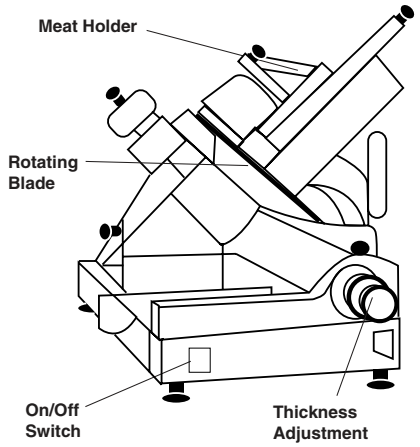
- Develop and implement safe operating procedures for shearing machines and conduct periodic inspections to ensure compliance.
- Instruct operators to use distancing tools when their hands might reach into the point of operation because of the size of the material being cut.
- Instruct employees to perform routine maintenance on the clutch and braking systems.
- Instruct employees to inspect all guarding to ensure that it is in place properly before the machine is operated.
- Instruct supervisors to ensure that operators keep their hands out of the shear's point of operation at all times while the machine is energized and not properly locked out.
- Instruct employees not to perform activities on the back side of a shear while it is operating or still energized.
- Prohibit employees from riding the foot activation pedal.
- Ensure that all operators receive on-the-job training under the direct supervision of experienced operators until they can work safely on their own.

- Require workers to perform servicing and maintenance activities under an energy control program in §1910.147.

Food slicers

Food slicers are electrically powered machines typically equipped with a rotary blade, an on/off switch, thickness adjustment, and a food holder or chute. A pushing/guarding device or plunger may be used to apply pressure to the food against the slicer blade, or pressure may be applied by gravity/or by an attachment connected to the food holder.

Figure 32. Meat slicer



Amputations resulting from work with food slicers can occur as follows:

- When the operator adjusts or services the slicer while it is still operating or while it is switched off but still plugged in or energized. In the latter case, amputations occur when the operator accidentally switches the slicer on.
- When the operator fails to use the sliding attachment on the food-holding device, especially when slicing small pieces of meat.
- When the operator hand-feeds food into a chute-fed slicer without using the proper pushing/guarding device or plunger.

Case history

An employee was cleaning a meat slicer that was turned off but still plugged in. He inadvertently turned the machine on, bumping the on/off switch, resulting in an amputation of his right ring finger.

Food slicer safeguards

Some engineering controls you should use include the following:

- Install guards that cover the unused portions of the slicer blade on both the top and bottom of the slicer.
- Buy slicers already equipped with a feeding attachment on the sliding mechanism of the food holder, or purchase the attachment separately and install it prior to use.

- Instruct employees to use a pushing/guarding device with chute-fed slicers.
- Provide employees with a plunger for chute-fed slicers that are not equipped with a pushing/guarding device.

Work practice and administrative controls

Other work practices and administrative controls you can implement for food slicers include appropriate procedures and training. For example, you should:

- Develop and implement safe operating procedures for slicers and conduct periodic inspections to ensure compliance.
- Ensure that all operators receive on-the-job training under the direct supervision of experienced operators until they can work safely on their own.
- Instruct operators to turn off and unplug slicers when not in use or when left unattended for any period of time.
- Instruct operators to use plungers to feed food into chute-fed slicers. For other slicers, they should use the feeding attachment located on the food-holder. Never place food into the slicer by hand-feeding or hand pressure.
- Tell operators that, although not required, wire mesh gloves may be worn while operating the slicer or cleaning the slicer's blade.
- Instruct operators to retract the slicer blade during cleaning operations.
- Instruct employees to perform servicing and maintenance activities under an energy control program in accordance with §1910.147.

If the slicer is cord-and-plug connected equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing and maintenance, §1910.147 does not apply.

Meat grinders

Electrically powered meat grinders typically have a feeding tray attached to a tubular throat, a screw auger that pushes meat to the cutting blade and through the cutting plate, an on/off switch, a reverse switch, and a plunger.

Meat grinder hazards

Amputations can occur when:

- The operator reaches into the throat of the grinder while it is still operating or while it is switched off but still plugged in (energized). In the latter case, amputations occur when the operator accidentally switches the grinder back on.
- The operator fails to use the attached feeding tray and throat.

Defective meat grinders, such as ones with holes in the throat or screw auger area, are also a source of workplace amputations and must be taken out of service.

Case history

An operator amputated his arm below the elbow while hand-feeding potatoes into a five-horsepower meat grinder through a feed throat with a 4-inch by 6-inch opening and no point of operation guard. This untrained employee had been working on the machine for only 15 minutes.

Source: OSHA IMIS Accident Investigation Database

Meat grinder safeguards

In terms of engineering controls, the following are effective:

- Equip meat grinders with properly sized throats that prevent the operator's hands from inadvertently reaching the point of operation.
- Provide operators with properly sized plungers to eliminate the need for their hands to enter the feed throat during operation.

In addition, work practice and administrative controls such as these can help prevent accidents and injuries:

- Develop and implement safe operating procedures for meat grinders to ensure that the guards are adequate and in place, and that the grinder feeding methods are performed safely. Conduct periodic inspections of grinder operations to ensure compliance.
- Ensure that all operators receive appropriate on-the-job training under direct supervision of experienced operators until they can work safely on their own.
- Instruct operators to turn off and unplug grinders when not in use or when left unattended for any period of time.
- Instruct operators to use the proper plunger device to feed meat into grinders. No other device should be used to feed the grinder.
- Instruct employees to operate only grinders with feeding trays and throats installed.
- Instruct operators to use the meat grinder only for its intended purpose.
- Perform appropriate servicing and maintenance activities under an energy control program in accordance with §1910.147.

If the slicer is a cord and plug connected equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing and maintenance, §1910.147 does not apply.

Meat-cutting band saws

Band saws can cut wood, plastic, metal, or meat. These saws use a thin, flexible, continuous steel strip with cutting teeth on one edge, that runs around two large motorized pulleys or wheels. The blade passes through a hole in the work table where the operator feeds the stock. Blades are available with various teeth sizes, and the saws usually have adjustable blade speeds.

Unlike band saws used in other industries, meat-cutting band saws are usually constructed of stainless steel for sanitary purposes and for easy cleaning. The table, which may slide or roll, has a pushing guard installed to protect the operator while feeding the saw. Meat-cutting band saws may also be equipped with a fence and pushing guard to feed the meat through the band saw.

Meat-cutting band saw hazards

Amputations occur most frequently when operators' hands contact the running saw blade while feeding meat into the saw. The risk of amputation is greatest when operators place their hands too close to the saw blade, in a direct line with the saw blade, or beneath the adjustable guard during feeding operations. Here are some common causes of amputations involving meat-cutting band saws:

- The operator's hand slips off the meat or otherwise accidentally runs through the blade.
- The operator attempts to remove meat from the band saw table while the blade is still moving.
- The operator's gloves, jewelry, or loose-fitting clothing became entangled in the saw blade.

Case history

An operator amputated the tip of his right ring finger while using a band saw to cut 1/4-inch slabs of meat from a 4-inch thick piece of beef. As the piece of meat got smaller, his hands moved too close to the saw blade. The employee was not using the pusher guard provided for the saw.

Source: OSHA IMIS Accident Investigation Database

Meat-cutting band saw

Engineering controls you can use include the following:

- Install a guard over the entire blade, except at the working portion, or point of operation of the blade. The guard must be adjustable to cover the unused portion of the blade above the meat during cutting operations.
- Enclose the pulley mechanism and motor completely.
- Install a brake on one or both wheels to prevent the saw blade from coasting after the machine shut off.
- Provide a pushing guard or fence to feed meat into the saw blade.

Work practice and administrative controls

The following work practice and administrative controls will help ensure safety in your workplace:

- Develop and implement safe operating procedures for meat-cutting band saws to ensure the guards are adequate and in place and that operators safely perform feeding methods. Conduct periodic inspections of the saw operation to ensure compliance.
- Ensure that all operators receive adequate on-the-job training under the direct supervision of experienced operators until they can work safely on their own.
- Instruct operators to adjust the point of operation guard to admit only the meat.
- Instruct operators to use the pushing guard or fence to feed the saw, especially when cutting small pieces of meat.
- Instruct operators to use only sharp meat-cutting blades and to tighten blades to the appropriate tension.
- Instruct operators not to wear gloves, jewelry, or loose-fitting clothing while operating a band saw and to secure long hair in a net or cap.

- Prohibit operators from removing meat from the band saw while the saw blade is still moving.
- Instruct operators to turn off and unplug band saws when not in use or when left unattended for any period of time.
- Instruct employees to perform servicing and maintenance activities under an energy control program in accordance with §1910.147.

If the band saw is a cord and plug connected equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing and maintenance, §1910.147 does not apply.

Drill presses

Electrically powered drill presses use a rotating boring bit to drill or cut holes in wood or metal. The holes may be cut to a desired preset depth or completely through the stock. A basic drill press operation consists of selecting an appropriate drill bit, tightening the bit in the chuck, setting the drill depth, placing the material on the drill press bed, securing the work to the bed so that it will not rotate during drilling, turning the drill press on, and pulling the drill press lever down so that the drill bit will be lowered into the stock.

Drill press hazards

Amputations typically occur when the operator's gloves, loose-fitting clothing, or jewelry become entangled in the rotating drill bit. Here are some other causes of drill press-related amputations:

- Inadequately guarding points of operation or power-transmission devices.
- Performing servicing and maintenance activities such as changing pulleys and belts, changing or tightening drill bits, lubricating the drill press, and cleaning the drill press without de-energizing the drill press.
- Making adjustments to the drill press such as setting the depth, securing the material to the drill press bed, and repositioning the wood or metal while the drill bit is still rotating.

Case history

A mechanic amputated the first joints of his left index and middle fingers while changing the belt position on a multi-pulley drill press. While the mechanic was pulling the belt on, it suddenly went around the outside pulley, pulling the mechanic's fingers through the nip point.

Source: OSHA IMIS Accident Investigation Database

Drill press safeguards

For drill presses, you can install guards and other controls and perform work practices:

- Install guarding over the motor, belts, and pulleys.
- Install an adjustable guard to cover the unused portion of the bit and chuck above the material being worked.
- Replace projecting chucks and set screws with non-projecting safety-bit chucks and set screws.
- Cover operator controls so that the drill press cannot be accidentally turned on.

- Develop and implement safe work practices for drill-press operations and conduct periodic inspections to ensure compliance.
- Train and supervise all operators until they can work safely on their own.
- Instruct employees not to wear gloves, jewelry, or loose-fitting clothing while operating a drill press and to secure long hair in a net or cap.
- Make sure operators secure material to the drill press bed with clamps before drilling, so that the material will not spin and strike the operator. The operator should not manually secure the work to the drill press bed while drilling holes.
- Do not adjust the drill press while the drill bit is still rotating.
- Use the drill press only for its intended purposes.
- Shut off the drill press when not in use or when left unattended for any period of time.
- Remove the chuck immediately after each use.
- Perform appropriate servicing and maintenance activities under an energy control program §1910.147.

Milling machines

Electrically powered milling machines cut metal using a rotating cutting device called a milling cutter. These machines cut flat surfaces, angles, slots, grooves, shoulders, inclined surfaces, dovetails, and recessed cuts. Cutters of different sizes and shapes are available for a wide variety of milling operations.

Milling machines include knee-and-column machines, bed-type or manufacturing machines, and special milling machines designed for special applications. Typical milling operations consist of selecting and installing the appropriate milling cutter, loading a work piece on the milling table, controlling the table movement to feed the part against the rotating milling cutter, and calipering or measuring the part.

Milling machine hazards

The following procedures are frequent causes of amputation from milling machines:

- Loading or unloading parts and calipering or measuring the milled part while the cutter is still rotating.
- Performing servicing and maintenance activities such as setting up the machine, changing and lubricating parts, clearing jams, and removing excess oil, chips, fines, turnings, or particles while the milling machine is either stopped but still energized, or while the cutter is still rotating.
- Getting jewelry or loose-fitting clothing entangled in the rotating cutter.

Case history

An employee was using a milling machine to cut metal samples to length. After a part had been cut, the employee needed to gauge the part size. While he was checking the edge of the sample, the blade caught the tip of his glove, pulled his hand into the cutting area, and amputated his right ring finger and part of his middle finger.

Source: OSHA IMIS Accident Investigation Database

Milling machine safeguards

You should implement the following engineering, work practices, and administrative controls:

- Install self-closing guards that enclose the milling cutter when the table has been withdrawn.
- Install an interlocked barrier guard around the table. When equipped with a cutter blade brake, the brake should be applied when opening or removing the interlocked barrier guard.
- Use other safeguarding devices such as splash shields, chip shields, or barriers if they provide effective protection to the operator and when it is impractical to guard cutters without interfering with normal production operations or creating a more hazardous situation.
- Instruct operators not to use a jib or vise that prevents the point of operation guard from being adjusted appropriately.
- Develop and implement safe work practices for machine operators and conduct periodic inspections to ensure compliance.
- Ensure that all operators receive appropriate on-the-job training by experienced operators until they can work safely on their own.
- Instruct operators to move the work holding device back to a safe distance when loading or unloading parts and calipering or measuring the work and not to perform these activities while the cutter is still rotating unless the cutter is adequately guarded.
- Prohibit operators from reaching around the cutter or hob to remove chips while the machine is in motion or not de-energized.
- Instruct operators to remove fines, turnings, or particles only with a brush while the cutter is stopped.
- Instruct operators to place the jib or vise locking arrangement so that force must be exerted away from the milling cutter.
- Instruct operators not to leave the cutter exposed after withdrawing work piece.
- Instruct operators to turn off the milling machine when not in use or when left unattended for any period of time.
- Instruct employees not to wear gloves, jewelry, or loose-fitting clothing while operating a milling machine and to secure long hair in a net or cap.
- Instruct operators to perform servicing and maintenance activities under an energy control program in §1910.147.

Grinding machines

Grinding machines primarily alter the size, shape, and surface finish of metal by placing a workpiece against a rotating abrasive surface or wheel. Grinding machines may also be used for grinding glass, ceramics, plastics, and rubber. Examples of grinding machines include abrasive belt machines, abrasive cutoff machines, cylindrical grinders, centerless grinders, gear grinders, internal grinders, lapping machines, offhand grinders, surface grinders, swing frame grinders, and thread grinders.

Grinding machine hazards

Amputation injuries occur when the operator's hands enter the point of operation during the following activities:

- Grinding on the side of the wheel not designed for grinding.
- Using an inadequately guarded grinding wheel.
- Using an incorrectly adjusted or missing work rest or a poorly maintained or unbalanced abrasive wheel.

- Wedging a tool between the work rest and the abrasive wheel, causing the wheel to break into flying particles.
- Adjusting the work rest, balancing the wheel, cleaning the area around the abrasive wheel, attempting to stop a rotating abrasive wheel by hand, and loading and unloading parts or measuring parts while the abrasive wheel is still rotating.

Case history

After grinding a piece of steel on an offhand grinder, an employee turned off the machine and tried to stop the wheel with a piece of scrap steel. His hand slipped and hit the rotating abrasive wheel, amputating the tip of his left middle finger.

Grinding machines safeguards

You can help prevent worker accidents and injuries by using guards and other engineering controls. Here are some examples:

- Install safety guards that cover the spindle end, nut, and flange projections or otherwise ensure adequate operator protection.
- Install adjustable and rigid work rests on offhand grinding machines.
- Install guards on foot-operated controls to prevent accidental activation.
- Instruct operators to use hand tools to maintain a safe distance between the operator and the point of operation when needed.

Work practice and administrative controls

Work practices and administrative controls also are important. Here are some recommended ways to safeguard grinding machines by using the following controls:

- Develop and implement safe work practices for grinding machine operations and conduct periodic inspections to ensure compliance.
- Ensure that all operators receive appropriate on-the-job training and supervision until they can work safely on their own.
- Instruct operators to inspect the grinding wheel to ensure that it is not defective, unbalanced, loose, or too small.
- Instruct operators to inspect the point of operation guard and to adjust it if necessary prior to each use.
- Instruct operators to adjust the work rest to within 1/8 inch from the wheel.
- Instruct employees not to wear gloves, jewelry, or loose-fitting clothing while operating grinding machines and to secure long hair in a net or cap.
- Instruct employees to keep their hands as far away as possible from the point of operation while feeding work into an offhand grinder.
- Instruct employees not to adjust the guard or clean the grinding machine while the abrasive wheel is still rotating.
- Instruct employees to perform servicing and maintenance activities under an energy control program in §1910.147.

OSHA COMPLIANCE MANUAL

Slitters

Slitters use rotary knives to slit flat rolled metal, plastic film, paper, plastic, foam, and rubber as well as other coiled or sheet fed materials. Slitters range from small hand-fed paper slitters to large-scale automated metal slitters, complete with metal processing and handling units such as unwinders and rewinders. Both light and heavy gage slitters are available.

Slitter hazards

Amputations often occur when clothing or body parts come in contact with slitter blades or get caught in the movement of coils and rolls. Here are some example:

- Workers can inadvertently get their fingers and hands caught in the in-going nip points of the slitter or associated machinery such as rewinders.
- Gloves, jewelry, and loose clothing can get entangled in in-going nip points or in the rotary knives of the slitter.
- Workers can suffer an amputation when clearing, adjusting, cleaning, or servicing the slitter while it is either still operating, or shut off but still plugged in (energized).

Case history

An employee was feeding cardboard strips onto slit steel as it was being coiled on a slitter machine. While the machine was operating, the employee was placing the cardboard strips on the coils. After reaching over the steel strips, the coiled steel on the mandrel pulled his right arm into the machine and amputated it.

Source: OSHA IMIS Accident Investigation Database

Slitter machine safeguards

You can use guards and other engineering controls such as the following:

- Install a fixed or adjustable point of operation guard at the in-feed and out-feed section of the machine.
- Install a fixed point of operation guard to cover the sides of the unwinder/rewinder to prevent an employee's hands or clothing from entering into the rollers.
- Install fixed or interlocked guards to cover other moving parts of the machine such as the power transmission apparatus.
- Use an awareness barrier guard with an interlocking gate around the perimeter of the machine to prevent unauthorized entry.
- Provide guards for operator control stations to prevent inadvertent activation.

Work practice and administrative controls

You can also implement work practices and administrative controls to help do the following:

- Develop and implement safe work procedures for machine operators and conduct periodic inspections to ensure compliance.
- Ensure that all operators receive appropriate on-the-job training and supervision until they can work safely on their own.
- Instruct employees to perform servicing and maintenance activities under an energy control program in §1910.147.

Woodworking machines

Machines used in woodworking are dangerous, particularly when used improperly or without proper safeguards. Workers operating woodworking equipment are at risk for the following injuries: laceration, amputation, severed fingers, and blindness. Wood dust and the chemicals used in finishing are health hazards, and workers in this industry can suffer from skin and respiratory diseases.

Woodworking hazards

The principal hazards of woodworking can be classified as either safety or health hazards. **Safety hazards** can cause immediate injury to a worker. For example, if not properly grounded, the metal framework of a circular saw could become energized and possibly cause electrocution. Or, if a worker's hands were to contact a saw blade, he or she could have one or more fingers cut off.

Safety hazards

- Machine hazards
  - Point of operation
  - Rotary and reciprocating movements
  - In-running nip points (pinch points)
- Kickbacks
- Flying chips, materials
- Tool projection
- Fire and explosion hazards
- Electrical hazards

Most **health hazards** are associated with long-term exposure to certain substances or to excessive noise levels or vibration. Certain types of wood dust, for example, can cause allergic reactions, and saw dust has been determined to be a group A carcinogen by the International Agency for Research on Cancer (IARC). Likewise, some finishes and coatings used in finishing processes contain chemicals that can affect the central nervous system, causing headaches, nausea, and dizziness. Health hazards can cause both immediate (acute) and long-term (chronic) health effects. For example, exposure to turpentine, a chemical used in some furniture waxes and finishes, can result in a range of health effects, from temporary irritation of the eyes and skin to kidney and bladder damage.

Health hazards

- Noise
- Vibration
- Wood dust — carcinogens
- Chemical hazards — from exposure to coatings, finishings, adhesives, solvent vapors

Hazards of woodworking equipment

It is important to train/teach your employees how to identify hazards related to their assigned job tasks. This section provides an overview of the major safety hazards associated with woodworking equipment.

Point of operation

The point of operation is the place where work is performed on the material. This is where the stock is cut, shaped, bored, or formed. Most woodworking machines use a cutting and/or shearing action. The following table shows how injuries can occur at the point of operation.

How injuries occur at the point of operation

- Employees can be injured if their hands get too close to the blade, particularly when working on small pieces of stock. The size of the piece dictates that the operator's hand be close to the blade. Accidents can occur when stock unexpectedly moves or when the operator's hand slips.
- Stock can get stuck in a blade and actually pull the operator's hands into the machine.
- Employees can be injured if the machine or its guard is not properly adjusted or maintained. An improperly adjusted radial saw might not return to its starting position after making a cut.
- If the machine has controls that are not recessed or remote, and the equipment is accidentally started, a worker's hands may be caught at the point of operation.
- Contact also can occur during machine repair or cleaning if care is not taken to de-energize the machine — that is, if lockout/tagout procedures are not followed.
- An employee may be injured if he or she reaches in to clean a saw or remove a piece of wood after the saw has been turned off, but is still coasting or idling. Also, saw blades often move so fast that it can be difficult to determine whether they are moving. This is especially a problem under fluorescent lighting.

Rotating and reciprocating movements

All machines operate by rotating or reciprocating motion or by a combination of these motions. For example, rotary cutting and shearing mechanisms, rotating wood stock, flywheels, shaft ends, and spindles all rotate. Rotating action is hazardous regardless of the speed, size, or surface finish of the moving part. Rotating parts and shafts, such as stock projecting from the chuck of a lathe, can catch hair or clothing and draw the operator in. This can seriously mangle or crush the operator.

Rotating parts and stock can also force an arm or hand into a dangerous position, breaking bones and lacerating or severing a hand or other parts of a limb. Bolts, projecting keys, or screws on rotating parts increase the danger of getting caught by the rotary part. Operators can also be struck by a projecting bolt or key.

Reciprocating movement is back-and-forth or up-and-down motion. Operators can be caught and crushed by reciprocating movement when the moving part approaches or crosses a fixed part of the machine.

In-running nip points

In-running nip points (or pinch points) are a special danger arising from rotating or reciprocating parts. They occur whenever machine parts move toward each other or when one part moves past a stationary object. Parts of the body may be caught between or drawn into the nip point and crushed, mangled, or severed. In-running nip points that may be encountered in the woodworking industry are located where the belts or chains approach the pulleys or gears, or where the rotating parts approach the stationary components.

Kickbacks

Kickbacks occur when a saw seizes the stock and hurls it back at the operator. This can happen when the stock twists and binds against the side of the blades or is caught in the teeth. A blade that is not sharpened, or that is set at an incorrect height, can cause kickbacks. Poor-quality lumber (in other words, frozen lumber or lumber with many knots or foreign objects such as nails) can also result in kickbacks. Hazards due to kickbacks are most likely when there is a lack of safeguards, such as spreaders, anti-kickback fingers, and gauge or rip fences. Kickbacks occur more often when cutting parallel to the wood grain (ripping) than when cross-cutting.

Flying chips

Employees may be exposed to splinters and chips that are flung by the cutting action of woodworking equipment.

Tool projection (unbalanced cutter heads)

Many pieces of woodworking equipment — such as routers, shapers, and molders — employ rotating cutter heads with multiple knives. Cutter heads that are not properly adjusted, or that are poorly mounted or have broken knives, can become unbalanced. Balance is critical for keeping knives secured to a rapidly moving cutter head. The centrifugal forces on an unbalanced cutter head can fling the knives from the tool and severely or fatally injure the operator or others nearby. Using the wrong tool on a cutter head or using a tool at a higher speed than it was designed to operate at also can cause tool breakage and projection.

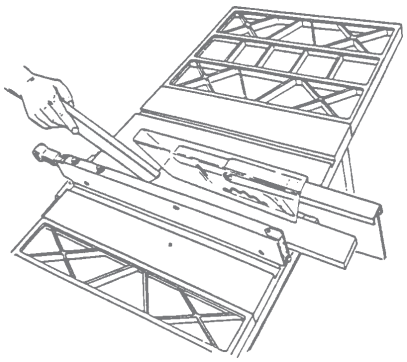
Hazard controls

The preferred way to control hazards is through engineering or work practice controls. When these controls are not possible or do not provide adequate protection, personal protective equipment (PPE) has to be provided. Employers must institute all feasible engineering and work practice controls to eliminate or reduce hazards before using PPE to protect employees.

Engineering controls involve physically changing the machine or work environment to prevent employee exposure to the potential hazard. Examples are using a guard on a machine, or using local exhaust ventilation to remove dust and other contaminants at the source.

Work practice controls involve removing employees from exposure to the potential hazard by changing the way they do their jobs. For example, workers should always use push sticks to guide short or narrow pieces of stock through saws. Using a push stick allows saw operators to keep their hands at a safe distance from the saw blades.

Figure 3. Push stick work practice control



Source: *Accident Prevention Manual for Industrial Operations,* National Safety Council

Personal protective equipment encompasses a wide variety of devices and garments designed to protect workers from injuries. Examples include respirators, goggles, safety shields, hard hats, gloves, earmuffs, and earplugs.

Engineering controls

Machine guarding

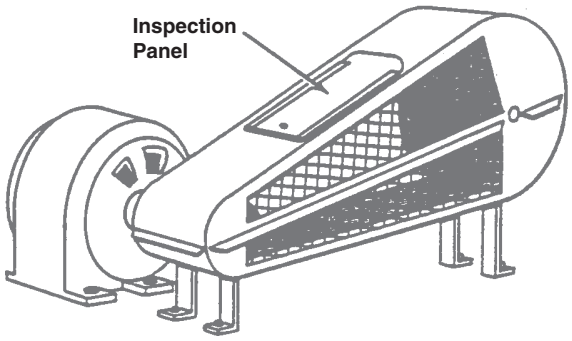
Guards are now standard equipment on most woodworking machines. If you purchase a machine that does not come equipped with a guard, install one. Contact the manufacturer of the machine to see if appropriate guard(s) are available for the equipment. If not, use the following information to help you determine the appropriate guard to install. Because woodworking equipment is dangerous, guards should always be designed and installed by technically competent and qualified persons. In addition, it is a good idea to have the equipment manufacturer review proposed guard designs to ensure that the guard will adequately protect employees and allow safe operation of the equipment.

There are many ways to guard machines. The type of operation, size or shape of stock, work being performed on the material, method of handling, and production requirements are some of the factors that help determine the appropriate safeguarding method for an individual machine. All moving machine parts that may cause injury must be safeguarded. This includes the point of operation, the power transmission apparatus, and rotary or reciprocating parts. The table on page 57 describes three types of machine guards commonly used on woodworking machinery: fixed, adjustable, and self-adjusting.

To be effective, a guard should prevent employees from contacting the dangerous parts of the machines, and it should be secure. This is not always possible, as in the case of the radial arm saw. Regardless, workers should not be able to easily bypass, remove, or otherwise tamper with the guard. In protecting the worker, however, the guard must not create additional hazards, nor prevent the worker from performing the job.

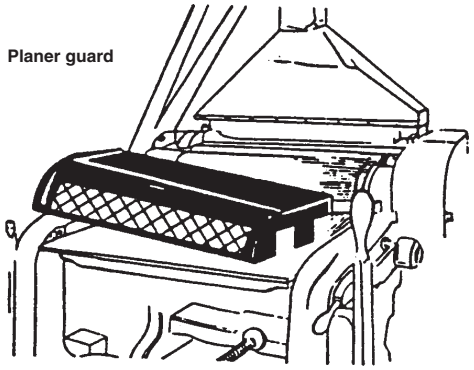
Make sure that guards are in working order and that they are appropriate and practical for the machinery. Guards must have adequate strength to resist blows and strains and should be constructed to protect operators from flying splinters and machine parts such as broken saw teeth, and tools.

Figure 4. Fixed guard on belt and pulley



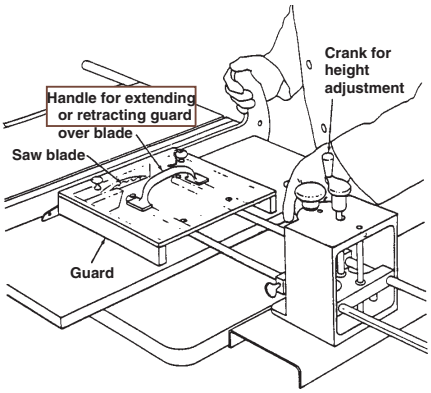
Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Figure 5. Fixed guard on planer



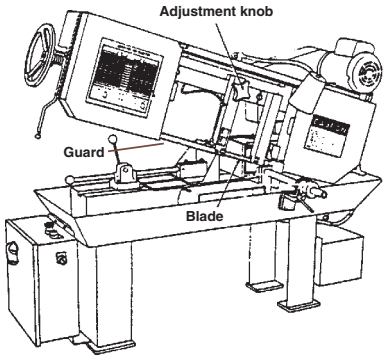
Source: *Health and Safety Guide for Wooden Furniture Manufacturing,* NIOSH

Figure 6. Adjustable guard on table saw



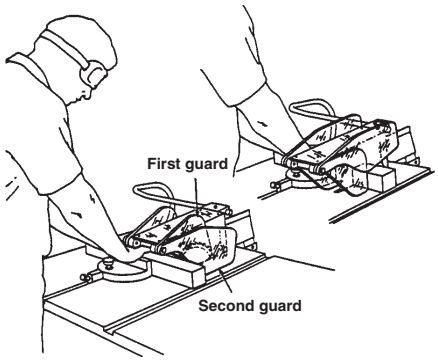
Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Figure 7. Adjustable guard on horizontal band saw



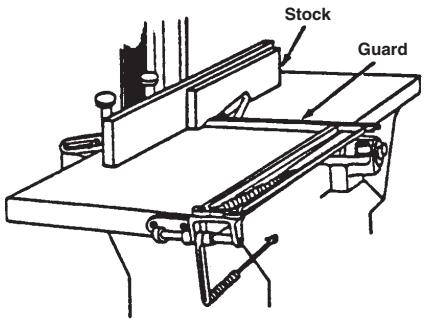
Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Figure 8. Self-adjusting guard on table saw



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Figure 9. Self-adjusting guard on jointer



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Types of woodworking machine guards

Type	Safeguarding action	Advantages	Limitations	Examples
Fixed	Provides a barrier and is a permanent part of machine.	• Can be constructed to suit many specific applications. • Can provide maximum protection. • Usually requires little maintenance. • Suitable to high production, repetitive operations.	• May interfere with visibility. • Machine adjustment and repair often require removal of guard. • Other means of protecting maintenance personnel often required (i.e., lockout).	Use on: • In-running rolls. • Belts and pulleys (see Figure 4). • Power transmission apparatus. • Cutting heads of planers and other automatic-feed equipment (see Figure 5).
Adjustable	Provides a barrier that may be adjusted to facilitate a variety of production operations.	• Can be constructed to suit many specific applications. • Can be adjusted to admit varying sizes of stock.	• Hands may enter danger area, protection may not be complete at all times. • May require frequent maintenance or adjustment. • Operator may make guard ineffective. • May interfere with visibility.	Used on woodworking machinery, such as: • Table saws (see Figure 6). • Routers. • Shapers. • Band saws (see Figure 7).
Self-adjusting	Provides a barrier that moves according to the size of the stock entering the point of operation. Guard is in place when machine is at rest. Guard pushes away when worker moves stock into point of operation.	• Off-the-shelf guards are often commercially available. • Do not require manual adjustments.	• Does not provide maximum protection. • May interfere with visibility. • May require frequent maintenance and adjustment.	Used on woodworking machinery, such as: • Table saws (see Figure 8). • Radial saws. • Band saws. • Jointers (see Figure 16).

Source: Adapted from *Concepts and Techniques of Machine Safeguarding*, U.S. Department of Labor, OSHA.

Other methods of safeguarding machines

Additional methods for safeguarding machines include guarding by location or distance, feeding methods, and appropriate placement of controls however, none of these methods should replace machine guards. It is always important to provide a guard or barrier that prevents access to the danger area. The following table describes these other safeguarding methods.

Other methods of safeguarding machines

Method	Safeguarding principle	Examples	Comments
Location/distance	Dangerous parts of machinery positioned so that they are not accessible to workers during normal operation.	• Placement of machine's power apparatus against wall. • Fencing off access to automatic machines. • Feeding long stock into machine.	Not always feasible, particularly on nonautomatic machines.
Automatic feeding and ejection methods	Operator not required to place his or her hands in the danger area.	• Self-feeder planers. • Sanders. • Lathes.	Malfunctioning can create hazard. Controls should be set at a distance.
Prevent accidental startup	Controls shrouded or recessed.	Standard on many machines.	Off switch should be easily accessible, and operator should be able to operate machine with ease.
Miscellaneous	Hazardous part of machine automatically retracted after operation is complete.	Counterweight/stroking mechanisms that return blade to rest after stock has been cut on overhead swing and radial saws.	Improperly adjusted counterweights can create hazard. Blade may travel in wrong direction or may fail to retract.
Placement of controls	Place controls sufficiently far from point of operation to prevent reaching into point of operation.	Two hand controls sit at a distance from the point of operation.	Stopping time of machine is a factor in calculating the distance.

Source: *Accident Prevention Manual for Industrial Operations*, National Safety Council

Work practices and administrative controls

- **Use appropriate equipment for the job.** Workers can be seriously injured if they do not use the correct equipment for a job. Use machines only for work within the rated capacity specified by the machine manufacturer. Use the correct tools on a given machine. For example, when using a circular saw, use the correct blade for the required cutting action. Similarly, you must only mount blades, cutter heads, or collars on machine arbors that have been accurately sized and shaped to fit these parts.
- **Train workers on machine use and allow only trained and authorized workers to operate and maintain the equipment.** Workers should understand the purpose and function of all controls on the machine, should know how to stop the equipment in an emergency, and should be trained on the safety procedures for special set-ups.

Operator training should include hazards associated with the machine, how the safeguards protect the worker from these hazards, under what circumstances the guard may be removed (usually just for maintenance), and what to do if the guard is damaged or not functioning properly.

Employees should be able to demonstrate their ability to run the machine with all safety precautions and mechanisms in place.

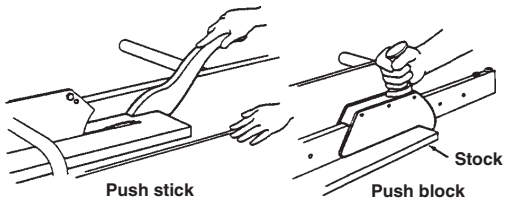
- **Frequently inspect equipment and guards.** Ensure that: (1) the operator and machine are equipped with the safety accessories suitable for the hazards of the job, (2) the machine and safety equipment are in proper working condition, and (3) the machine operator is properly trained.

  Document the inspections and keep the records. Documentation should identify the machine, inspection date, problems noted, and corrective action taken. Noting problems helps to ensure that corrective action will be taken, that operators on all shifts will be made aware of any potential danger, and that any pattern of repeat problems on a particular machine can be detected and resolved as early as possible.

- **Use equipment only when guards are in place and in working order.** A worker should not be allowed to operate a piece of woodworking equipment if the guard or any other safety device, return device, spreader, anti-kickback fingers apparatus, guard on in-running rolls, or gauge or rip fence is not functioning properly. When guards cannot be used (during rabbeting or dadoing, for instance), you must provide combs, featherboards, or suitable jigs for holding the stock.

- **Provide employees with push sticks or other hand tools so that their hands are away from the point of operation when they work on small pieces of stock.** A push stick is a strip of wood or block with a notch cut into one end that is used to push short or narrow lengths of material through saws. (See Figure 10.) Using push sticks keeps stock from tipping and prevents the operator's fingers from coming in contact with blades.

Figure 10. Push stick and push block



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

- **Use a brush or stick to clean sawdust and scrap from a machine.** Never allow employees to clean a saw with their hands or while the machine is running.

- **Provide regular preventive maintenance.** Regularly clean and maintain woodworking equipment and guards. Ensure that blades are in good condition. Knives and cutting heads must be kept sharp, properly adjusted, and secured. Sharpening blades prevents kickback. Remove any cracked or damaged blades from service. Keep circular saw blades round and balanced. Remove dull, badly set, improperly filed or improperly tensioned saws from service, and immediately clean saws to which gum has adhered.

- **Never leave a machine unattended in the "on" position.** Make sure that workers know never to leave a machine that has been turned off but is still coasting.

- **Maintain proper housekeeping.** Workers have been injured by tripping and then falling onto the blades of saws. Keep floors and aisles in good repair and free from debris, dust, protruding nails, unevenness, or other tripping hazards. Do not use compressed air to blow away chips and debris. Make sure you have a non-slip floor.

- **Do not allow workers to wear loose clothing or long hair.** Loose clothing or long hair can be easily caught up in rotating parts.
- **Never saw freehand.** Always hold the stock against a gauge or fence. Freehand sawing increases the likelihood of an operator's hands coming in contact with the blade.
- **Use appropriate personal protective equipment.**

Safeguarding for specific types of woodworking machinery

This section covers the major safety hazards of specific woodworking machinery and discusses the engineering controls and work procedures for minimizing employee exposure to these hazards.

Circular/crosscut/ripsaws

These table saws are used for straight sawing. Depending on the blade, they cut either across (crosscut) or with (ripsaw) the grain of the wood. With the hand-fed saws, the operator adjusts the height and angle of the blade. Then, holding the stock, the operator pushes it into the blade. A guide is used to maintain a straight cut at the desired width. At the end of the cutting stroke, the operator either changes positions or pushes the stock through the blade. Self-feed or power table saws are equipped with rollers or a conveyor system to hold the lumber and force-feed it into the saw blade.

Circular/crosscut/ripsaw hazards

Injuries can occur if an operator's hands slip as he or she is feeding the stock into the saw, or if the operator holds his or her hands too close to the blades while cutting. Employees can also be injured when removing scrap or finished pieces from the table. Kickbacks (that is, when the blade catches the stock and throws it back toward the operator) are another major cause of injury. Kickbacks can result if the blade height is not correct or if the blade is not properly maintained. Kickbacks are more likely to occur when ripping, rather than crosscutting. Kickbacks also can occur if safeguards are not used or if poor-quality lumber is being cut.

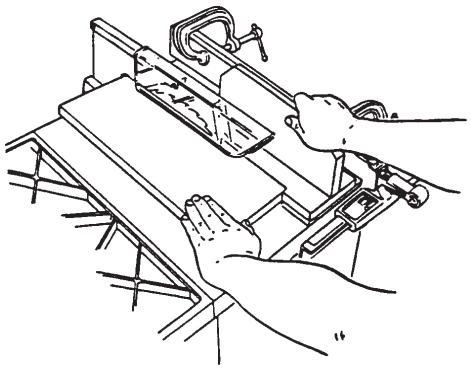
Hazards of circular/crosscut/ ripsaws
• Point of operation — Contact with the turning blade may occur.
• Other moving parts — Contact with the blade under the table, or with the power transmission apparatus (if not enclosed), may occur.
• Kickbacks — Stock caught by the blade may be thrown back at the operator.
• Flying particles — Wood chips, splinters, and broken saw teeth may be thrown by the cutting action of the blade.
• Nip points from automatic feed — Clothing, hair, or hands may be caught by and pulled into the in-running rolls.

Circular/crosscut/ripsaw safeguards

- Ripsaws and crosscut saws. Enclose the portion of the saw above the table with a self- adjusting guard, as shown in Figure 11. The guard must adjust to the thickness of the material being cut and remain in contact with it. Hinge the guard so that the blades can be easily changed.
- For ripsaws, use a spreader to prevent material from squeezing the saw or kicking back during ripping. Use antikickback fingers to hold the stock down in the event that the saw kicks back the material.
- Guard all belts and in-running nip points.
- Always guard the portion of the blade below the table. Operators must be protected from possible contact when reaching under the table.

- Attach a brake to the motor's arbor to stop the saw from coasting after it has been cut off, or have the operator remain at the saw station once the motor is shut off until the blade stops turning.
- Guard feed rolls on self-feed circular saws by a hood or guard to prevent hands from coming into contact with in-running rip points.

Figure 11. Saw blade with a self-adjusting guard



Source: *Accident Prevention Manual for Industrial Operations,* National Safety Council

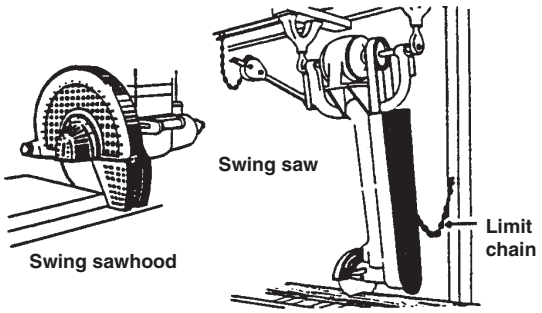
Work practices

- Keep hands out of the line of the cut.
- Use proper blade for cutting action (for example, don't use crosscut blade for ripping).
- Operate saw at speed specified by the manufacturer.
- Maintain and sharpen blade.
- Leave sufficient clearance for stock.
- Remove cracked saws from service.
- Stand to side of the saw blade to avoid injury due to kickback.
- Guide stock parallel to the rip fence to minimize the potential for kickback.
- Use a push stick for small pieces of wood and for pushing stock past the blade.
- Avoid crosscutting long boards on table saws. Considerable hand pressure is required close to the saw blade, and the boards create a safety hazard to other people.
- Use a filler piece between the fence and the saw blade when necessary (e.g., when there is little clearance on the fence side).
- Properly support all pieces of stock, including the cut and uncut ends, scrap, and finished product.

Overhead swing and straight line pull cutoff saws

These are special types of circular saws, which are also used for straight cutting. They are preferred for cutting long pieces of stock. The overhead swing saw is suspended from the ceiling, as shown in Figure 12; the saw is generally attached directly to the motor shaft. To run the saw the operator pulls it forward like a pendulum.

Figure 12. Overhead swing saw



Source: *Health and Safety Guide for Wooden Furniture Manufacturing,* NIOSH

Overhead swing and straight line pull cutoff saw hazards

Injuries can occur if the operator reaches to remove a section of board while the blade is coasting or idling, or if the operator tries to measure a board or position it while the saw is still running. Injuries can also occur if an improperly adjusted saw swings beyond its safe limits.

Safety hazards of overhead swing and straight line pull cutoff saws
• Point of operation — Contact with the blade may occur during operation, when the saw is idling; if the return device fails, or if the saw bounces forward from a retracted position.
• In-running nip points — Clothing, hair, or hands may be caught by and pulled into the in-running rolls of automatic feed.
• Kickback — Stock caught by the blade may be thrown back at the operator.
• Flying particles — Wood chips, splinters, and broken saw teeth may be thrown by the cutting action of the blade.

Overhead swing and straight line pull cutoff saw safeguards

- Enclose upper half of saw and arbor end with a fixed guard; enclose the point of operation (the lower part of the blade) with a self-adjusting hood. The hood must drop on top of and remain in contact with the table or stock. When the saw returns to the back of the table, the hood must cover the lower portion of the blade.
- Ensure that the saw contains an automatic device (for example, a counterweight) to return the saw to the back of the table after the cut has been made.
- Install a latch with a rachet release on the handle, nonrecoil spring, bumper, or other device to keep the saw from rebounding from its idle position.
- Use limit chains or other means to keep saw from moving beyond the front or back edge of the table. (See Figure 12.)
- Enclose overhead drive with a fixed guard.

Work practices

- Position the piece to be cut before starting the saw.
- Stand at the side of the saw blade when the saw is running, and use the hand nearest the handle to operate the saw. (This keeps the operator's body out of the line of the saw.)

- Remove cracked and defective saw blades from service.
- Keep hands out of the line of the cut.
- Make sure guards and counterweights are properly adjusted at all times. Take improperly adjusted saws out of service.

Radial saws

Radial saws are circular saws that cut downward, either with or against the wood grain (rip or crosscut). For crosscutting, the wood is pushed away from the operator and against a fence. For rip cuts, the blade is set parallel to the fence, and the stock is pushed through. The saw blade rotates upward toward the operator; who feeds the stock in the opposite direction of the blade movement.

Radial saws have features that make them more versatile than table saws. The saw arm can be raised and lowered and swung from side to side to adjust the depth and horizontal angle of the cut. The blade can be replaced with shaping cutters, disk or drum sanders, and other accessories.

Radial saw hazards

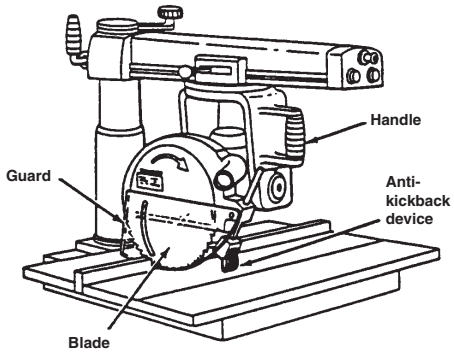
The principal types of injury from radial saws are cuts to the arms and hands, or amputation of fingers, from contact with the blade or flying wood chips. Workers can also be injured from kickback and those working nearby can be seriously injured if stock that is fed in the wrong direction is flung out of the saw.

Safety hazards of radial saws
• Point of operation — Contact with the turning blade may occur.
• In-running nip points — Clothing, hair, or hands may be caught by and pulled into the in-running rolls of the automatic feed.
• Kickback — Stock caught in the blade or fed in the wrong direction may be thrown back at the operator.
• Flying particles — Wood chips, splinters, and broken saw teeth may be thrown by the cutting action of the blade.

Radial saw safeguards

- Enclose the upper half of the saw (from the blade down to the end of the saw arbor) with a fixed hood. Guard the lower half with a self-adjusting, floating guard that rises and falls and automatically adjusts to the thickness of the stock. Figure 13 shows a radial saw with a self-adjusting guard covering the lower half of the blade.
- Make sure the saw has a return device. The front end of the unit must be slightly higher than the rear, so that the cutting head will return to its original position when released by the operator. This should also prevent the cutting head from rolling or moving the arm due to gravity or vibration.
- Install an adjustable stop to limit forward travel distance of the blade during repeat cuts.
- Guard feed rolls.
- For ripping, install non-kickback fingers on both sides of the saw blade.
- Use a spreader in ripping operations to prevent the cut in the wood from immediately closing and binding the blade.

Figure 13. Radial saw with self-adjusting guard



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Work practices

- During crosscutting, operate the saw on the side of table with the handle.
- Make sure that stock is fed in the correct direction. Post a warning label on the hood showing the direction of saw rotation.
- Measure boards against a stop gauge, or turn off the saw if measuring by rule. (Wait for the blade to stop before moving materials or making measurements.)

Band saws

Band saws are used for both straight sawing and for cutting curved pieces. The band saw uses a thin, flexible, continuous steel strip with cutting teeth on one edge. The blade runs on two pulleys, driven and idler, through a hole in the work table on which stock is fed. The operator hand-feeds and manipulates the stock against the blade to saw along a predetermined line.

Band saw hazards

Although workers are not injured as frequently or as severely on band saws as on circular saws, injuries do occur. The most common injury is caused by contact with the blade. Contact with the blade at the point of operation occurs because the operator's hands may come close to the blade during cutting, and band saws cannot be completely guarded.

Safety hazards of band saws
• Point of operation — Contact with the moving blade may occur.
• In-running nip points — Clothing, hair, or hands may be caught by and pulled into feed rolls or the pulley mechanism.
• Kickbacks — Stock caught by the blade may be thrown back at the operator.
• Flying chips — Wood chips and splinters may be thrown by the cutting action of the blade.

Band saw safeguards

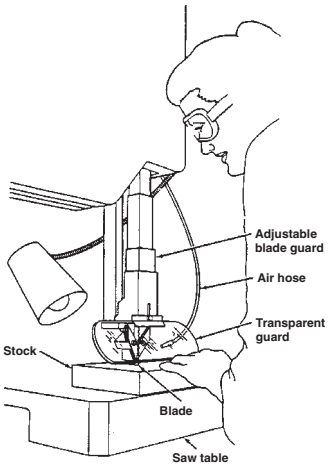
- Guard the blade entirely except at the point of operation (the working portion of the blade between the bottom of the guide rolls and the table). (See Figure 14.)
- Use a self-adjusting guard for the portion of the blade between the sliding guide and the upper saw so that it raises and lowers with the guide.

- Properly adjust the blade guide post to fit the thickness of the stock and to provide additional guarding.
- Fully enclose the pulley mechanism.
- Guard feed rolls.
- Install a brake on one or both wheels to minimize the potential for coasting after the saw has been shut off; or do not retrieve material until the blade has stopped.
- Make sure the saw includes a tension control device to indicate proper blade tension.

Work practices

- Use a blade of an appropriate size and type (for example, do not force a wide saw to cut on a small radius).
- Never stop the saw too quickly or thrust a piece of wood against the cutting edge of the teeth after the power has been shut off.
- Periodically examine blades; remove cracked or defective blades immediately.
- Make cuts only when the power is on and not while the saw is coasting.
- Set the guard to just clear the stock being cut.
- Use a push stick to control the stock when it is near the blade.
- Use a special jig or fixture when cutting small pieces of stock.

Figure 14. Adjustable guard on band saw



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Jig saws

Jig saws are useful for precision-cutting intricate curves and patterns on thin stock. They have thin blades that move rapidly up and down through the opening in the saw table. The blade is held in upper and lower chucks that pull it tight and keep it from bending. A hold-down adjusts to the thickness of the wood being cut.

Jig saw hazards

Jig saws are generally not considered to be as dangerous as other saws; however, contact at the point of operation can cause hand and finger injuries. Contact with the blade can also occur below the table. All portions of the blade must be guarded.

Hazards of jig saws
• Point of operation — Contact with the moving blade may occur.
• In-running nip points — Clothing, hair, or hands may be caught by and pulled into the in-running rolls.
• Flying chips — Wood chips and splinters may be thrown by the cutting action.
• Kickback — Stock caught by the blade may be thrown back at operator.

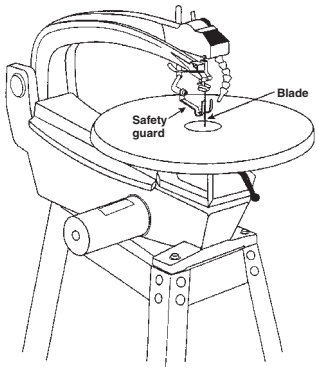
Jig saw safeguards

- Use a threshold rest (slotted foot) to hold the stock.
- Guard the blade with an adjustable or self-adjusting guard (Figure 15).
- Guard drive belts and pulleys.
- Guard the portion of the blade below the table.

Work practices

- Make turns slowly; do not make sharp turns with a wide blade; use a narrow blade for sharp turns.
- Make sure the blade is properly attached and secured.

Figure 15. Jig saw



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Jointers

Jointers face or flatten wood and are primarily used to joint small pieces of material. The operator passes stock over a cylindrical, multiple-knife cutter head, while keeping the stock flush against a guide. The depth of the cut is achieved by adjusting the front table. There are two types of jointers: hand-fed jointers with a horizontal cutting head, and wood jointers with a vertical head.

Jointer hazards

Hand-fed jointers are dangerous woodworking machines. Injuries can occur if the operator's hands and fingers come in contact with the knives. This can happen when the operator is jointing narrow lengths of stock, particularly if he or she does not use a jig or other holding device. Injuries can occur when the operator allows his or her fingers to ride along the surface of the jointer as the wood is fed through. Also, stock may be accidentally kicked away, exposing the operator's hands to the cutter head.

Hazards of jointers
• Point of operation — Contact with the knives may occur, especially if a holding device is not used.
• In-running nip points — Clothing, hair, or hands may be caught by and pulled into the in-running rolls of the automatic feed.
• Flying chips — Stock may be thrown back at the operator after being caught by the knives; this may also expose the operator's hands to the knives.
• Kickback — Wood chips and splinters may be thrown by the cutting action of the knives.

Jointer safeguards

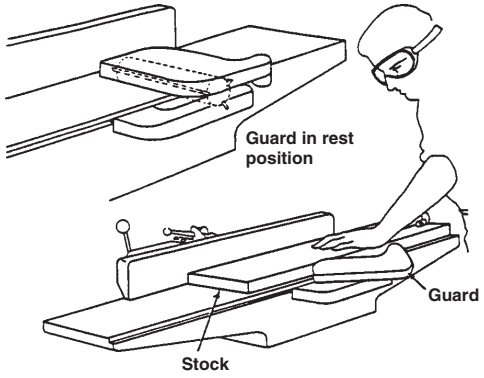
For hand-fed jointers, horizontal head:

- Enclose cutter head with an automatic (spring-loaded, self-enclosing) guard that exposes the cutter head only when the stock is being fed. The guard must automatically adjust to cover the unused portion of the head, and it must remain in contact with the material at all times. Figure 16 shows the appropriate use of a self-adjusting guard.
- Adjust the cylindrical cutter head so that the knife projects no more than $^1/_8$ inch beyond the cylindrical body of the head.
- Adjust the cutter head so that the clearance between the path of the knife projection and the rear table is no more than $^1/_8$ inch.
- Keep the clearance between the table and the head as small as possible.

For vertical head jointers:

- Completely enclose cutter head, except for slot to apply the material for jointing. This guard can be part of the local exhaust system.

Figure 16. Jointer with self-adjusting guard



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Work practices

- Use hold-down push blocks when jointing wood narrower than three inches.
- Avoid deep cuts; they increase the likelihood of kickbacks and require a larger table opening.
- As a general rule, never joint pieces of material that are less than four times the width of the bed opening.
- Check knives regularly for proper setting and adjustment, but only when the power is shut off.

Shapers

Shapers are most commonly used to shape the edges of stock. The operator feeds the stock from any direction against a vertical rotating cutter mounted on a spindle. The spindle rotates at a high speed. Some machines have multiple spindles. Guidepins hold the stock for curved shaping and fences hold it for straight line shaping.

Shaper hazards

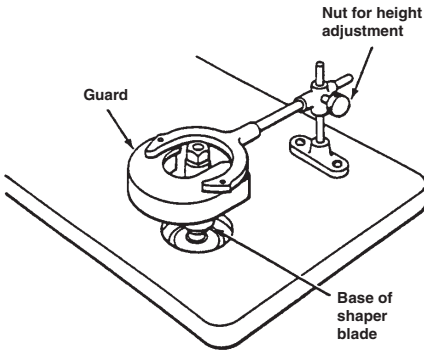
Injuries can occur when the operator's hands or fingers contact the revolving knives. Workers can also be seriously injured or killed by tool projection from unbalanced cutter heads. Shapers are difficult to guard; however, a number of guards are available to protect operators' hands.

Hazards of shapers
• Point of operation — Contact with the cutter head may occur, particularly if holding devices are not used.
• Tool projection — Knives may be flung if the cutter head is unbalanced.
• Kickback — Stock may be thrown back at the operator after being caught by the cutter head.
• Flying chips — Wood chips and splinters may be thrown by the cutting action of the knives.
• In-running nip points — Clothing, hair, or hands may be caught by and pulled into the in-running rolls of the automatic feed.

Shaper safeguards

- As shown in Figure 17, enclose the spindle with an adjustable guard or cage. For straight-line shaping, the fence frame should include the guard. The fence should contain as small an opening as possible for the knives, and should extend at least 18 inches on either side of the spindle. Split adjustable fences are useful for guarding when the entire edge of the stock is to be shaped.
- Mount a ring guard around the cutting bit to reduce contact with the bit.
- Guard automatic feed rollers.
- Ensure that double-spindle shapers have a starting and stopping device for each spindle.
- Use a safety collar to minimize the potential for tool projection.

Figure 17. Sharper with adjustable guard



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Work practices

- Maintain the knives. Make sure they are precision-ground to apply uniform pressure. Make sure the knives are balanced and fit properly.
- Train operators to listen for "chatter," which indicates that knives are out of balance. To start the machine, operators should apply the power in a series of short starts and stops to slowly bring the spindle to operating speed.
- Use templates, jigs, and fixtures to distance the operator's hands from the point of operation. Featherboards may be clamped to the fence for straight line shaping.
- Cut in the opposite direction of the spindle's rotations.

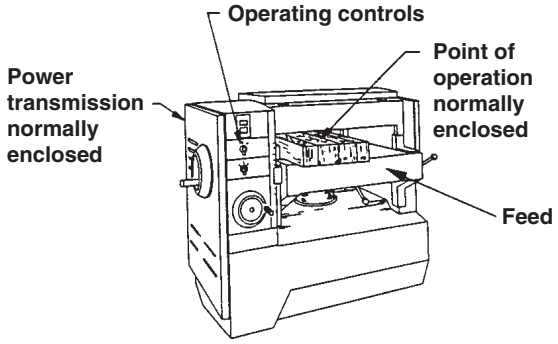
Power-feed planers/moulders

Also called surfacers, planers are used to dress and size rough-sawed lumber on one or more sides. They plane boards to an even thickness. Stock passes under or between cylindrical cutter heads with multiple knives. (See Figure 18.) Planers are similar to jointers except that the cutter head is above, or above and below, the stock. The operator adjusts for the cut and then feeds stock into the infeed side of the machine. The surface board is retrieved from the out-running end.

Planer/moulder hazards

Automatic feeding mechanisms make this equipment less hazardous. However, operators' hands may be pulled into the cutting area, and can come in contact with the point of operation while adjusting blades. Operators' hands also may be pinched between the stock and in-running rolls, if the feed system is not properly guarded.

Figure 18. Planer



Source: *Machine Guarding — Assessment of Need,* NIOSH

Hazards of power-feed planers or moulders
• Point of operation — Contact with the cutter head may occur during black adjustment or other maintenance activities.
• In-running rolls — Clothing, hair, or hands may be caught by and pulled into the automatic feed mechanism.
• Kickbacks — Stock may be thrown back at the operator after being caught by the cutter head.
• Flying objects — Workpiece, wood chips and splinters may be thrown by the cutting action.
• Vibration (and noise) may be produced if the machinery is not anchored to, and insulated from, a solid foundation.

Planer/moulder safeguards

- Completely enclose belts and pulleys of line shaft with sheet metal or heavy mesh guards; guards must be used regardless of the location of the line shaft.
- Cover cutting heads with a metal guard or cage. The exhaust system may be integrated with the guard.
- Guard feed rolls with a wide metal strip or bar that will allow boards to pass but that will keep operators' fingers out.
- Provide barriers at the loading and unloading ends to keep hands out of point of operation.
- Install anti-kickback fingers on the in-feed side across the width of the machine.
- Use a barrier or guardrail when the machine is running.

Work practices

- Stand back once the boards have been put through to avoid injuries from kickback and flying splinters.
- Do not feed boards of different thicknesses. Thinner boards will be kicked back.

Lathes

Lathes are used for shaping round parts, such as table legs. Two types of lathes are used in the woodworking industry: automatic-feed and manual-feed. In an automatic-feed lathe, the stock, mounted on a carriage, is moved into contact with a multiple-knife cutter head that runs the entire length of the stock. The stock rotates at a low speed, while the cutter rotates faster. Using a feed lever, the operator feeds the stock into the cutter head and maintains the proper pressure for effective cutting.

In a hand-fed lathe, the stock, mounted between two centers, rotates rapidly while the operator applies a single-point tool to the wood. The operator holds the tool on a tool rest and advances it along the length of the tool rest to shape the stock as desired.

Lathe hazards

The primary hazards of lathes are contact with rotating parts and contact at the point of operation. Operators' hands, clothing, or jewelry may be caught on the rotating parts and pulled into the machine. The danger is greater with hand-fed lathes, because the operator works in such close proximity to the rotating stock and the cutting tool. With automatic lathes, the operator can contact the rotating parts if he or she reaches into the work area to adjust components while the machine is running. Flying chips are also a hazard on lathes.

Hazards of lathes
• Point of operation — Contact with the tool or cutter head may occur.
• Rotating parts — Clothing, hair, or hands may be caught by and pulled into the cutter or the rotating stock.
• Flying chips — Wood splinters and chips may be thrown by the cutting action.
• Kickback — The workpiece may be thrown out.

Lathe safeguards

- For automatic wood-turning lathes with rotating knives, cover the cutter head with a metal shield or hood that completely covers the knives and material, except at the contact points, when the machine is in operation. A hinged shield permits adjustments when needed.
- For manual lathes, cover the cutter heads as completely as possible with a hood or shield.
- Cover lathes used for turning long stock with long curved guards extending over the top of the lathe. Such guards prevent the stock from being thrown from the machine, should the stock come loose.
- Install a brake for bringing the stock to a complete stop after the power is shut off.
- On hand-fed lathes, guard the tool and point of operation with a plexiglass tool guard, as shown in Figure 19.
- Enclose the power transmission with a fixed guard.

Work practices

- Never permit operators to wear loose clothing, long hair, jewelry, or gloves.
- Make sure tools are properly adjusted and used in a proper manner.
- Do not use stock that has checks, splits, cracks, or knots.
- Allow glued joints to dry before working on stock.
- Hold tools firmly in both hands.
- Make sure the tool rest is set close to the stock. Work only in the area covered by the tool rest; do not attempt to support the tool with your hands. Adjust the tool rest when the lathe is not running.

Figure 19. Plexiglass guard on lathe protects operator from flying chips

Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

Sanders

Sanders finish stock by using a coated abrasive surface to remove material. Figures 20 and 21 show the three general types of sanders: drum, belt, and disc. A belt sander uses a system of pulleys to move the abrasive material across the stock. Either the wood is fed manually or automatically into the machine or the sanding belt is pressed toward the wood, which is located on a working table.

Figure 20. Drum sander

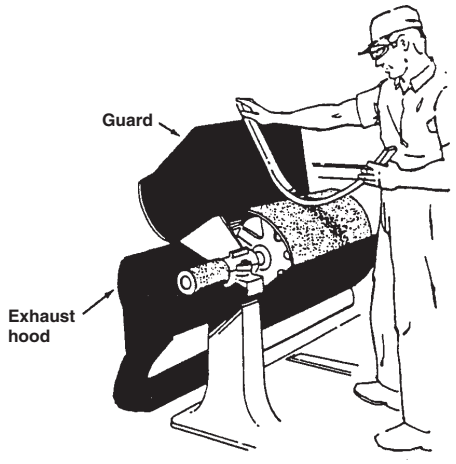
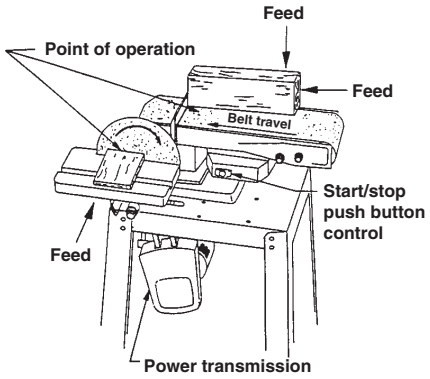


Figure 21. Belt and disc sander



Sources: *Health and Safety Guide for Wooden Furniture Manufacturing* and *Machine Guarding — Assessment of Need,* NIOSH

Sander hazards

Sanders produce a considerable quantity of fine wood dust. All sanders should be carefully ventilated. The primary safety hazard of belt sanders is that workers may catch their hands, clothing, or jewelry in the inrunning rolls. Also, contact with an abrasive surface can cause abrasions and lacerations.

Hazards of sanders
• Point of operation — Contact with disc or drum may occur.
• In-running nip points — Clothing, hands, or hair may get caught by and pulled into the in-running rolls on automatic sanders or sanding belts.
• Flying chips — Wood splinters and chips may be thrown from the sanding action.

Sander safeguards

- Guard feed rolls with a semi-cylindrical guard to prevent the operator's hands from coming in contact with the in-running rolls on automatic sanders. The guard design must allow for adjustment to any thickness of stock.
- Guard the unused run of the sanding belt against accidental contact. These guards must prevent the operator's hands or fingers from coming in contact with nip points.
- Enclose drum and disc sanders with guards, except for the portion of the sander's drum above the table. The guard can consist of a protective cover at the rear side of the wheel and a hinged cover around the wheel periphery.
- Enclose power transmission pulleys with a fixed guard.

Work practices

- Replace torn, frayed, or excessively worn belts or drums. A worn-out belt, disk, or drum can cause massive heat buildup, which can cause the belt, disk, or drum to tear or break and pelt the surrounding area with projected bits.
- Keep hands away from abrasive surfaces.
- Sand on the downward-moving side of the disk or belt.

Routers

Routers are used for such purposes as cutting and shaping decorative pieces, making frame and panel doors, and milling moldings. Routers have spindles that spin variously shaped, small-diameter cutting tools at high speeds. The tool is held in a collet chuck and protrudes through a flat, smooth base that slides over the surface of the work. The tool-spindle axis is usually vertical, but it may be tilted. The operator lowers the head for machining, and the head automatically returns to its original position after the cut is made. The spindle is driven by belts and pulleys or by a high-speed motor.

Router hazards

Operators may be injured from inadvertent contact with the rotating tool when handling the stock or removing scrap from the table. Kickback is another common source of injury among router operators. Kickback may be caused by poor-quality lumber (i.e., if the stock breaks) or incorrect work method, such as feeding the stock into the tool too abruptly or in the wrong direction, or poorly fixing the stock to the template.

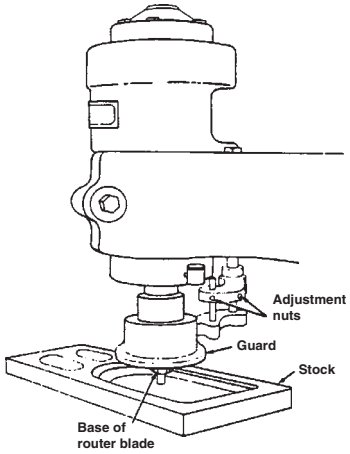
Projection of tools can severely injure or kill router operators. Tools can be flung from the cutter head if they are poorly fastened in the tool holder, if the wrong tool is used, or if the tool speed is too high.

Hazards of routers
• Point of operation — Contact with the cutter head may occur.
• Rotating parts — Clothing or hair may be caught on rotating cutter head.
• Tool projection — Knives may be thrown from unbalanced or improperly adjusted cutter heads, or from cutter heads operated with tools that were not designed for the cutter head.
• Flying chips — Wood chips or wood dust, and splinters may be thrown by the cutting action.

Router safeguards

- Enclose the tool with an adjustable tool guard, as shown in Figure 22.
- Equip routers with a spindle braking system that gradually engages.
- Guard feed rolls.

Figure 22. Router with adjustable tool guard



Source: *Concepts and Techniques of Machine Safeguarding,* OSHA

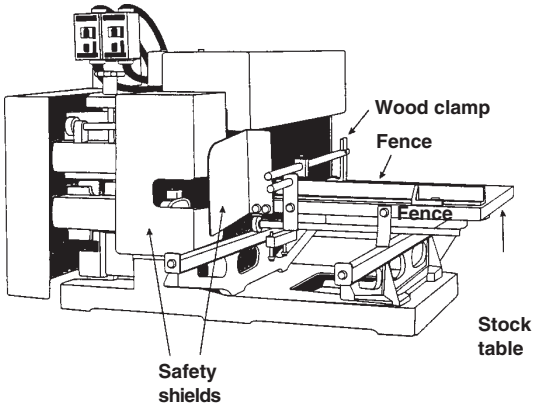
Work practices

- Properly attach and secure tools to the holder.
- Label cutting tools and holders with the maximum permissible spindle speed.
- Use tools only as intended.

Tenoning machine

Tenoning machines use cutter heads and/or saw blades to form projections (tenons) on pieces of stock. Each tenon can be inserted into a cavity (mortise) on another piece of wood to form a mortise and tenon joint. Figure 23 shows a single-end tenoning machine.

Figure 23. Single-end tenoning machine



Tenoning machine hazards
• Point of operation — Contact with cutter head or saw blade may occur.
• in-running nip points — Clothing, hair, or hands may be caught by and pulled into the in-running rolls of the automatic feed.
• Flying chips — Wood splinters and chips may be thrown by the cutting action.
• Kickbacks — Stock may be thrown back at the operator after being caught by the cutter head or saw blade.

Tenoning machine safeguards

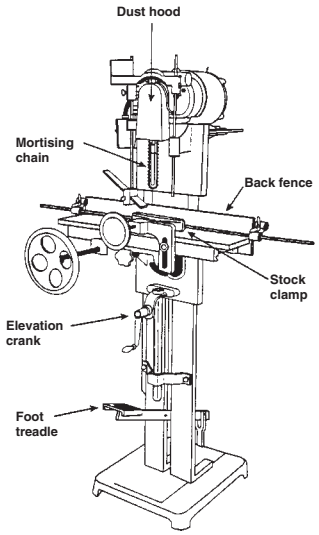
- Enclose feed chains and sprockets of double end machines, except for the portion of the chain conveying stock.
- The cutting head and saws must be guarded with metal guards. Cover the unused part of the periphery of the cutting head. If an exhaust system is used, the guard must form part of the exhaust system.

Boring/mortising machine

Boring and mortising machines use boring bits or mortising chains to cut cavities in pieces of stock. These cavities are often used in mortise and tenon joints. Figure 24 shows a chain mortising machine.

Boring/mortising machine hazards
• Point of operation — Contact with the boring bit or mortising chain may occur.
• Rotating parts — Clothing or hair may be caught on rotating boring bit or mortising chain.
• In-running nip points — Clothing, hair, or hands may be caught by and pulled into in-running rolls of automatic feed.
• Flying chips — Woods chips and splinters may be thrown by the cutting action.
• Kickbacks — Stock may be thrown back at operator.

Figure 24. Chain mortising machine



Boring/mortising machine safeguards

- Use safety bit chucks with no projecting screws.
- Enclose boring bits with a guard that encloses the bit and chuck above the material being worked.
- Enclose the top of the cutting chain and driving mechanism.
- If a counterweight is used, prevent it from dropping by bolting it to the bar or attaching a safety chain to it.
- Cover operating treadles with inverted U-shaped guard to prevent accidental tripping.

Robotics in the workplace

Robots are machines that load and unload stock, assemble parts, transfer objects, or perform other tasks.

Robots are used for replacing humans who were performing unsafe, hazardous, highly repetitive, and unpleasant tasks. They are utilized to accomplish many different types of application functions such as material handling, assembly, arc welding, resistance welding, machine tool load/unload functions, painting/spraying, etc.

Studies in Sweden and Japan indicate that many robot accidents have not occurred under normal operating conditions but rather during programming, program touch-up, maintenance, repair, testing, setup, or adjustment. During many of these operations, the operator, programmer or corrective maintenance worker may temporarily be within the robot's working envelope where unintended operations could result in injuries.

All industrial robots are either servo or non-servo controlled. Servo robots are controlled through the use of sensors which are employed to continually monitor the robot's axes for positional and velocity feedback information. This feedback information is compared on an on-going basis to pre-taught information which has been programmed and stored in the robot's memory.

Non-servo robots do not have the feedback capability of monitoring the robot's axes and velocity and comparing with a pre-taught program. Their axes are controlled through a system of mechanical stops and limit switches to control the robot's movement.

Type of potential hazards

The use of robotics in the workplace also can pose potential mechanical and human hazards.

Mechanical hazards

Mechanical hazards might include workers colliding with equipment, being crushed, trapped by equipment, or being injured by falling equipment components. For example, a worker could collide with the robot's arm or peripheral equipment as a result of unpredicted movements, component malfunctions, or unpredicted program changes.

A worker could be injured by being trapped between the robot's arm and other peripheral equipment or being crushed by peripheral equipment as a result of being impacted by the robot into this equipment.

Mechanical hazards also can result from the mechanical failure of components associated with the robot or its power source, drive components, tooling or end-effector, and/or peripheral equipment. The failure of gripper mechanisms with resultant release of parts, or the failure of end-effector power tools such as grinding wheels, buffing wheels, deburring tools, power screwdrivers, and nut runners are such hazards.

Human errors

Human errors can result in hazards both to personnel and equipment. Errors in programming, interfacing peripheral equipment, connecting input/output sensors, can all result in unpredicted movement or action by the robot which can result in personnel injury or equipment breakage.

Human errors in judgment result frequently from incorrectly activating the teach pendant or control panel. The greatest human judgment error results from becoming so familiar with the robot's redundant motions that personnel are too trusting in assuming the nature of these motions and place themselves in hazardous positions while programming or performing maintenance within the robot's work envelope.

Robots in the workplace are generally associated with the machine tools or process equipment. Robots are machines, and as such must be safeguarded in ways similar to those presented for any hazardous remotely controlled machine.

Various techniques are available to prevent employee exposure to the hazards which can be imposed by robots. The most common technique is through the installation of perimeter guarding with interlocked gates. A critical parameter relates to the manner in which the interlocks function. Of major concern is whether the computer program, control circuit, or the primary power circuit, is interrupted when an interlock is activated. The various industry standards should be investigated for guidance; however, it is generally accepted that the primary motive power to the robot should be interrupted by the interlock.

The ANSI safety standard for industrial robots, ANSI/RIA R15.06, is very informative and presents certain basic requirements for protecting the worker. However, when a robot is to be used in a workplace, the employer should accomplish a comprehensive operational safety/health hazard analysis and then devise and implement an effective safeguarding system which is fully responsive to the situation. (Various effective safeguarding techniques are described in ANSI B11.19.)

Essentially, robots perform work that would otherwise have to be done by an operator. They are best used in high-production processes requiring repeated routines where they prevent other hazards to employees. However, they may create hazards themselves, and if they do, appropriate guards must be used.

The following figures show a type of robot in operation, the danger areas it can create, and an example of the kind of task (feeding a press) it can perform.

Figure 25. Robot movement capability

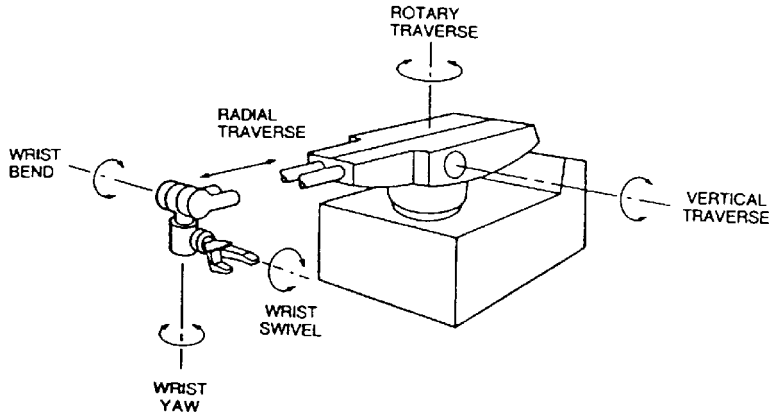


Figure 26. Potential danger areas in robot envelope

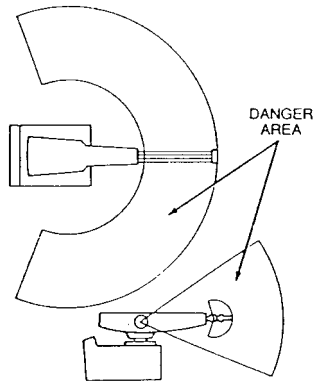
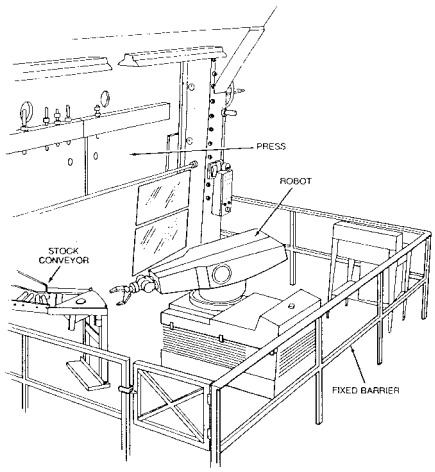


Figure 27. Using barrier guards to protect robot envelope



Cellular manufacturing systems

A development in manufacturing technology has given rise to a manufacturing concept known as Manufacturing Systems/Cells, or Cellular Manufacturing Systems. These systems of integrated industrial machines, linked by a material handling system and operated by (controlled by) a programmable electronic system (computer) are capable of manufacturing discrete parts or assemblies. The safety of employees exposed to these systems is important.

Because a system is to be safeguarded, it is logical that a system hazard analysis will yield the parameters of the safeguarding system required. Figures 28 through 30 depict typical cellular system concepts and safeguarding considerations.

ANSI B11.20, should be referred to for assistance when a cellular manufacturing system is envisioned.

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Figure 28. Typical manufacturing system/cell using a robot as the material handling system showing perimeter marking/barrier, fixed barriers with interlocked gates, presence sensing devices, warning devices, and additional system emergency stop devices

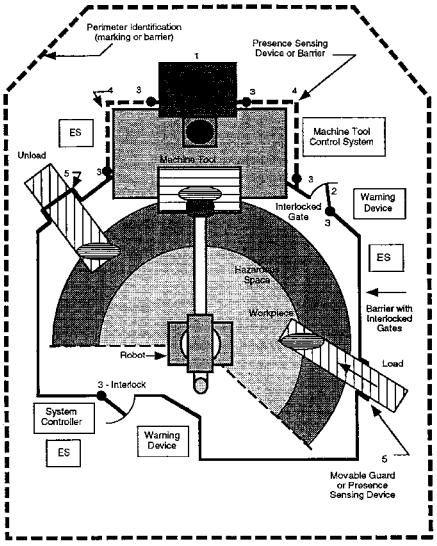

Figure 29. Manufacturing system composed of several cells

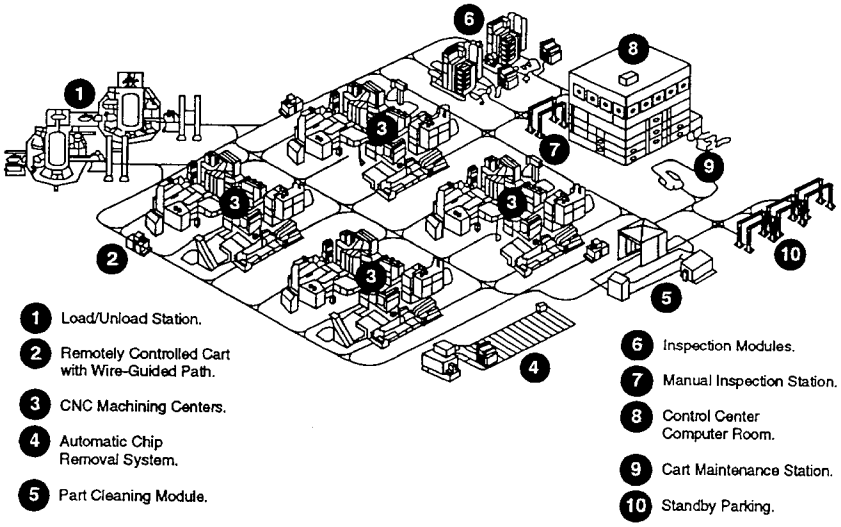

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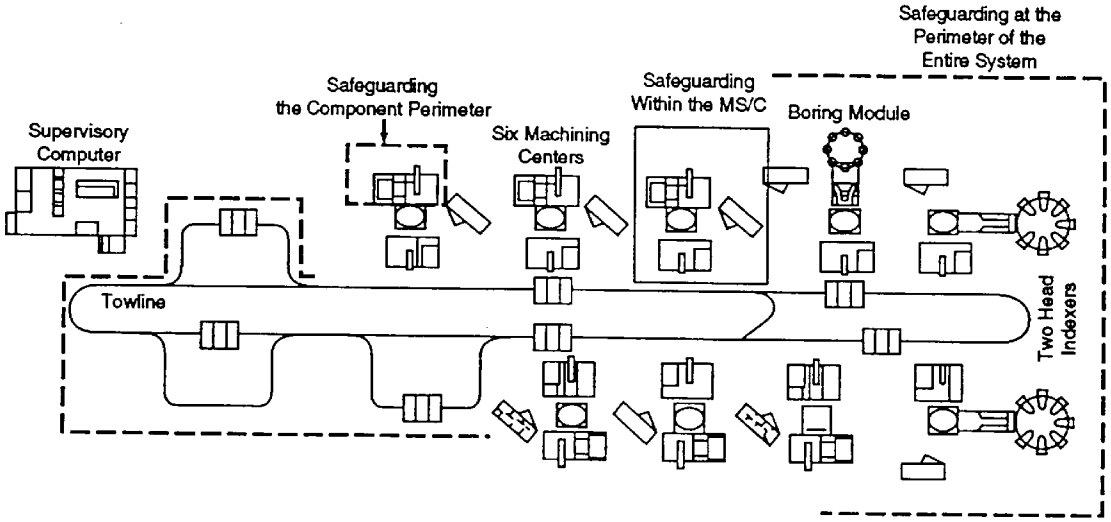
Figure 30. Areas to be considered for safeguarding



OSHA COMPLIANCE MANUAL

WORKPLACE AUDIT / INSPECTION REPORT
Machine Guarding

Location: _____

Audited by: _____ **Date:** _____

Audit Item/Practice
Check (✔) if Item/Practice not in compliance

General safeguarding

- ❑ Do the safeguards provided meet minimum OSHA requirements? 29 CFR 1910 Subpart O
- ❑ Do the safeguards prevent workers' hands, arms, and other body parts from making contact with dangerous moving parts? 29 CFR 1910.212(a)(1)
- ❑ Are the safeguards firmly secured and not easily removable? 29 CFR 1910.212(a)(2)
- ❑ Do the safeguards ensure that no objects will fall into the moving parts?
- ❑ Do the safeguards permit safe, comfortable, and relatively easy operation of the machine?
- ❑ Is there a system for shutting down the machinery and locking/tagging out before safeguards are removed?
- ❑ Are machines that are designed for a fixed location securely anchored to prevent walking or moving? 29 CFR 1910.212(b)

Point of operation

- ❑ Is there a point-of-operation safeguard for each machine? 29 CFR 1910.212(a)(3)(ii)
- ❑ Does the point-of-operation safeguard keep the operator's hands, fingers, and body out of the danger area? 29 CFR 1910.212(a)(3)(ii)
- ❑ Do you check to make sure that the safeguards have not been tampered with or removed?
- ❑ Could changes be made on the machine to eliminate the point-of-operation hazard entirely?

Power transmission apparatus

- ❑ Do you ensure there are no unguarded gears, sprockets, pulleys, or flywheels on the apparatus? 29 CFR 1910.219
- ❑ Do you ensure there are no exposed belts or chain drives? 29 CFR 1910.219(g), (e)
- ❑ Do you ensure there are no exposed set screws, key ways, collars, etc.? 29 CFR 1910.219(i)
- ❑ Are starting and stopping controls within easy reach of the operator?
- ❑ If there is more than one operator, are separate controls provided? 29 CFR 1910.217(c)(3)(vi)

Other moving parts

- ❑ Are safeguards provided for all hazardous moving parts of the machine, including auxiliary parts?

Non-mechanical hazards

- ❑ Have appropriate measures been taken to safeguard workers against noise hazards? 29 CFR 1910.95
- ❑ Have special guards, enclosures, or personal protective equipment been provided, where necessary to protect workers from exposure to harmful substances used in machine operation?

Electrical hazards

- ❑ Is the machine installed in accordance with National Fire Protection Association and National Electrical Code requirements?
- ❑ Is the machine properly grounded?
- ❑ Is the power supply correctly fused and protected?
- ❑ Do you investigate any reports of workers receiving minor shocks while operating any of the machines?

Pull-out/Restraint device

- ❑ Is each pull-out or restraint device in use visually inspected and checked for proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed? 29 CFR 1910.217(c)(3)(iv)(d)
- ❑ Is necessary maintenance and repair performed and completed before the press is operated? 29 CFR 1910.217(c)(3)(iv)(d)
- ❑ Are all parts, nuts, bolts etc., secure?
- ❑ Are attachments connected to and being operated only by the press slide or upper die?
- ❑ Are attachments adjusted to prevent each operator from reaching into the point of operation or to withdraw the operator's hands from the point of operation before the die closes? 29 CFR 1910.217(c)(3)(vi)
- ❑ Are horizontal and vertical supports secure?
- ❑ Are cables in good shape (not bent, frayed, or twisted)?
- ❑ Are brackets secure and in good condition?

Portable power tools

- ❑ Are grinders, saws, and similar equipment provided with appropriate safety guards? 29 CFR 1910.243(a)(1), 1910.243(c)(1)-(4), 1910.243(e)(1)(i)
- ❑ Are power tools used with the correct shield, guard, or attachment recommended by the manufacturer?
- ❑ Does each portable power tool have a constant pressure switch (dead man switch) that will shut off the power when pressure is released? 29 CFR 1910.243(a)(2)

Equipment markings

- ❑ Are all emergency stop buttons colored red? 29 CFR 1910.144(a)(1)(iii)
- ❑ Are manually operated valves and switches controlling the operation of equipment and machines clearly identified and readily accessible?

Lockout

- ❑ Are correct lockout/tagout procedures in use? 29 CFR 1910.147(c)(4) 29 CFR 1910.147(d) 29 CFR 1910.147(e)
- ❑ Is all machinery or equipment capable of movement, required to be de-energized or disengaged and locked out during cleaning, servicing, adjusting or setting up operations, whenever required? 29 CFR 1910.147(c)(1)
- ❑ _____

Repairs/corrections must be completed by (date) _____

Routed to _____ Date_____

Repairs/corrections from above have been done.

Supervisor _____ Date_____ Page____of____

OSHA COMPLIANCE MANUAL

WORKPLACE AUDIT / INSPECTION REPORT
Machine Guarding

Location: _____

Audited by: _____ **Date:** _____

Commentary on repairs/corrections:

Repairs/corrections must be completed by (date) _____

Routed to _____ Date _____

Repairs/corrections from above have been done.

Supervisor _____ Date _____ Page____of____

Machine safety program

Purpose

It is the policy of _____ to permit only trained and authorized employees to operate machinery, tools, or equipment at any time. This policy is applicable to:

- Daily operators of machinery, tools, and equipment; and
- Those who only occasionally have cause to use machinery, tools, or equipment.

This program describes methods and practices for care and use of machines, equipment, and tools that can be read and understood by all managers, supervisors, and employees. This program is intended to be used to:

- Create an awareness of the hazards among our workforce,
- Standardize procedures for use and care of the equipment,
- Provide a consistent format for training employees on the proper procedures,
- Minimize the possibility of injury or harm to our employees, and
- Demonstrate our company's compliance with OSHA's machine safety and equipment regulations.

Administrative duties

_____ our company's _____, is responsible for developing and maintaining this machine safety program. This person is solely responsible for all facets of the program and has full authority to make necessary decisions to ensure its success.

_____ is also qualified, by appropriate training and experience that is commensurate with the complexity of the plan, to administer or oversee our machine/equipment safety program and conduct the required evaluations.

This machine safety program kept at the following location: _____.

If, after reading this plan, you find that improvements can be made, please contact _____. We encourage all suggestions because we are committed to creating a safe workplace for all employees.

A safe and effective machine/equipment safety program is an important component of our overall safety plan. We strive for clear understanding, safe work practices, and involvement in the program from every level of the company.

List of machinery, tools, and equipment

The machinery, tools, and equipment used at this company includes the following:

Department	Machinery, tools, or equipment

Pre-operational procedures

Hand tools must be inspected prior to use to ensure that:

- For tools with jaws, jaws are not sprung to the point of slippage.
- For impact tools, they are free of mushroom heads.

- For tools with wooden handles, the handles are free of splinters or cracks and are tight in the tool.
- The tool is otherwise safe for use.

Any machine or power-operated tool, function, or process which may cause injury will be guarded. All permanent guards are securely attached in good working order and all removable guards are in place on the machine or equipment before starting use. Guards meet these minimum general requirements:

- Prevent contact - The guards prevent hands, arms, or any part of an employee's body or clothing from making contact with dangerous moving parts.
- Secure - Guards are not easy to remove or alter. Guards and safety devices are made of durable material that will withstand the conditions of normal use. They are firmly secured to the machine.
- Protect from falling objects - The guards ensure that no objects can fall into moving parts.
- Create no new hazards - If a guard creates a hazard of its own such as shear point, a jagged edge, or an unfinished surface which can cause a laceration, then employees must not use the piece of machinery or equipment.

If a guard is defective, damaged, or in any way does not meet the requirements of these procedures, employees may not use the machine, and must immediately notify _____.

Where the operation of a machine or accidental contact with it can injure employees in the vicinity, the hazard is either controlled or eliminated.

Employees must locate and put on necessary and appropriate personal protective equipment (PPE) for use with the machinery or equipment before beginning use. PPE can be obtained from _____.

Employees must make sure that work areas are well-lit, dry, and clean before beginning work. Sawdust, paper, and oily rags are a fire hazard and can damage machinery and equipment.

Employees must change clothing or take off jewelry that could become entangled in the machinery or equipment.

Only qualified personnel may install or repair equipment. Employees must notify _____ if machinery or equipment is in need of any type of repair.

If a lock or tag is in place on a piece of machinery or equipment, it may not be removed and the machinery or equipment may not be used.

Operating procedures

Employees may not remove a guard for any reason while operating any piece of machinery or equipment.

All necessary personal protective equipment is worn while the machinery or equipment is running.

If an employee is distracted or unable to focus on the work with the machinery or equipment, he/she must stop work with that machinery or equipment.

Upon finishing with a piece of equipment, tool, or machine, basic maintenance must be performed. It should be kept sharp, oiled, and stored properly, as appropriate.

Problem equipment must be immediately reported to _____ so it can be repaired or replaced.

Employees must always use the proper piece of machinery or equipment for the job. Electric cables and cords must be kept clean and free from kinks. Equipment may never be carried by its cord.

Training program

Under no circumstances will an employee operate a piece of machinery or equipment until he/she has successfully completed _____ machinery and equipment training program. This includes all new operators or users of machinery and equipment, regardless of claimed previous experience.

The company training program includes classroom instruction and operational training on each specific piece of machinery and equipment to be utilized by the employee in the assigned work area.

The following individuals receive training: _____.

_____ will identify all new employees in the Employee Orientation Program and make arrangements with department managers to schedule the classroom instruction.

Classroom training consists of:

- Review of the written procedures.
- Review general safety training video.
- Successful completion of examination.

The following additional topics are covered in the classroom training: _____.

Operational training consists of:

- Pre-operational procedures.
- Basic maintenance for machinery and equipment.
- Operational review of each piece of machinery, tool, or equipment the employee is expected to operate.

The following additional information is covered in the operational training: _____.

_____ is responsible for training a designated Operations Trainer in each department/area. The following employees have been trained and are designated as Operations Trainers:

Employee	Department

Department management is responsible for scheduling employees with the Department Operations Trainer to complete the operational training program following completion of the classroom training or re-training segment.

New equipment start-up inspection procedures

The procedures in this section are required during and after the:

- Installation of new equipment,
- Rearrangement of existing equipment into a new layout, and
- Relocation of existing equipment.

While work is in progress on installation of new equipment, the following departments, in charge of specific expertise, must be involved from the beginning to the end of the installation process: _____ _____.

Corrections that need implementation during the installation should be done as needed.

Before operation of the equipment in the workplace, all specialty departments must signify that the equipment meets all expectations in their area of concern.

_____ is accountable for all phases of installation and for making sure equipment is safe and efficient to run before letting employees operate it.

After _____ has verified completion, the equipment can be put into service.

Inspections

Machinery, tools, and equipment will be inspected regularly to insure safety and serviceability. _____ has overall responsibility for the inspection of all machinery, equipment, cords and accessories according to the following schedule: _____.

Recordkeeping

_____ is responsible for maintaining records of inspections of machinery, tools, and equipment. These records are kept _____.

_____ maintains records in employee safety files of individuals trained and certified for specific machinery and equipment.

Disciplinary procedures

Constant awareness of and respect for machine, tool, and equipment safety procedures and compliance with all safety rules are considered conditions of employment. Supervisors and individuals in the Safety and Human Resources Departments reserve the right to issue disciplinary warnings to employees, up to and including termination, for failure to follow the guidelines of this machine, tool, and equipment safety program.

Program evaluation

Although we may not be able to resolve all problems, we address as many as possible to improve employee protection and encourage employee safe practices. _____ is responsible for evaluating and updating this written plan as necessary. The evaluation will include a review of reported accidents, as well as near misses, to identify areas where additional safety measures need to be taken.

Periodic reviews will also be conducted to determine the effectiveness of the program. This review may include:

- A walk-through of the facility,
- Interviews with employees to determine whether they are familiar with the requirements of this program and if safety measures are being practiced, and
- _____.

Appendices

We have attached the following appendices to ensure better understanding of this written plan: _____ _____.

OSHA COMPLIANCE MANUAL

PERMIT-REQUIRED CONFINED SPACES

OSHA COMPLIANCE MANUAL

Reserved

Permit-required confined spaces

Introduction

OSHA's Permit-Required Confined Space standard at §1910.146 is intended to protect workers who must enter confined spaces from toxic, explosive, or asphyxiating atmospheres and from possible engulfment from small particles, such as grain or sawdust. It focuses on areas with immediate health or safety risk, classifying these as "permit-required" confined spaces. Under the standard, employers must identify all permit-required spaces in their workplaces, prevent unauthorized entry into them, and protect authorized workers from hazards through a permit space program. Confined spaces that do not meet the definition of a permit space are not covered by the standard.

Confined spaces may be encountered in virtually any occupation; therefore, their recognition is the first step in preventing fatalities. The standard covers all of general industry, including agricultural services, manufacturing, chemical plants, refineries, transportation, utilities, wholesale and retail trade, and miscellaneous services. Types of permit spaces that it applies to include boilers (found virtually throughout general industry), storage vessels, furnaces, railroad tank cars, manholes, and cooking and process vessels.

This section provides an overview of the permit space standard's requirements, discusses confined space hazards, and contains a sample permit, decision flow chart, and a respirator selection guide.

Permit-required confined spaces

The standard covers general industry workers, including over 1.6 million who enter confined spaces each year and an additional 10.6 million employed at the 240,000 covered worksites. When the standard was implemented, OSHA expected it to prevent about 85 percent of the deaths and injuries caused by confined space entry and rescue — an estimated 54 deaths and 10,000 injuries each year. It does not apply to agriculture, construction, or shipyard employment.

What is a confined space?

A confined space is defined as an area which:

1. Has adequate size and configuration for an employee to enter and perform work;
2. Has limited or restricted means to enter and exit; and
3. Is not designed for continuous employee occupancy.

What is a permit-required confined space?

A permit-required confined space is defined as a confined space having one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere;
2. Contains material that has the potential for engulfing an entrant;
3. Has an internal configuration that could trap or asphyxiate an entrant by inwardly converging walls or sloping floor; or
4. Contains any othe recognized serious safety or health hazard.

Evaluation

Employers have to perform an evaluation of the workplace to determine if there are any spaces that are permit spaces. If there are permit spaces, steps need to be taken to prevent unauthorized entries. Employees must be notified of the permit spaces through danger signs, blocking off the area, or other equally effective means.

Permit-required confined space program

Where permit spaces exist, the employer must develop a written program to:

- Prevent unauthorized entry,
- Identify and evaluate confined space hazards, and
- Establish procedures and practices for safe entry, including testing and monitoring.

Under the program, the employer has to provide specified equipment to employees involved in confined space entry; have an attendant stationed outside permit spaces during entry; establish procedures to summon rescuers and prevent unauthorized personnel from attempting rescue; and develop a system for preparing, issuing, using, and canceling entry permits.

In addition, procedures need to be in place for coordinated entry when employees of more than one employer are involved. The permit space program must be reviewed at least annually.

Permit system

Before entry, a permit system has to be developed to ensure that the space is safe to enter and entrants, attendants, and the supervisor are prepared. A designated and trained entry supervisor must authorize the entry, prepare and sign written permits, order corrective measures if necessary, and cancel permits when work is completed. Permits must be available to all permit space entrants at the time of entry and should extend only for the duration of the task. Cancelled permits have to be retained for a year to use in a review of the confined space program.

Entry permit

An entry permit documents the essential elements of an entry and must include:

1. Identification of the space;
2. Purpose of the entry;
3. Date and duration of the permit;
4. Names of authorized entrants;
5. Names of attendants and the entry supervisor;
6. List of hazards in the space;
7. List of measures to isolate the space and eliminate or control the hazards;
8. Acceptable entry conditions;
9. Results of tests initialed by the person(s) performing the tests;

10. Rescue and emergency services available and the means to summon them;
11. Communication procedures for attendants and entrants;
12. Equipment used for the entry (respirators, communication, alarms, etc.);
13. Any other necessary information; and
14. Additional permits (such as for hot work).

Training

All employees who work in permit spaces have to be trained to understand the hazards of confined spaces and obtain the skills necessary to safely perform their assigned duties. Training must be done:

- Before the employee is first assigned duties;
- Before there is a change in assigned duties;
- Whenever there is a change in operations that present a new hazard; and
- Whenever there are deviations from the entry procedures or inadequacies in an employee's knowledge are noted.

The employer must certify that the training has been completed. Required training documentation includes each employee's name, the signatures or initials of the trainers, and the dates of training.

Entrant duties

Authorized permit-required confined space entrants are required to be knowledgeable about the space and their job tasks inside the space to successfully perform their duties which include:

- Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- Properly use equipment;
- Communicate with the attendant;
- Alert the attendant whenever:
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
  - The entrant detects a prohibited condition; and
- Exit from the permit space as quickly as possible whenever:
  - An order to evacuate is given by the attendant or the entry supervisor,
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,
  - The entrant detects a prohibited condition, or
  - An evacuation alarm is activated.

Attendant duties

Authorized permit-required confined space attendants are required to be knowledgeable about the space to successfully perform their duties which include:

- Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- Being aware of possible behavioral effects of hazard exposure in entrants;

- Continuously maintain an accurate count of entrants and ensure that the entrants are accurately identified;
- Remaining outside the space during entry operations until relieved by another attendant;

  NOTE: If the entry program allows it, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations and if they have been relieved by another attendant.
- Communicating with entrants to monitor their status and to alert them to evacuate the space, if necessary;
- Monitoring activities inside and outside the space to determine if it is safe for entrants to remain in the space;
- Ordering entrants to evacuate the space immediately under any of the following conditions:
  - Detecting a prohibited condition,
  - Noticing the behavioral effects of hazard exposure in an entrant,
  - Detecting a situation outside the space that could endanger the entrants, or
  - Determining that an attendant cannot effectively and safely perform all the required duties;
- Summoning rescue and other emergency services as soon as it is determined that entrants may need escape assistance;
- Warning unauthorized personnel to stay away from the permit space, or if they have already entered the space, tell them to exit it;
- Warning entrants and the entry supervisor if unauthorized persons have entered the space;
- Performing non-entry rescues, if specified by the employer's rescue procedure; and
- Performing no duties that might interfere with the attendant's primary duty to monitor and protect entrants.

Entry supervisor duties

Permit-required confined space entry supervisors are required to be knowledgeable about the space to successfully perform their duties which include:

- Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- Verifying, by checking the entry permit, that all tests specified by the permit have been conducted and that all procedures and equipment are in place before endorsing the permit and allowing entry to begin;
- Terminating the entry and cancelling the permit at the conclusion of work;
- Verifying that rescue services are available and that the means for summoning them are operable; and
- Removing unauthorized individuals who enter or who attempt to enter the permit space during entry operations.

Supervisors also must determine, at least when shifts and entry supervisors change, that the acceptable conditions specified in the permit continue.

Rescue services

It is up to the employer to decide whether rescue services will be provided by onsite employees or by contracting with an offsite service. OSHA expects that each employer having permit-required confined space hazards will ensure that rescue procedures are adequate, whatever means are used. Many employ-

ers rely on offsite rescue services, such as those provided by local fire departments, to handle their emergency situations. Often, however, small local fire departments are neither adequately trained nor equipped to effectively handle such an emergency. See pages 21 and 27 for guidelines in selecting a rescue service.

The decision of whether to contract with an offsite emergency rescue service or to train and equip in-house personnel rests with the employer. Response time, adequate preparedness, and competence of the emergency team are the key elements in successful rescue procedures. The time lapse between the initial contact of an offsite rescue service and implementation of its rescue may be too great to save lives, while an onsite emergency team has a greater opportunity to immediately implement rescue operations.

An onsite team which is appropriately trained and equipped may be able to perform more effective rescue services because team members are familiar with the facility and are closer to the spaces being entered. However, many small employers do not have the time, expertise, or personnel to develop an in-house rescue team and outside resources may be the only viable option for them. There are many factors for employers to consider when deciding whether to use an on-site or offsite rescue team.

Offsite rescue and emergency services

OSHA requires that prospective rescue services be evaluated for their proficiency with rescue-related tasks, adequate equipment, and ability to function appropriately while rescuing entrants from the employer's particular type of permit spaces.

Employers choosing to use an offsite service must evaluate the prospective rescue team or service to ensure that it:

- Has the capability to reach the victim(s) within an appropriate time frame;
- Is equipped for and proficient in performing the needed rescue services;
- Knows the hazards they may confront when called on to perform rescue; and
- Has access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

Onsite employee rescue and emergency services

Employers that choose to train and equip their own onsite rescue team must:

- Provide team members with the personal protective equipment needed to conduct rescues safely and train them to use the PPE appropriately;
- Train team members to perform assigned rescue duties;
- Train team members in basic first aid and cardiopulmonary resuscitation (CPR). At least one member of the rescue team or service must hold a current certification in first aid and CPR; and
- Ensure that team members practice making permit space rescues at least once every 12 months, using a space similar to the types of spaces from which rescues would be made.

Hospitals or treatment facilities have to be provided with any material safety data sheets (MSDSs) or other information in a permit space hazard exposure situation that may aid in treatment of rescued employees.

Host/Contractor relationship

OSHA addresses the host/contractor relationship for permit-required confined space entries in §1910.146(c)(8) by requiring the parties to share information and coordinate entry procedures. If an outside contractor is hired to perform work in a confined space, it is the host employer's responsibility to ensure that

the contractor uses a written confined space program. The host employer must verify that the contractor's workers are adequately trained in permit-required confined space entry and that they are informed of the hazards in the host's facility as it relates to their work.

Host employers must provide information to contractors on:

- Their permit spaces,
- The permit space program,
- Established procedures, and
- Likely hazards that the contractor's workers may encounter.

Once work has begun, the host should routinely check that the contractor is following the agreed upon procedures.

The contractor is responsible to ensure that all necessary information regarding the space, its hazards, and entry procedures are provided and that any additional hazards encountered during the work are reported to the host employer. Joint entries must be coordinated and the contractor debriefed at the conclusion of entry operations.

Coordination between the host and contractor should include a determination of which permit program is to be used by the contractor. The host employer is not prohibited from requiring a contractor to use the host's permit program, nor is the contractor required to use it. But, the host employer may choose to condition its contract on the contractor's compliance with the host's program.

The host employer and the contractor need to cooperate and make arrangements to implement a permit program best suited for a particular situation. There are a wide variety of circumstances in which contractor personnel enter permit spaces. There are circumstances in which a contractor sets up a complete permit space program at the host employer's workplace, and there are situations in which both contractor and host employer employees are working side-by-side in a permit space.

Alternate entry procedures

OSHA allows employers to use an alternate entry procedure for permit spaces where the *only hazard is atmospheric* and continuous forced air ventilation alone can control the hazard. By using the alternate procedure, employers are able to simplify confined space entries by eliminating OSHA's requirements for:

- An attendant during the entry,
- A written permit program, and
- Emergency rescue provisions.

Alternate procedures are covered in the standard at §1910.146(c)(5). The steps involved in verifying that a space qualifies for the alternate entry provision include:

1. Ensure that it is safe to remove the entrance cover;
2. Determine that ventilation alone is sufficient to maintain the permit space safe for entry and that work to be performed within the permit-required space must introduce no additional hazards;
3. Gather monitoring and inspection data to support (1) and (2);
4. If entry is necessary to conduct initial data gathering, perform such entry under the full permit program; and
5. Document the determinations and supporting data and make them available to employees.

Entry can take place after:

- It has been determined safe to remove the entrance cover;
- Any openings are guarded to protect against falling and falling objects;
- Internal atmospheric testing;
- Air remains without hazard whenever any employee is inside the space; and
- Continuous forced air ventilation has eliminated any hazardous atmosphere.

The space has to be tested periodically. Employees must exit immediately if a hazardous atmosphere is detected during entry, and the space must be evaluated to determine how the hazardous atmosphere developed. When a permit space is entered using alternate procedures, the employer must verify that the space is safe for entry and that the required pre-entry measures have been taken. The certification has to include:

- Date,
- Location of the space, and
- Signature of the person providing the certification.

This document has to be available for review by all entrants prior to entry.

Reclassification entry procedures

When a permit space poses no actual or potential atmospheric hazards and, if *all hazards within the space are eliminated without entry* into the space, the permit space may be reclassifed as a non-permit confined space for as long as the hazards are eliminated.

If the permit space has to be entered to eliminate hazards, the entry must be done following the required steps of a permit entry. When tests and the inspection during the entry show that the hazards have been eliminated, the space may be reclassifed as a non-permit space for as long as the hazards are eliminated.

All entrants must immediately leave a declassified space if any hazards arise. Following evacuation, the space has to be reevaluated as to whether it should be reclassified as a permit space again. When a permit space is reclassified, the employer must document the basis for determining that all hazards have been eliminated. The certification needs to include:

- Date,
- Location of the space, and
- Signature of the person making the reclassification determination.

This document has to be available for review by all entrants prior to entry.

Hazardous atmospheres in confined spaces

Entrants are in the most danger because of the many, often invisible, hazards associated with permit space environments. In order to properly identify the hazards of confined spaces, each space needs to be individually surveyed. By assessing the specific space, as well as the work to be performed, appropriate measures can be taken to avoid tragic incidents.

In general, the hazards of confined spaces are categorized as either atmospheric or physical. Atmospheric is usually the most lethal because dangerous atmospheres are not always detectable through the senses. Also, the atmosphere in a confined space may be extremely hazardous because of the lack of natural air movement. This characteristic of confined spaces can result in:

- Oxygen-deficient atmospheres,

- Flammable/combustible atmospheres, and/or
- Toxic atmospheres.

Oxygen-deficient atmospheres

Normal air has an oxygen content of 20.8 percent. An atmosphere is considered "oxygen-deficient" when there is less than 19.5 percent available oxygen. Any atmosphere with less than 19.5 percent oxygen should not be entered without an approved self-contained breathing apparatus (SCBA).

When the oxygen level drops below 17 percent, an entrant may experience rapid breathing and an accelerated heartbeat. As the oxygen content decreases, other physical effects become evident including poor muscle coordination, rapid fatigue, and intermittent respiration, nausea, and an inability to perform tasks. At concentrations less than six percent, there is rapid loss of consciousness, and death occurs in minutes.

Oxygen deficiency occurs from chemical or biological reactions which displace or consume oxygen from the space. Oxygen consumption takes place during:

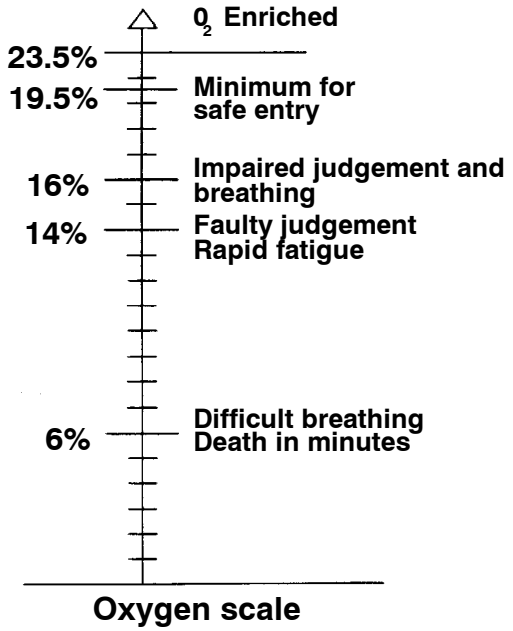
- Combustion of flammable substances as in welding, cutting, or brazing; and
- Bacterial action, such as in the fermentation process.

Oxygen deficiency can result from bacterial action in excavations and manholes which are near garbage dumps, landfills, or swampy areas. Slow chemical reactions such as in the formation of rust on the exposed surface of metal tanks, vats, and ship holds will also consume oxygen in a confined atmosphere.

Oxygen displacement

A simple asphyxiating atmosphere contains an inert gas (or gases) which does not produce any ill effects on the body. However, in sufficient quantity, an inert gas will displace oxygen and may result in an atmosphere unable to support normal breathing.

If 100 percent nitrogen — a non-toxic, colorless, odorless gas — is used to displace the oxygen in a confined space, it would cause immediate collapse and death to an entrant if the confined space is not adequately ventilated before worker entry. Other examples of simple asphyxiants which have claimed lives in confined spaces include carbon dioxide, argon, and helium.



OSHA COMPLIANCE MANUAL

Flammable/combustible atmospheres

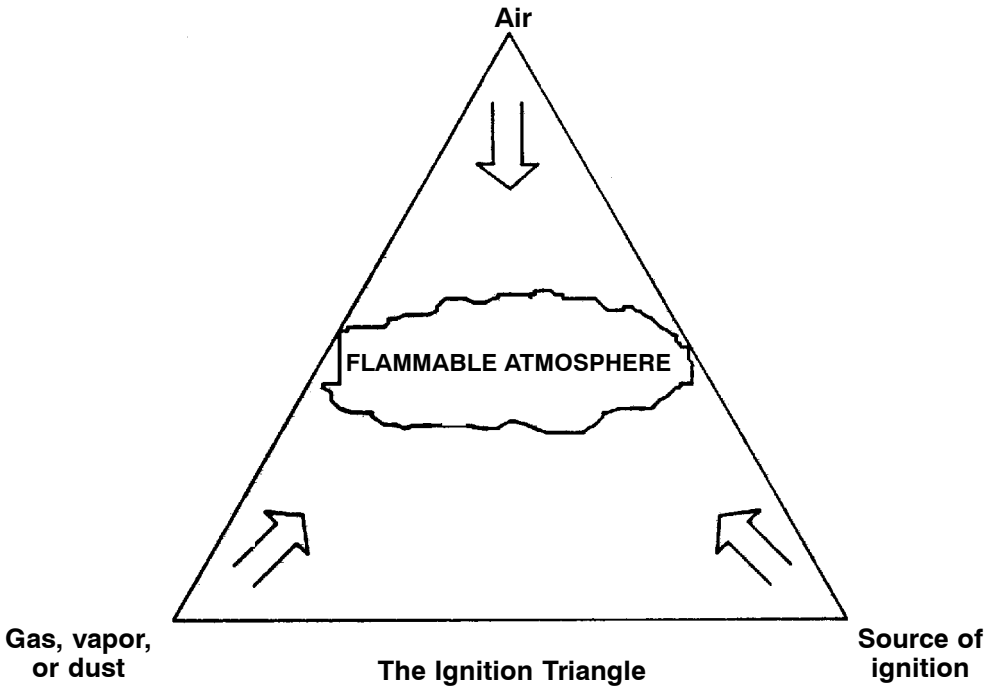
A flammable atmosphere generally results from the vaporization of flammable liquids, by-products of chemical reactions, enriched oxygen atmospheres, or concentrations of combustible dusts. For combustion to occur, three elements — oxygen, fuel, and heat — must be present in the atmosphere. In the right amounts, these elements create an unrestricted chemical reaction which produces a fire. If one of these elements is missing, or is not present in the appropriate amount, combustion will not occur.

- Fuel — a flammable gas, vapor, or dust
- Oxygen — to support combustion
- Source of ignition — a sparking, heat, pressure, shock, or impact

The proper mixture of fuel and oxygen varies from gas to gas. The flammability range for each gas is measured in terms of the lower flammability limit (LFL) and the upper flammability limit (UFL). Ten percent of flammable gas and vapor lower exposure limits is generally considered a safe level.

Example: The explosive range for methane is between five percent and 15 percent in air. Concentrations below five percent methane are below the explosive range (lean), and concentrations above 15 percent are too rich to support combustion. If a confined space contains 27 percent methane and forced ventilation is started, the introduction of air into the confined space may dilute the methane in air, taking it into the explosive range.

An oxygen-enriched atmosphere (above 23.5 percent) will cause flammable materials, such as clothing and hair, to burn violently when ignited. Never use pure oxygen to ventilate a confined space — always ventilate with normal air.



The Ignition Triangle

Toxic atmospheres

Most substances (liquids, vapors, gases, mists, solid materials, and dusts) should be considered hazardous in a confined space. Toxic gases may be present in a confined space due to the:

- *Product stored in the space*

  The manufacturing process uses toxic gases and the product may be absorbed into the walls of the space and give off toxic gases. Also, there may be biological or chemical processes occurring in the product stored in the confined space.

  Examples: Hydrogen chloride and vinyl chloride monomerin are used in producing polyvinyl chloride. The product can be absorbed into the walls and give off toxic gases when removed; or when cleaning out the residue of a stored product, toxic gases can be given off.

  Removing sludge from a tank or sump — decomposing oganic material can give off deadly hydrogen sulfide gas.

- *Work being performed in the space*

  The operation being performed in the confined space can release a toxic gas. Toxic gases may be created when acids are used for cleaning the interior of a confined space.

  Examples: Hydrochloric acid reacts chemically with iron sulfide to produce hydrogen sulfide which is heavier than air and will settle out at the bottom of a confined space. Hydrogen sulfide is extremely toxic and exposure can cause paralysis of the olfactory system (making the victim unable to smell the gas), loss of reasoning, respiratory failure, unconsciousness, and death.

  A welding, cutting, or brazing operation can cause the release of nitrogen, ozone, and carbon monoxide. Painting, scraping, sanding, degreasing can also cause the release of toxic gases.

  Cleaning solvents used in many industries for cleaning/degreasing produce vapors which are very toxic in a confined space. Solvent vapors cause unconsciousness by depressing the central nervous system. Some chlorinated hydrocarbon solvents, such as chloroform, have been used as anesthetic agents.

  In addition, certain chlorinated or fluorinated hydrocarbon solvents are toxic to the heart and have been associated with sudden death in confined spaces. Methylene chloride can be toxic in confined spaces both because of its solvent properties and also because it is metabolized in the body to carbon monoxide.

- *Areas adjacent to the space*

  Toxicants produced by work in the area of a confined space can enter and accumulate in the space. Gases that are heavier than air may migrate across a work area and accumulate in the lowest level, such as a maintenance pit.

Some toxic gases such as phosgene or carbon monoxide are particularly insidious because of their poor warning properties. Toxic gases which have been reported to cause death in workers in confined spaces include carbon monoxide, hydrogen cyanide, hydrogen sulfide, arsine, chlorine, oxides of nitrogen, and ammonia.

NIOSH classification scheme

The National Instutite for Occupational Safety and Health (NIOSH) has developed a classification scheme for atmospheric hazards in confined spaces. It is based on the oxygen content of the air, the flammable characteristics of gases or vapors, and the concentration of toxic substances that may be present in a space.

Listing a particular confined space as class A, B, or C is determined by the most hazardous condition present. The usefulness of this classification is that it provides a framework upon which recommendations for work practices and rescue procedures can be made.

NIOSH confined space classification

Characteristics		
Class A	*Class B*	*Class C*
Immediately dangerous to life	Dangerous, but not immediately life threatening	Potential hazard
Oxygen		
Class A	*Class B*	*Class C*
16% or less *(122 mm Hg) or greater than 25% (190 mm Hg)	16.1% to 19.4% *(122-147 mm Hg), or 21.5% to 25% (163-190 mm Hg)	19.5%-21.4% *(148-163 mm Hg)
Flammability characteristics		
Class A	*Class B*	*Class C*
20% or greater of lower flammable limit (LFL)	10-19% LFL	10% LFL or less
Toxicity		
Class A	*Class B*	*Class C*
IDLH**	Greater than contamination level, referenced in 29 CFR Part 1910, Subpart Z (IDLH**)	Less than contamination level referenced in 29 CFR Part 1910 Subpart Z

* Based on a total atmospheric pressure of 760 mm Hg (sea level)
** Immediately Dangerous to Life or Health

Physical hazards in confined spaces

In addition to atmospheric hazards, a confined space must also be assessed for physical hazards. These hazards include those associated with hazardous energy releases, grinding equipment, dry particles that can engulf an entrant, communication problems, noise, temperature, and size of openings into the space.

Engulfment

Engulfment in loose materials is one of the leading causes of death from physical hazards in confined spaces. Engulfment and suffocation are hazards associated with storage bins, silos, and hoppers where grain, sand, gravel, or other loose material are stored, handled, or transferred. The behavior of such material is unpredictable, and entrapment and burial can occur in a matter of seconds.

Flow path

In some cases, material being drawn from the bottom of storage bins can cause the surface to act like quicksand. When a storage bin is emptied from the bottom, the flow of material forms a funnel-shaped path over the outlet. The rate of material flow increases toward the center of the funnel. During a typical unloading operation, the flow rate can become so great that once a worker is drawn into the flow path, escape is virtually impossible.

Bridging

A condition known as “bridging” can create additional hazardous situations. Bridging occurs when grain or other loose material clings to the sides of a container or vessel that is being emptied from below, allowing a hollow space to be created. The bridge of material over the space may collapse without warning, entrapping workers who are standing below or on top of the bridge and who are unaware that the surface is unstable.

Bridging can occur in storage bins, silos, and hoppers that contain ground grains, soybean meal and other meals, or other loose materials such as cement, limestone, coal, and sawdust. The diameter of the storage vessel and the moisture content of the stored materials are factors that contribute to bridging.

Hazardous energy releases

The nature of confined space work may make it difficult to separate the worker from hazardous forms of energy such as powered machinery, electrical energy, and hydraulic or pneumatic lines. Activation of electrical or mechanical equipment can cause injury to workers in a confined space. It is essential to de-energize and lock out all electrical circuits and physically disconnect mechanical equipment prior to any work in confined spaces.

The release of material through lines which are an integral part of the confined space pose a life-threatening hazard. All lines should be physically disconnected, blanked off, or a double block and bleed system should be used.

External hazards

Falling objects can pose a hazard in confined spaces, particularly in spaces that have topside openings for entry through which tools and other objects may fall and strike a worker. Traffic hazards from forklifts and street traffic, even inattentive pedestrians, can pose a danger for entrants. Operational processes in close proximity to the space may create hazards or release toxic substances that migrate into the space.

Interior conditions

Surfaces

Interior surfaces that are uneven, wet, or slick can cause falls in confined spaces. In addition, wet surfaces can provide a grounding path and increase the hazard of electrocution in areas where electrical equipment, circuits, and tools are used. Workers in some confined spaces need to be aware that objects may fall on them, particularly in spaces with topside openings and where tasks are being done overhead.

Equipment

Grinding equipment, agitators, steam or steam fittings, mulching equipment, drive shafts, gears and other moving parts pose a danger if they are not locked or blocked out prior to entry.

Temperatures

Extremely hot or cold temperatures can make work inside a confined space hazardous. Heat stress increases fatigue and the inability to concentrate. Jobs requiring manual dexterity are more difficult in cold environments. Entrants working in spaces with great temperature variances should wear appropriate protective clothing. If a confined space has been steam cleaned, it should be allowed to cool thoroughly before any entry is made.

Noise

Noise within a confined space may be amplified because of the design and acoustic properties of the space. Excessive noise is not only harmful to a worker's hearing, but can also affect communication, such as causing a warning to go unheard. This is especially true when hearing protection is being worn.

Biological hazards

Biological hazards such as molds, mildews and spores frequently found in dark, damp spaces can irritate the respiratory system. Bacteria and viruses, found in sewage treatment, expose the entrant to a variety of illnesses. In addition, rodents, snakes, spiders and other insects, as well as bird and animal feces can present serious health hazards.

The presence of dust may pose dangers to entrants in the form of respiratory hazards. Dust also has the potential to cause combustion or an explosion and cause reduced visibility and slippery surfaces within the space. Other conditions, such as inadequate lighting and the presence of radioactive matter within the space must be evaluated before entry.

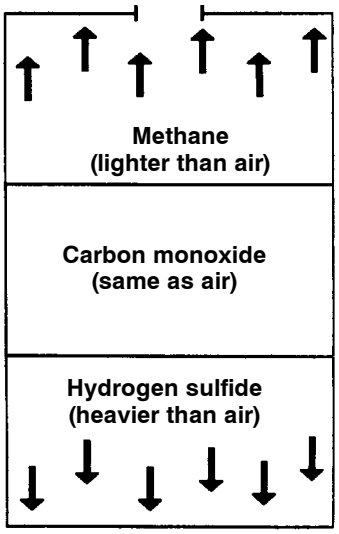
OSHA COMPLIANCE MANUAL

Testing the atmosphere

It is important to understand that some gases or vapors are heavier than air and will settle to the bottom of a confined space. Also, some gases are lighter than air and will be found around the top of the confined space. Therefore, it is necessary to test all areas — top, middle, bottom — of a confined space with properly calibrated instruments to determine what gases are present.

If testing reveals oxygen-deficiency or the presence of toxic gases or vapors, ventilate the space and retest before entry. Allow sufficient time for diffusion during the ventilation/purging process. If ventilation is not possible and entry is necessary, such as for an emergency rescue, workers must wear appropriate respiratory protection.

CAUTION: Never trust your senses to decide if the air in a confined space is safe. You cannot see or smell many toxic gases and vapors, nor can you determine the level of oxygen present.



Procedures for atmospheric testing

Atmospheric testing is required to evaluate the hazards of the permit space and to verify that acceptable entry conditions exist. The person performing the testing must know how to operate and read the test instrument. A monitor should be calibrated before every use or as required by the manufacturer to ensure that the device provides accurate measurements.

Draw air samples through a weep hole or other small entry port leading into the space. When combustible or flammable gases could be present, use a non-sparking probe. If possible, do not open the entry portal to the confined space before this step has been completed. Sudden changes in atmospheric composition within the space could cause violent reactions or dilute the contaminants, giving a false low initial gas concentration.

Be sure to allow enough time for the instruments to respond to full scale. Assess as many space conditions as possible from the outside; but if entry is necessary for some part of the assessment, respiratory protective equipment may be needed for entrants' safety. All entrants must be permitted to observe the testing and review the results before they enter the space.

For safety's sake, take at least three sets of readings:

1. Before ventilation,
2. After ventilation, and
3. The entrant's reading during the initial entry survey.

Additional or continuous monitoring may be needed. Because of the way test instruments operate, atmospheric monitoring must be performed in a specific sequence.

▶ Oxygen

Oxygen tests must always be made first because most combustible gas meters are oxygen-dependent. Too little oxygen may cause a low combustible gas reading. Too much oxygen can cause a combustible gas meter to explode if gases and vapors are present in ignitable quantities.

Oxygen concentrations are generally measured over a range of 0 to 25 percent oxygen in air, with readings being displayed on either an electronic readout or an analog meter. Oxygen indicators are calibrated with uncontaminated fresh air containing a minimum of 20.8 percent oxygen. With some models, an alarm is activated when oxygen levels drop below 19.5 percent and above 23.5 percent.

▶ Flammable and combustible gases

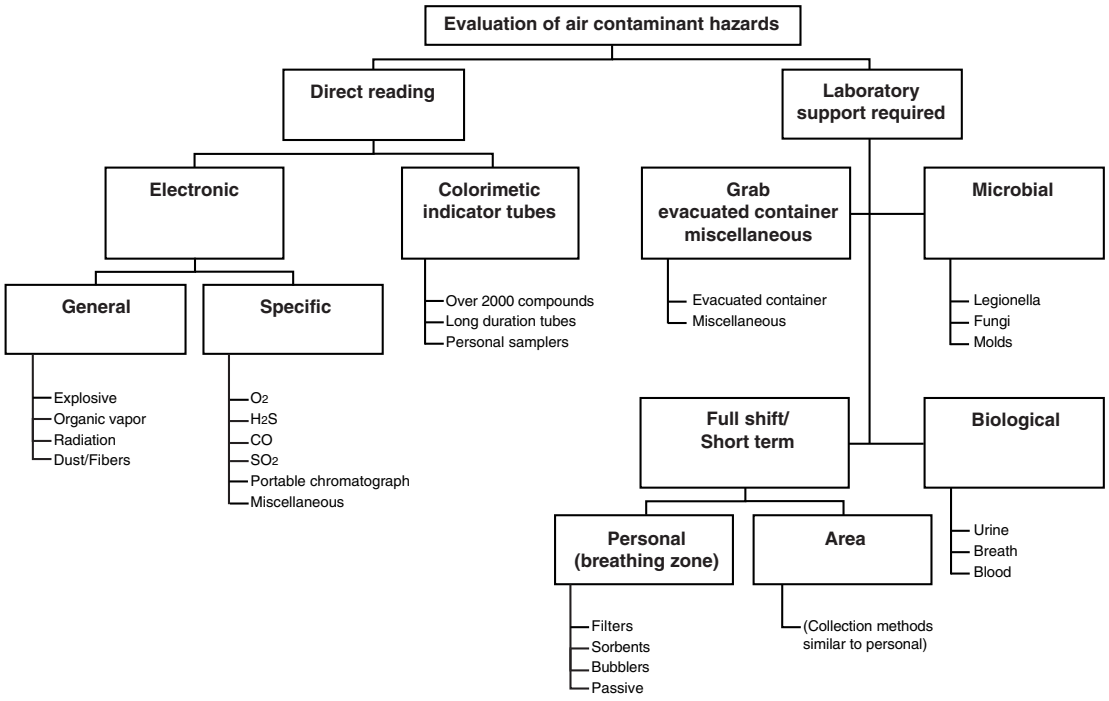
Flammable and combustible gases are measured next because the risk posed by fire or explosion is more immediate and life-threatening than exposure to toxic gases and vapors.

▶ Toxic gases and vapors

Toxic gases and vapors, which are commonly found in confined spaces, are measured last. A toxic sensor requires that the specific toxic substance be identified in advance. Each substance has a specific level to ensure entrant safety and the sensors are specific to these levels. Substance specific detectors should be used whenever actual contaminants have been identified.

Evaluation

The results of the atmospheric testing will have a direct impact on the selection of protective equipment necessary for the tasks in the confined space. It may also dictate the duration of worker exposure to the environment of the space, or whether an entry will be made at all. Evaluation and interpretation of this data and development of the entry procedure should be implemented, based on the evaluation of all serious hazards.



Verification

The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all identified contaminants using permit-specified equipment. This will determine if residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration) should be recorded on the confined space permit in the area provided adjacent to the acceptable entry condition.

Duration

The measurement of values for each atmospheric substance should be made for at least the minimum response time of the test instrument specified by the manufacturer.

Stratified atmospheres

When monitoring for entries involving a descent into atmospheres that may be stratified, the space should be tested a distance of approximately four feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

Inerting and purging

Introducing a non-reactive gas is called inerting. Displacing an existing atmosphere with a non-reactive gas (such as nitrogen) results in an atmosphere that is noncombustible. The hazards of fire, explosion, or chemical reaction is often best addressed by inerting. Although an existing hazard is removed through this procedure, another hazardous atmosphere is created due to lack of oxygen in the space. Any personnel entering the space after inerting has occurred must wear some form of air-supplied respiratory equipment.

Purging is the process of initially clearing a confined space of atmospheric contaminants before ventilation. The purpose is to do a complete air exchange in a confined space prior to entry. Normally, a purge is considered complete when atmospheric tests indicate the air is of suitable quality to sustain life.

Ventilation

Ventilation is the process of continuously moving fresh, uncontaminated air through a confined space. Ventilation dilutes and displaces air contaminants, assures than an adequate supply of oxygen is maintained during entry, and exhausts contaminants formed by processes such as welding, oxy-fuel gas cutting, or abrasive blasting. Oxygen levels must be maintained within a range of 19.5 to 23.5 percent.

Ventilation by a blower or fan may be necessary to remove harmful gases and vapors from a confined space. There are several ventilating methods and equipment to choose, depending on the size of the confined space openings, gases to be exhausted, and source of makeup air.

Equipment selection considerations include the:

- Physical structure of the space,
- Space's previous contents,
- Existence of natural drafts,
- Number and location of any openings, and
- Nature of any contaminant-producing tasks that may be performed in the space.

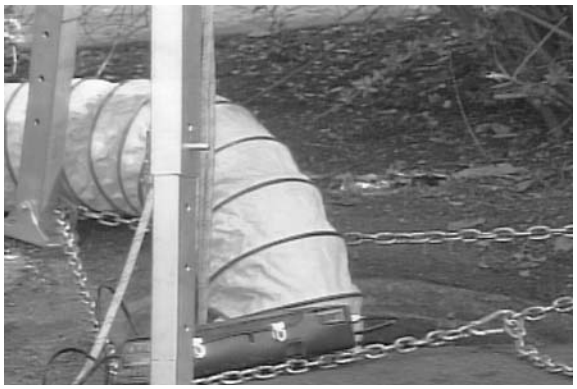
Because ventilating may create the potential for static electricity, always follow appropriate bonding and grounding procedures.

Under certain conditions where flammable gases or vapors have displaced the oxygen level, but are too rich to burn, forced air ventilation may dilute them until they are within the explosive range. Typically, an opening

is made in the top or side of the space and clean air s blown into it. Dilution works best with low toxicity and concentration levels and when the contaminants are well distributed.

Ventilation should be continuous where possible, because in many confined spaces, the hazardous atmosphere will form again when the flow of air is stopped. Be sure that the source of air intake is not placed where it can draw carbon monoxide (as from an idling vehicle parked close by) or other contaminants into the space.

A common method of ventilation requires a large hose, one end attached to a fan and the other lowered into a manhole or opening. For example, a manhole would have the ventilating hose run to the bottom to blow out all harmful gases and vapors. The air intake should be placed in an area that will draw in fresh air only.



Isolation

Isolating a confined space is a process that removes the space from service by:

- *Locking out* electrical sources, preferrably at disconnect switches remote from the equipment.
- *Blanking and bleeding off* pneumatic and hydraulic lines.
- *Disconnecting* belt and chain drives and mechanical linkages on shaft-driven equipment where possible.
- *Securing* mechanical moving parts within confined spaces with latches, chains, chocks, blocks, or other devices.

Respiratory protection

Respirators allow confined space entrants to breathe safely without inhaling toxic gases, fumes, or particles. Supplied air respirators provide fresh breathing air in oxygen-deficient atmospheres. The two basic types of respirators are:

- Air-purifying, which filter dangerous substances from the air; and
- Air-supplying, which deliver a supply of safe breathing air.

Selecting the proper respirator for the job, the hazard, and the person is very important, as is thorough training in the use and limitations of respirators. For more information on respirators, see the PERSONAL PROTECTIVE EQUIPMENT chapter.

NOTE: Only air-supplying respirators should be used in confined spaces that have oxygen-deficient atmpspheres.

Communication

Effective communication among entrants, attendants, and supervisors is essential and must occur continuously to be effective. It is critical to have the correct communications equipment for the space being entered. Workers inside have to be able to communicate among themselves, as well as with the attendant outside of the work space. In the event of an emergency, communications equipment allows help to be summoned quickly.

Effective communication can take many different forms.

- Voice communication is highly effective when distance and noise levels permit. If the distance is too far or the noise level too loud, other methods must be used to maintain contact.
- Hand signals can be used effectively if the entrant and the attendant are able to maintain visual contact.
- Hard wire communication and hand radios can also be highly effective.
- Because of normal movement, rope pull signals are not recommended. Ropes can also be ineffective if the entrant becomes incapacitated and is not able to signal in the case of an accident.

All workers involved in a confined space entry should be knowledgeable about the communication equipment and trained in its use. Testing needs to be done routinely prior to space entry as well as immediately after entry. All communication equipment must be intrinsically safe, especially in flammable atmospheres.

Entrant retrieval

If an incident occurs during a confined space entry and an entrant is not able to escape, retrieval from outside the space must be done. In this case, the attendant should call for help before operating any retrieval device.

If external retrieval will be used in an emergency situation, the entrant must wear a full body harness. Wristlets are acceptable under very specific situations, but should be used as a last result. The best and safest option is to use a combination of both wristlets and full harness. Because wristlets allow for retrieval by hands-first, it is an effective method to use when the space opening is narrow.

Retrieval devices

There are two main types of mechanical retrieval devices. One is a mounted tripod or davit arm that uses a cable mechanism to lift an entrant. This system requires low maintenance and is relatively easy for an attendant to use. The cable system is appropriate if flexibility is not required. The other retrieval device

allows for flexibility, using a rope instead of cable. Disadvantages of the rope system include the increased maintenance and a higher level of difficulty to operate.

Lifelines and other devices

Lifelines with self-retracting features are appropriate if retrieval can be accomplished using a ladder or other similar devices. These lines help protect an entrant from falling. However, not all types of lifelines are appropriate for confined space entry because some have no capabilities for retrieval.

If an entrant needs to be lowered into a space, a cable winch may be used. Manufacturers provide accessories such as tripods to complete this entry and retrieval system. A portable davit arm is also an excellent piece of equipment to use for retrieval; however, if the space is entered frequently, a fixed davit arm is more effective.

Other devices are available for specific confined space configurations. Horizontal entries often use column extraction systems. Forklift davit arms can be very useful in locations that are difficult to reach and field operations may require a vehicle hitch mount davit arm.

Return space to service

The final element in a confined space program is a procedure to follow at the termination of the entry. Once the entry is complete:

- Account for all equipment and supplies taken into the space;
- Verify that all entrants have left the space;
- Secure all openings;
- Replace any gasket or seal that is damaged or defective;
- Use the entry permit to identify all isolation equipment; and
- Remove lockout equipment and instruments after the piping is reconnected.

Operating personnel should not be released to the space until it is returned to normal operating condition. Problems during start-up could occur if these steps are not accomplished properly.

Tools and equipment

Any items that were damaged during entry must be removed from service and discarded. All other equipment should be inspected and cleaned before the next entry. This equipment needs to be stored in its apropriate place where employees have access to it.

Some supplies which may be used during the entry will be consumed in the process, such as:

- Batteries,
- Respirator cartridges, and
- Disposable coveralls.

These supplies need to be replaced prior to future entries.

Entry permit

Finally, at the conclusion of the work, the entry permit, must be terminated by the entry supervisor. The permit should include the recording of any problems or situations that may have been encountered during entry. Cancelled entry permits must be kept for at least one year and used to evaluate the effectiveness of the permit space program.

Criteria for evaluating a rescue service

The following information, from Appendix F in OSHA's Permit-Required Confined Space standard, provides guidance in choosing an appropriate rescue service. It contains criteria that may be used to evaluate the capabilities of prospective, as well as current, rescue teams.

Before a rescue team can be trained or chosen, however, a satisfactory permit program, including an analysis of all permit-required confined spaces to identify all potential hazards in those spaces, must be completed. OSHA believes that compliance with all the provisions of §1910.146 will enable employers to conduct permit space operations without recourse to rescue services in nearly all cases.

Experience indicates that circumstances will arise where entrants will need to be rescued from permit spaces. It is therefore important for employers to select rescue services or teams, either onsite or offsite, that are equipped and capable of minimizing harm to both entrants and rescuers if the need arises.

Evaluations

For all rescue teams or services, the evaluation should consist of two components:

- *Initial evaluation*: Employer decides whether a potential rescue service or team is adequately trained and equipped to perform permit space rescues of the kind needed at the facility and whether such rescuers can respond in a timely manner; and
- *Performance evaluation*: Employer measures the performance of the team or service during an actual or practice rescue.

  Example: Based on the initial evaluation, an employer may determine that maintaining an onsite rescue team will be more expensive than obtaining the services of an offsite team, without being significantly more effective, and decide to hire a rescue service. During a performance evaluation, the employer could decide, after observing the rescue service perform a practice rescue, that the service's training or preparedness was not adequate to effect a timely or effective rescue at his or her facility and decide to select another rescue service, or to form an internal rescue team.

Initial evaluation

The employer should meet with the prospective rescue service to facilitate the evaluations required by §1910.146(k)(1)(i and ii). At a minimum, if an offsite rescue service is being considered, you must contact the service to plan and coordinate the evaluations required by the standard. Merely posting the service's number or planning to rely on the 911 emergency phone number to obtain these services at the time of a permit space emergency *would not comply* with paragraph (k)(1) of the standard.

Questions to ask

The capabilities required of a rescue service vary with the type of permit spaces from which rescue may be necessary and the hazards likely to be encountered in those spaces. Answering the following questions will assist you in determining whether the rescue service is capable of performing rescues in the permit spaces present at your workplace.

1. What are your needs with regard to response time (time for the rescue service to receive notification, arrive at the scene, and set up and be ready for entry)?

   Example: If entry is to be made into an IDLH atmosphere, or into a space that can quickly develop an IDLH atmosphere (if ventilation fails or for other reasons), the rescue team or service would need to be standing by at the permit space.

   On the other hand, if the danger to entrants is restricted to mechanical hazards that would cause injuries (e.g., broken bones, abrasions) a response time of 10 or 15 minutes might be adequate.

2. How quickly can the rescue team or service get from its location to the permit spaces from which rescue may be necessary?

   Relevant factors to consider would include:

   - Location of the rescue team or service relative to your workplace,
   - Quality of roads and highways to be traveled,
   - Potential bottlenecks or traffic congestion that might be encountered in transit,
   - Reliability of the rescuer's vehicles, and
   - Training and skill of its drivers.

3. What is the availability of the rescue service?
   - Is it unavailable at certain times of the day or in certain situations?
   - What is the likelihood that key personnel of the rescue service might be unavailable at times?
   - If the rescue service becomes unavailable while an entry is underway, does it have the capability of notifying you so that you can instruct the attendant to abort the entry immediately?
4. Does the rescue service meet all the requirements of paragraph (k)(2) of the standard?
   - If not, has it developed a plan that will enable it to meet those requirements in the future?
   - If so, how soon can the plan be implemented?
5. For offsite services, is the service willing to perform rescues at your workplace? (An employer may not rely on a rescuer who declines, for whatever reason, to provide rescue services.)
6. Is an adequate method for communications between the attendant, employer, and prospective rescuer available so that a rescue request can be transmitted to the rescuer without delay?
7. How soon after notification can a prospective rescuer dispatch a rescue team to the entry site?
8. For rescues into spaces that may pose significant atmospheric hazards and from which rescue entry, patient packaging and retrieval cannot be safely accomplished in a relatively short time (15-20 minutes), employers should consider using airline respirators (with escape bottles) for the rescuers and to supply rescue air to the patient.

   If the employer decides to use SCBA, does the prospective rescue service have an ample supply of replacement cylinders and procedures for rescuers to enter and exit (or be retrieved) well within the SCBA's air supply limits?
9. If the space has a vertical entry over five feet in depth, can the prospective rescue service properly perform entry rescues?
10. Does the service have the technical knowledge and equipment to perform rope work or elevated rescue, if needed?
11. Does the rescue service have the necessary skills in medical evaluation, patient packaging, and emergency response?
12. Does the rescue service have the necessary equipment to perform rescues, or must the equipment be provided by the employer or another source?

Performance evaluation

Rescue services are required to practice rescues at least once every 12 months, provided that the team or service has not successfully performed a permit space rescue within that time. As part of each practice

session, the service should perform a critique of the practice rescue, or have another qualified party perform the critique, so that deficiencies in procedures, equipment, training, or number of personnel can be identified and corrected.

Questions to ask

You should receive the results of the critique, and the corrections made to respond to the deficiencies identified, so that you can determine whether the rescue service can quickly be upgraded to meet the rescue needs or whether another service must be selected. The following questions will assist both employers and rescue teams or services in evaluating their performance.

1. Have all members of the service been trained as permit space entrants, at a minimum, including training in the potential hazards of all permit spaces, or of representative permit spaces, from which rescue may be needed?
2. Can team members recognize the signs, symptoms, and consequences of exposure to any hazardous atmospheres that may be present in those permit spaces?
3. Is every team member provided with, and properly trained in, the use and need for PPE, such as SCBA or fall arrest equipment, which may be required to perform permit space rescues in the facility?
4. Is every team member properly trained to perform his or her functions and make rescues, and to use any rescue equipment, such as ropes and backboards, that may be needed in a rescue attempt?
5. Are team members trained in the first aid and medical skills needed to treat victims overcome or injured by the types of hazards that may be encountered in the permit spaces at the facility?
6. Do all team members perform their functions safely and efficiently?
7. Do rescue service personnel focus on their own safety before considering the safety of the victim?
8. If necessary, can the rescue service properly test the atmosphere to determine if it is IDLH?
9. Can the rescue personnel identify information pertinent to the rescue from entry permits, hot work permits, and MSDSs?
10. Has the rescue service been informed of any hazards to personnel that may arise from outside the space, such as those that may be caused by future work near the space?
11. If necessary, can the rescue service properly package and retrieve victims from a permit space that has a limited size opening (less than 24 inches (60.9 cm) in diameter), limited internal space, or internal obstacles or hazards?
12. If necessary, can the rescue service safely perform an elevated (high angle) rescue?
13. Does the rescue service have a plan for each of the kinds of permit space rescue operations at the facility?
14. Is the plan adequate for all types of rescue operations that may be needed at the facility? Teams may practice in representative spaces, or in spaces that are "worst-case" or most restrictive with respect to internal configuration, elevation, and portal size. The following characteristics of a practice space should be considered when deciding whether a space is truly representative of an actual permit space:

(1) Internal configuration

Open: There are no obstacles, barriers, or obstructions within the space. One example is a water tank.

Obstructed: The permit space contains some type of obstruction that a rescuer would need to maneuver around. An example would be a baffle or mixing blade. Large equipment, such as a

ladder or scaffold, brought into a space for work purposes would be considered an obstruction if the positioning or size of the equipment would make rescue more difficult.

(2) Elevation

Elevated: A permit space where the entrance portal or opening is above grade by four feet or more. This type of space usually requires knowledge of high angle rescue procedures because of the difficulty in packaging and transporting a patient to the ground from the portal.

Non-elevated: A permit space with the entrance portal located less than four feet above grade. This type of space will allow the rescue team to transport an injured employee normally.

(3) Portal size

Restricted: A portal of 24 inches or less in the least dimension. Portals of this size are too small to allow a rescuer to simply enter the space while using SCBA. The portal size is also too small to allow normal spinal immobilization of an injured employee.

Unrestricted: A portal of greater than 24 inches in the least dimension. These portals allow relatively free movement into and out of the permit space.

(4) Space access

Horizontal: The portal is located on the side of the permit space. Use of retrieval lines could be difficult.

Vertical: The portal is located on the top of the permit space, so that rescuers must climb down, or the bottom of the permit space, so that rescuers must climb up to enter the space. Vertical portals may require knowledge of rope techniques, or special patient packaging to safely retrieve a downed entrant.

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Permit-required confined space entry checklist

Use the following sample checklist to evaluate your confined space. Each type of confined space is unique and, to be thorough, you may need to customize it to include all elements of your space.

YES	NO	
		Permit-required confined spaces
☐	☐	Have all confined spaces and permit-required confined spaces been identified?
☐	☐	Is entry necessary?
☐	☐	Is the permit-required confined space sufficiently isolated?
☐	☐	Are danger signs posted (or other equally effective means of communication) to inform employees about the existence, location, and dangers of permit-required confined spaces?
☐	☐	Have pedestrian, vehicle or other necessary barriers been provided to protect entrants from external hazards?
☐	☐	Is the written permit-required confined space entry program available to employees?
		Atmospheric hazards
☐	☐	Are confined spaces thoroughly emptied of any corrosive or hazardous substances, such as acids or caustics, before entry?
☐	☐	Is each confined space checked for decaying vegetation or animal matter which may produce methane?
☐	☐	Is the confined space checked for possible industrial waste which could contain toxic properties?
☐	☐	Has the space been flushed, ventilated, purged, and rendered inert to eliminate or control atmospheric hazards prior to entry?
		Atmospheric monitoring
☐	☐	Are the instruments used in atmospheric testing properly calibrated?
☐	☐	Are authorized entrants or their representatives provided an opportunity to observe any monitoring or testing of permit spaces?
☐	☐	When testing for atmospheric hazards, has oxygen been tested for first, then flammable gases and vapors, and then toxic gases and vapors?
☐	☐	Was the oxygen level at least 19.5 percent and not more than 23.5 percent?
☐	☐	Are toxic, flammable, or oxygen-displacing gases/vapors present?

- Hydrogen sulfide
- Carbon monoxide
- Methane
- Carbon dioxide
- Nitrogen
- Other (list) _____

_____

_____

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YES	NO	
☐	☐	Is the permit space being tested or monitored to determine if acceptable entry conditions are being maintained during entry operations?
		Ventilation
☐	☐	Is ventilating equipment available to obtain and maintain acceptable entry conditions?
☐	☐	If the confined space is below the ground and near areas where motor vehicles will be operating, is vehicle exhaust or carbon monoxide prevented from entering the space?
☐	☐	Is approved respiratory equipment required if the atmosphere inside the confined space cannot be made acceptable?
☐	☐	If the space was steam-cleaned prior to entry, has enough cooling time been allowed?
		Isolation
☐	☐	Has the space been isolated and blocked from other systems?
☐	☐	Has electrical or any other hazardous energy sources been locked/blocked?
☐	☐	Have disconnects been used wherever possible?
☐	☐	Have lines under pressure been blanked and bled?
☐	☐	Has mechanical equipment been blocked, chocked, and disengaged where necessary?
☐	☐	Are all impellers, agitators, or other moving equipment inside the space locked out?
		Permits
☐	☐	Before permit space entry operations begin, has the entry supervisor issued and signed the entry permit to authorize entry?
☐	☐	Does the permit include a list of emergency telephone numbers?
☐	☐	Has the permit been made available at the time of entry to all authorized entrants by posting at the entry portal, or by other equally effective methods?
		Hot work
☐	☐	Before gas welding or burning is started, are hoses checked for leaks, compressed gas bottles forbidden inside of the confined space, torches lighted only outside of the confined area and the confined area tested for an explosive atmosphere?
☐	☐	If employees will be using oxygen-consuming equipment such as salamanders, torches, or furnaces in the space, is sufficient air provided to assure combustion without reducing the oxygen concentration below 19.5 percent by volume?
☐	☐	Whenever combustion-type equipment is used in a confined space, are provisions made to ensure the exhaust gases are vented outside of the enclosure?
		Attendant/Entrant
☐	☐	Are those having active roles in entry operations appropriately designated and trained (for example, authorized entrants, attendants, entry supervisors, and persons who test or monitor the atmosphere in a confined space)?
☐	☐	Is at least one attendant stationed outside the confined space for the duration of the entry operation?
☐	☐	Is communications equipment provided to allow the attendant to communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the permit space?

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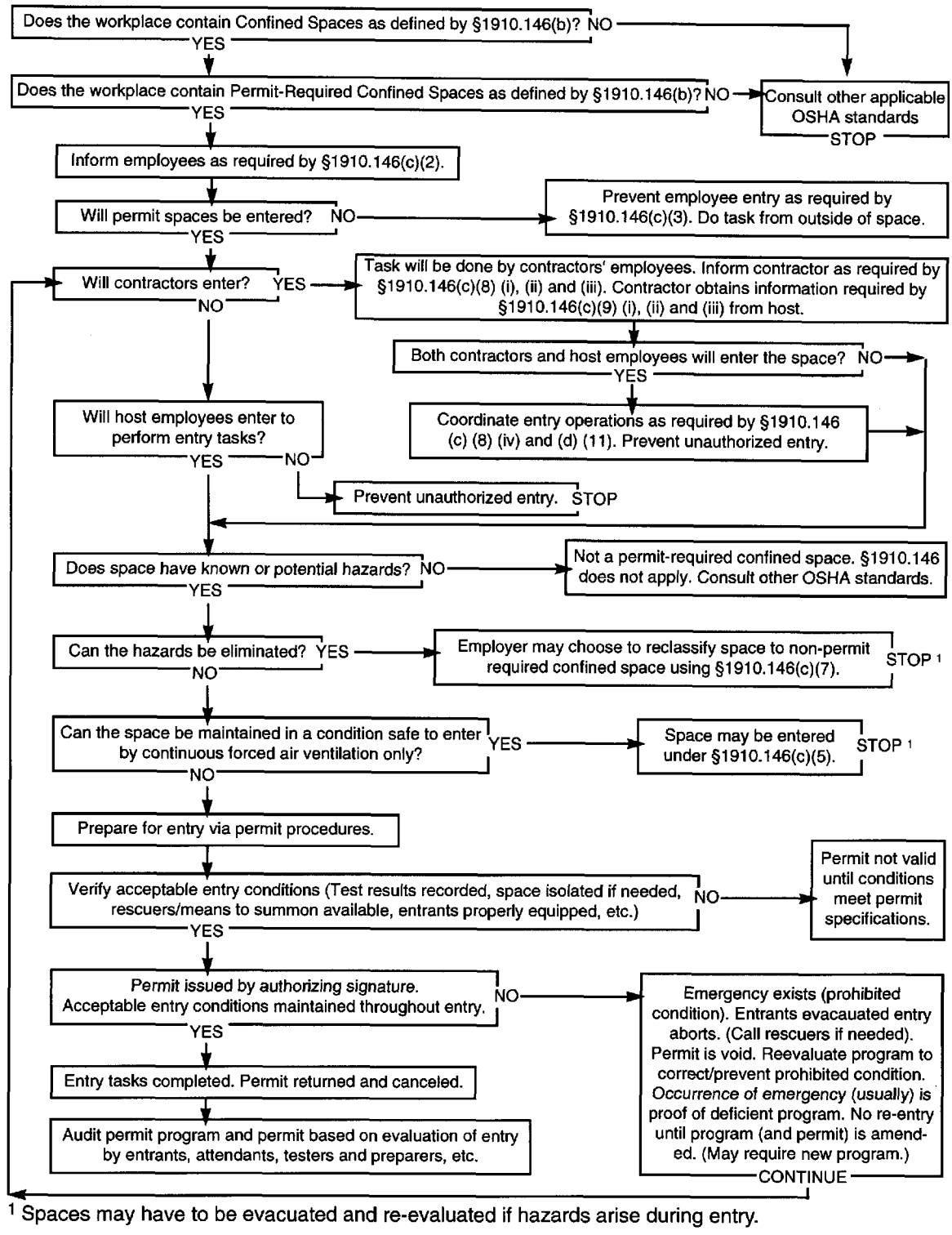
YES	NO	
☐	☐	Is the attendant or other employees prohibited from entering the confined space without lifelines and respiratory equipment if there is any question as to the cause of an emergency?
☐	☐	Are attendants and entrants familiar with emergency rescue procedures?
☐	☐	Is there at least one attendant whose sole responsibility is to watch the work in progress, sound an alarm if necessary, and render assistance?
		Equipment
☐	☐	Are pieces of equipment, such as ladders and retrieval systems needed for safe entry and exit, in good condition?
☐	☐	Has necessary lighting equipment been provided?
☐	☐	Is communication equipment in good working condition?
☐	☐	Is all portable electrical equipment used inside confined spaces either grounded and insulated, or equipped with ground fault protection?
☐	☐	Is adequate personal protective equipment available?
☐	☐	If respiratory protection is necessary, are NIOSH-approved respirators of the type required by space conditions available?
☐	☐	Is rescue and emergency equipment readily available?
		Rescue and emergency services
☐	☐	Has the rescue team/service been evaluated according to the requirements in the confined space standard?
☐	☐	If employees are designated to provide permit space rescue, have they received adequate training?
☐	☐	Does the employee rescue team have appropriate equipment to carry out a successful rescue?
☐	☐	If an outside rescue service is used, have members practiced rescue procedures in your spaces?
☐	☐	Does the outside service have adequate equipment to carry out a successful rescue?

OSHA COMPLIANCE MANUAL

Permit-required confined space decision flow chart



[1] Spaces may have to be evacuated and re-evaluated if hazards arise during entry.

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Sample 1: Confined space entry permit

Date and Time Issued: _____ Date and Time Expires: _____
Job site/Space I.D.: _____ Job Supervisor _____
Equipment to be worked on: _____ Work to be performed: _____
Stand-by personnel _____ _____ _____

1. Atmospheric Checks: Time _____
   Oxygen _____ %
   Explosive _____ % L.F.L.
   Toxic _____ PPM
2. Tester's signature _____
3. Source Isolation (No Entry):

	N/A	Yes	No
Pumps or lines blinded,	( )	( )	( )
disconnected, or blocked	( )	( )	( )

4. Ventilation Modification:

	N/A	Yes	No
Mechanical	( )	( )	( )
Natural Ventilation only	( )	( )	( )

5. Atmospheric check after isolation and ventilation:
   Oxygen _____ % > 19.5 %
   Explosive _____ % L.F.L. < 10 %
   Toxic _____ PPM < 10 PPM H_2S
   Time _____
   Tester's signature _____
6. Communication procedures: _____
   _____
7. Rescue procedures: _____
   _____
   _____
   _____
   _____
   _____
8. Entry, standby, and back up persons:

	Yes	No
Successfuly completed required training?		
Is it current?	( )	( )

9. Equipment:

	N/A	Yes	No
Direct reading gas monitor - tested?	( )	( )	( )
Safety harnesses and life-lines for entry and stand-by persons?	( )	( )	( )
Hoisting equipment?	( )	( )	( )
Powered communications?	( )	( )	( )
SCBAs for entry and standby persons?	( )	( )	( )
Protective Clothing?	( )	( )	( )
All electric equipment listed Class I, Division I, Group D and Non-sparking tools?	( )	( )	( )

10. Periodic atmospheric tests:

Oxygen_____ % Time_____	Oxygen_____ % Time ____
Oxygen_____ % Time_____	Oxygen_____ % Time ____
Explosive_____ % Time_____	Explosive_____ % Time ____
Explosive_____ % Time_____	Explosive_____ % Time ____
Toxic_____ % Time_____	Toxic_____ % Time ____
Toxic_____ % Time_____	Toxic_____ % Time ____

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Permit Prepared By: (Supervisor) _____ _____

Approved By: (Unit Supervisor) _____ _____

Reviewed By: (CS Operations Personnel): _____ _____
(printed name) (signature)

This permit to be kept at job site. Return job site copy to Safety Office following job completion.
Copies: White Original (Safety Office) Yellow (Unit Supervisor) Hard (Job site)

OSHA COMPLIANCE MANUAL

Sample 2: Confined space entry permit

PERMIT VALID FOR 8 HOURS ONLY. ALL PERMIT COPIES REMAIN AT SITE UNTIL JOB COMPLETED.
DATE: _____ SITE LOCATION/DESCRIPTION _____
PURPOSE OF ENTRY _____
SUPERVISOR(S) in charge of crews Type of Crew Phone #

_____

_____
COMMUNICATION PROCEDURES _____
RESUCE PROCEDURES (PHONE NUMBERS AT BOTTOM) _____

* BOLD DENOTES MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY *

REQUIREMENTS COMPLETED	DATE	TIME	REQUIREMENTS COMPLETED	DATE	TIME
Lock Out/De-energize/Try-out	_____	_____	**Full Body Harness w/ "D" ring**	_____	_____
Line(s) Broken-Capped-Blanked	_____	_____	**Emergency Escape Retrieval Equipment**	_____	_____
Purge-Flush and Vent	_____	_____	**Lifelines**	_____	_____
Ventilation	_____	_____	Fire Extinguishers	_____	_____
Secure Area (Post and Flag)	_____	_____	Lighting (Explosive Proof)	_____	_____
Breathing Apparatus	_____	_____	Protective Clothing	_____	_____
Resuscitator - Inhalator	_____	_____	Respirator(s) (Air Purifying)	_____	_____
Standby Safety Personnel	_____	_____	Burning and Welding Permit	_____	_____

Note: Items that do not apply enter N/A in the blank.

* * RECORD CONTINUOUS MONITORING RESULTS EVERY 2 HOURS * *

CONTINUOUS MONITORING** TEST(S) TO BE TAKEN	PERMISSIBLE ENTRY LEVEL	_____							
Percent of Oxygen	19.5% to 23.5%	___	___	___	___	___	___	___	___
Lower Flammable Limit	Under 10%	___	___	___	___	___	___	___	___
Carbon Monoxide	+35 PPM	___	___	___	___	___	___	___	___
Aromatic Hydrocarbon	+ 1 PPM * 5 PPM	___	___	___	___	___	___	___	___
Hydrogen Cyanide	(Skin) * 4 PPM	___	___	___	___	___	___	___	___
Hydrogen Sulfide	+10 PPM *15 PPM	___	___	___	___	___	___	___	___
Sulfur Dioxide	+ 2 PPM * 5 PPM	___	___	___	___	___	___	___	___
Ammonia	*35 PPM	___	___	___	___	___	___	___	___

* Short-term exposure limit: Employee can work in the area up to 15 minutes.
+ 8 hr. Time - Weighted Avg.: Employee can work in area 8 hrs (longer with appropriate respiratory protection).
REMARKS: _____

GAS TESTER NAME & CHECK #	INSTRUMENT(S) USED	MODEL &/OR TYPE	SERIAL &/OR UNIT #
_____	_____	_____	_____
_____	_____	_____	_____

SAFETY STANDBY PERSON IS REQUIRED FOR ALL CONFINED SPACE WORK

SAFETY STANDBY PERSON(S)	CHECK #	CONFINE SPACE ENTRANT(S)	CHECK #
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

SUPERVISOR AUTHORIZING ENTRY - ALL ABOVE CONDITIONS SATISFIED _____
DEPARTMENT/PHONE _____
AMBULANCE 2800 FIRE 2900 Safety 4901 Gas Coordinator 4529 / 5387

Permit-required confined space program

General company policy

The purpose of this program is to inform interested persons, including employees, that _____is complying with the OSHA Confined Space Standard at §1910.146. We have determined that this workplace needs written procedures for the evaluation of confined spaces, and where permit-required spaces are identified, we have developed and implemented a permit-required confined space entry program. This program applies to all work operations at _____ where employees must enter a permit-required confined space as part of their job duties.

_____ has overall responsibility for coordinating safety and health programs in this company. _____ is the person having overall responsibility for the Permit-Required Confined Space Program. _____ will review and update the program, as necessary.

Copies of the written program may be obtained from _____.

Under this program, we identify permit-required spaces in our facility and provide training for our employees according to their responsibilities in the permit space. These employees receive instructions for safe entry into our specific type of confined spaces, including testing and monitoring, appropriate personal protective equipment, rescue procedures, and attendant responsibilities.

This program is designed to ensure that safe work practices are utilized during all activities regarding the permit space to prevent personal injuries and illnesses that could occur.

We encourage all suggestions because we are committed to creating a safe workplace for all our employees and a safe and effective permit-required confined space entry program is an important component of our overall safety plan. We strive for clear understanding, safe work practices, and involvement in the program from every level of the company.

Hazard evaluation for permit spaces

To determine if there are permit-required confined spaces in our facility, _____ has conducted a hazard evaluation of our workplace. This evaluation has provided us with the information necessary to identify the existence and location of permit-required confined spaces in our workplace that must be covered by the Permit-Required Confined Space Entry Program. This written hazard evaluation is kept in _____.

Preventing unauthorized entry

To provide a safe work environment and to prevent exposed employees from accidentally entering a permit space, we have implemented the following procedures to inform all employees of the existence, location, and danger posed by permit spaces in _____. To inform employees of the existence of a permit space, we use _____. To ensure that unauthorized employees do not enter and work in permit spaces, we _____.

Safe permit space entry procedures

_____ is the Entry Supervisor responsible for authorizing entry and issuing entry permits for work in our permit spaces. The file of permits and related documents are kept in _____. The procedures we follow for preparing, issuing, and canceling entry permits includes the following elements: _____. These are the employees who have current authorization to work in or near our permit spaces. This list also includes the work activities they are expected to perform _____.

Pre-entry evaluation

To ensure the safety and health of our employees, before allowing authorized workers to enter a permit space, we evaluate conditions in that space to determine if the conditions are safe for entry. Any employee who enters

the space, or that employee's authorized representative, has the opportunity to observe the pre-entry and any subsequent testing. The authorized entrant or that employee's representative also has the option of requesting a reevaluation of the space if they feel that the evaluation was not adequate.

Alternate entry evaluation

Our company follows the procedures to evaluate each permit space before entry according to 1910.146(c)(5)(ii)(C). This includes testing the internal atmosphere with a calibrated direct-reading instrument for oxygen content, flammable gases and vapors, and potential toxic air contaminants. We also periodically test the atmosphere of the space to ensure that the continuous ventilation is preventing the accumulation of a hazardous atmosphere.

Certification

Alternate entry procedure certification

According to 1910.146(c)(5)(ii), our company verifies that the space is safe for entry and that the pre-entry measures have been taken, through a written certification that contains the date, location of the space, and signature of the person providing the certification. At our company, _____ is responsible for verifying these procedures. The certification is made before entry and is available to each employee entering the space.

Reclassification as non-permit space certification

According to 1910.146(c)(7)(iii), our company documents the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, location of the space, and signature of the person making the determination. At our company, _____ is responsible for documenting this information. The certification is available to each employee entering the space.

Equipment

To ensure the safety and health of permit space entrants, our company provides appropriate equipment to all employees who are involved in our permit space program. Each authorized entrant will use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point which will present a profile small enough for the successful removal of the entrant. We may use wristlets instead of the body harness in instances where a body harness is infeasible or creates a greater hazard.

We maintain all equipment in excellent condition, train the entrants in the correct use of this equipment, and ensure that all equipment, including that used for personal protection, is maintained and used properly.

We follow these procedures to ensure that the appropriate equipment is being used by entrants: _____.

Duties: Authorized entrants

Those persons who have completed the training and are authorized to enter our permit spaces (authorized entrants) are assigned specific duties and responsibilities that they must perform when they work in the permit space. Their duties and responsibilities include: _____. The elements covered in the training program for authorized entrants include: _____.

Duties: Attendants

Those persons who have completed the training and have been designated as permit space attendants are assigned specific duties and responsibilities that they must perform in permit space job duties.

Their duties and responsibilities include: _____.

The elements covered in the training program for permit space attendants include: _____.

Duties: Entry supervisors

Those persons who have completed the training and have been designated as permit space entry supervisors are assigned specific duties and responsibilities that they must perform in permit space job duties. Their duties and responsibilities include: _____.

The elements covered in the training program for permit space entry supervisors include: _____.

Training program

Every employee at _____ who faces the risk of confined space entry is provided with training so that each designated employee acquires the understanding, knowledge and skills necessary for the safe performance of the duties assigned to them. _____ conducts our permit-required confined space training. All training related materials, documents, and signed certificates are kept in _____.

We use this criteria to determine which employees must receive permit-required confined space training: _____.

When we conduct the training, we use _____. New employees are always trained before their initial assignment of duties. We follow these procedures when training these employees _____. When changes occur in permit-required confined space areas of our company, we _____. If we have reason to believe that an employee has deviated from a previously trained upon procedure or that their knowledge seems inadequate, we _____.

Upon successful completion of _____ permit-required confined space training program, each participant receives a certificate which they sign verifying that they understand the material presented, and that they will follow all company policies and procedures regarding permit space entry.

Rescue and emergency services

Our company uses its own employees to perform rescue services in the event of a permit space emergency. This group of employees has been trained, at a minimum, to:

- Perform the assigned rescue duties;
- Correctly use personal protective equipment (PPE) required for the job;
- Establish proficiency as an authorized entrant, as provided by 1910.146(g) and (h); and
- Perform basic first aid and cardiopulmonary resuscitation (CPR).

_____ also ensures that at least one member of the rescue team holds a current certification in first aid and CPR, and that affected employees practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces will, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

_____ conducts our rescue and emergency training. The following designated persons currently make up our emergency rescue team _____.

Multiple employer entry procedures

When outside employers/contractors enter our facility to perform work in permit spaces, we coordinate entry and work operations following these procedures: _____.

Post-operations procedures

Upon completion of work in a permit space, we follow these procedures to close off the space and cancel the permit: _____.

Review procedures

To ensure that all employees participating in entry operations are protected from permit space hazards, _____ reviews the permit-required confined space entry program on a regular basis. We use the retained canceled permits from the past 12 months within one year after each entry and revise the program as necessary. _____ performs a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review will be performed.

Enforcement

Constant awareness of and respect for permit-required confined space entry hazards, and compliance with all safety rules are considered conditions of employment. Supervisors and individuals in the Safety and Personnel Department reserve the right to issue disciplinary warnings to employees, up to and including termination, for failure to follow the guidelines of this permit entry program.

Appendix

We have attached to this plan any lists, samples, or procedures we thought would ensure better understanding of our written program.

OSHA COMPLIANCE MANUAL

WORKPLACE HAZARDS

This manual deals with OSHA's efforts to establish and protect employee health and safety in the workplace, and the compliance required of you, the employer, in the areas of labeling, training, personal protective equipment, etc. However, there are other topics and dangerous conditions in the workplace that deserve special mention. That is what you will find in this chapter, as well as a systematic method to analyze jobs for those hazards.

Control of hazardous energy (lockout/tagout)

The control of hazardous energy (lockout/tagout) is vital to safe work practices when machines and equipment are being serviced or cleaned. Following specific procedures to lock out or block out the energy source prior to machine or equipment maintenance is required for the safey of all workers involved in the process.

Electrical hazards

Unsafe work practices appear to be a factor in about three-fourths of electrocutions in the workplace. You will find information on the hazards of electrical work as well as preventive measures to implement.

Temperature extremes

What you can do to keep your employees safe and healthy when they are exposed to hot and cold temperature extremes is covered in this section.

Air contaminants

An explanation about air contaminants and how to control them in the workplace. Additionally, this section contains OSHA's Tables Z-1, Z-2, and Z-3 which set the permissible exposure limits (PELs) for many hazardous substances.

Asbestos

The long-term mishandling of asbestos has left a grim legacy of disabling and fatal diseases. This part of the chapter describes the steps an employer must take to reduce occupational exposure to asbestos.

Job hazard analysis

Job hazard analysis provides a systematic procedure of breaking down a job into specific tasks, identifying the hazards associated with those tasks, and implementing controls to reduce or eliminate those hazards.

Occupational noise exposure

Noise, or unwanted sound, is a common hazard in the work environment. When employees are exposed to excessive noise, the employer must establish a hearing conservation program to ensure that employees' hearing is protected. This section of Workplace Hazards will help you understand noise exposures to better protect your employees and comply with OSHA's requirements.

Combustible dust

Combustible dusts are fine particles that present an explosion hazard when suspended in air in certain conditions. A dust explosion can be catastrophic and cause employee deaths, injuries, and destruction of entire buildings. In many combustible dust accidents, employers and employees were unaware that a hazard even existed. It is important to determine if your company has this hazard, and, if so, ensure appropriate action

be taken to prevent tragic consequences. This part of the chapter will help you understand combustible dust hazards and applicable OSHA requirements.

OSHA COMPLIANCE MANUAL

LOCKOUT/TAGOUT

OSHA COMPLIANCE MANUAL

Reserved

OSHA COMPLIANCE MANUAL

Lockout/Tagout

Introduction

Workers performing service or maintenance on machinery and equipment are exposed to injuries from the unexpected energization, startup of the machinery or equipment, or release of stored energy in the equipment.

OSHA's Lockout/Tagout (Control of Hazardous Energy) standard, which went into effect in January 1990, helps safeguard employees from the unexpected startup of machines or equipment or release of hazardous energy while they are performing servicing or maintenance. It identifies the practices and procedures necessary to shut down and lock out or tag out machines and equipment, requires that employees receive training in their role in the lockout/tagout program, and mandates that periodic inspections be conducted to maintain or enhance the energy control program.

This rule requires that, in general, before service or maintenance is performed on machines or equipment, the machines or equipment must be turned off and disconnected from the energy source, and the energy-isolating device must be either locked or tagged out.

Lockout is a more reliable means of deenergizing equipment than tagout and it should always be the preferred method used by employees. Except for limited situations, the use of lockout devices will provide a more secure and more effective means of protecting employees from the unexpected release of hazardous energy or startup of machines and equipment.

Scope of the standard

The Lockout/Tagout standard applies to general industry employment and covers the servicing and maintenance of machines and equipment in which the unexpected startup or the release of stored energy could cause injury to employees. Hazardous energy releases may occur during the installation, set up, adjusting, modifying, maintenance, servicing, or repairing of machines, equipment, processes, or systems.

It applies to any source of mechanical, hydraulic, pneumatic, chemical, thermal, or other energy, but does not cover electrical hazards. Subpart S of 29 CFR Part 1910 covers electrical hazards, and 29 CFR Part 1910.333 contains specific lockout/tagout provisions for electrical hazards.

Activities and operations not covered

Servicing and maintenance of equipment performed during normal production operations are not covered if:

- The safeguarding provisions of OSHA's Machine Guarding and other applicable general industry standards are effective in preventing worker exposure to hazards created by the unexpected energization or startup of machines or equipment, or the release of energy.
- Minor tool changes and adjustments, and other minor servicing activities that take place during normal production operations which are routine, repetitive, and integral to the use of that production equipment, as long as workers are effectively protected by alternative measures which provide effective machine safeguarding protection.
- Construction, agriculture, and maritime workers.
- Installations under the exclusive control of electric utilities for power generation, transmission, and distribution.
- Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations.
- Oil and gas well drilling and servicing.

- Work on cord and plug connected electrical equipment — if the equipment is unplugged from the energy source and the authorized employee has exclusive control of the plug.
- Hot tap operations that involve transmission and distribution systems for gas, steam, water, or petroleum products on pressurized pipelines — if continuity of service is essential, shutdown of the system is impractical, documented procedures are followed, and employees are effectively protected by special equipment.

Normal production operations

Machines and equipment present many hazardous situations during normal production operations — i.e., whenever machines and equipment are used to perform their usual production function. These production hazards are covered by other rules, such as the requirements for general machine guarding and guarding power transmission apparatus. In certain circumstances, such as the following examples, some servicing or maintenance hazards encountered during normal production operations may be covered by the lockout/tagout rule.

Servicing and/or maintenance operations

If a servicing activity — such as lubricating, cleaning, or unjamming the production equipment — takes place during production, the employee performing the servicing may be subjected to hazards that are not encountered as part of the production operation itself. Workers engaged in these operations are covered by lockout/tagout when any of the following conditions occur:

- The employee must either remove or bypass machine guards or other safety devices, resulting in exposure to hazards at the point of operation;
- The employee is required to place any part of his or her body in contact with the point of operation of the operational machine or piece of equipment; or
- The employee is required to place any part of his or her body into a danger zone associated with a machine operating cycle.

In these situations, the equipment must be deenergized and locks or tags must be applied to the energy-isolation devices. In addition, when other servicing tasks occur, such as setting up equipment, and/or making significant adjustments to machines, employees performing the tasks are required to lock out or tag out if they can be injured by unexpected energization or startup of the equipment.

Some servicing operations must be performed with the power on. Making many types of fine adjustments, such as centering the belt on conveyors, is one example. Certain aspects of troubleshooting, such as identifying the source of the problem as well as checking to ensure that it has been corrected, is another. You must provide effective protection when employees perform such operations. Although, in these cases, a power-on condition is essential either to accomplish the partitular type of servicing or to verify that it was performed properly, lockout or tagout procedures are required when other service or maintenance occurs and power is not required.

Minor servicing tasks

Employees performing minor tool changes and adjustments and/or other minor servicing activities that are routine, repetitive, and integral to the use of the production equipment and that occur during normal production operations are not covered by the lockout/tagout standard, provided the work is performed using alternative measures that provide effective protection.

Servicing motor vehicles

In an interpretative letter dated July 23, 1992 OSHA clarified how the Lockout/Tagout standard would apply to motor vehicles.

"Specifically, you posed the following question: If a truck driver or other person were to crawl under a truck, with the engine running, to adjust a linkage or fix another problem, would this be considered a violation of the standard?

The answer is: Yes, this would constitute a hazard, as well as a violation. We would agree with the verbal opinion offered by Mr. Sauger that turning the engine off and removing the ignition key would deenergize and isolate the power source. The key would also have to be retained by the employee performing the maintenance operation in order to provide effective protection under the standard.

When servicing or maintenance activities are to take place, on any equipment, deenergization of that equipment will provide maximum safety to an employee. The removal of a vehicle key which can be kept in the sole control of the employee performing the maintenance or service can significantly reduce the risk of serious injury or even possibly a fatal injury."

Lockout/tagout requirements

The Lockout/Tagout standard requires employers to establish procedures for isolating machines or equipment from their source of energy and affixing appropriate locks or tags to energy-isolating devices to prevent any unexpected energization, startup, or release of stored energy that could injure workers. When tags are used on energy-isolating devices not capable of being locked out, provide additional means to assure a level of protection equivalent to that of locks. The standard also requires employee training and periodic inspections of the procedures to maintain or improve their effectiveness.

Energy control program

If you are covered by the LO/TO standard, you must establish a program to ensure that machines and equipment are isolated and inoperative before any employee performs servicing or maintenance when the unexpected energization, start up, or release of stored energy could occur and cause injury.

The purpose of the energy control program is to ensure that, whenever the possibility of unexpected machine or equipment startup or energization exists or when the unexpected release of stored energy could occur and cause injury during servicing and maintenance, the equipment is isolated from its energy source(s) and rendered inoperative prior to servicing or maintenance.

The LO/TO standard allows you the flexibility to develop programs and procedures that meet the needs of your particular workplace and the particular types of machines and equipment being maintained or serviced. Your energy control program must include:

- Documented energy control procedures,
- An employee training program, and
- Periodic inspections of the use of the procedures.

Energy control procedures

Energy control procedures must be developed, documented, and used to control potentially hazardous energy whenever workers perform activities covered by the standard.

The written procedures have to identify the information that the authorized employees must know to control hazardous energy during servicing or maintenance. If this information is the same for various machines or equipment or if other means of logical grouping exists, then a single energy control procedure may be sufficient. If there are other conditions, such as multiple energy sources, different connecting means, or a particular sequence that must be followed to shut down the machine or equipment, then you must develop separate energy control procedures to protect employees.

The energy control procedures need to outline the scope, purpose, authorization, rules, and techniques that will be used to control hazardous energy sources as well as the means that will be used to enforce compliance. At a minimum, they should include the following elements:

- A statement on how the procedures will be used;
- The procedural steps needed to shut down, isolate, block, and secure machines or equipment;
- The steps designating the safe placement, removal, and transfer of lockout/tagout devices and who has the responsibility for them;
- The specific requirements for testing machines or equipment to determine and verify the effectiveness of locks, tags, and other energy control measures; and
- The employer or an authorized employee must notify affected employees before lockout or tagout devices are applied and after they are removed from the machine or equipment.

The procedures must include the following steps:

(1) Preparing for shutdown,

(2) Shutting down the machine or equipment,

(3) Isolating the machine or equipment from the energy source(s),

(4) Applying the lockout or tagout device(s) to the energy-isolating device(s),

(5) Safely releasing all potentially hazardous stored or residual energy, and

(6) Verifying the isolation of the machine or equipment prior to the start of servicing or maintenance work.

In addition, before lockout or tagout devices are removed and energy is restored to the machines or equipment, steps need to be taken to reenergize equipment after servicing is completed, including ensuring that machines or equipment components are operationally intact; all employees are safely positioned or removed from equipment; and that lockout or tagout devices are removed from each energy-isolating device by the employee who applied the device.

Sample lockout/tagout (energy control) procedure

General

Lockout is the preferred method of isolating machines or equipment from energy sources. Following this simple procedure for use in both lockout or tagout programs will help you develop a procedure which meets the requirements of the Lockout/Tagout standard. This procedure may be used when there are limited numbers or types of machines or equipment or there is a single power source. For more complex systems, a more comprehensive procedure will need to be developed, documented, and utilized.

Lockout (*or Tagout)* procedure for (*Company name*)

Purpose

This procedure establishes the minimum requirements for the lockout or tagout of energy isolating devices. It shall be used to ensure that the machine or equipment is isolated from all potentially hazardous energy, and locked out or tagged out before employees perform any servicing or maintenance activities where the unexpected energization, start-up or release of stored energy could cause injury (Type(s) and Magnitude(s) of Energy and Hazards).

Responsibility

Appropriate employees shall be instructed in the safety significance of the lockout (or tagout) procedure (*List name(s)/job title(s) of employees authorized to lockout or tagout*). Each new or transferred affected employee and other employees whose work operations are or may be in the area shall be instructed in the purpose and use of the lockout or tagout procedure (*List name(s)/job title(s) of affected employees and how to notify*).

Preparation for lockout or tagout

Make a survey to locate and identify all isolating devices to be certain which switch(s), valve(s) or other energy isolating devices apply to the equipment to be locked or tagged out. More than one energy source (electrical, mechanical, or others) may be involved. (*List type(s) and location(s) of energy isolating means*).

Sequence of lockout/tagout (energy control) procedures

1. Notify all affected employees that a lockout or tagout system is going to be utilized and the reason therefore. The authorized employee knows the type and magnitude of energy that the machine or equipment utilizes and understands the hazards.
2. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress stop button, open toggle switch, etc.)
3. Operate the switch, valve, or other energy isolating device(s) so that the equipment is isolated from its energy source(s). Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down, etc. (*List type(s) of stored energy-methods to dissipate or restrain*).
4. Lockout and/or tagout the energy isolating devices with assigned individual lock(s) or tag(s) (*List method(s); i.e., locks, tags, additional safety measures, etc.*)
5. After ensuring that no personnel are exposed, and as a check on having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate (*List type(s) of equipment checked to ensure disconnections*).

   CAUTION: Return operating control(s) to “neutral” or “off” position after the test.
6. The equipment is now locked out or tagged out.

Restoring machines or equipment to normal production operations

1. After the servicing and/or maintenance is complete and equipment is ready for normal production operations, check the area around the machines or equipment to ensure that no one is exposed.
2. After all tools have been removed from the machine or equipment, guards have been reinstalled and employees are in the clear, remove all lockout or tagout devices. Operate the energy isolating devices to restore energy to the machine or equipment.

Procedure involving more than one person

In the preceding steps, if more than one individual is required to lockout or tagout equipment, each shall place his/her own personal lockout device or tagout device on the energy isolating device(s). When an energy isolating device cannot accept multiple locks or tags, a multiple lockout or tagout device (hasp) may be used.

If lockout is used, a single lock may be used to lockout the machine or equipment with the key being placed in a lockout box or cabinet which allows the use of multiple locks to secure it. Each employee will then use his/her own lock to secure the box or cabinet. As each person no longer needs to maintain his or her lockout protection, that person will remove his/her lock from the box or cabinet (*List name(s)/job title(s) of employees authorized for group lockout or tagout*).

(*Company name*) rules for using lockout or tagout procedures

All equipment must be locked out or tagged out to protect against accidental or inadvertent operation when the operation could cause injury to personnel. Do not attempt to operate any switch, valve, or other energy isolating device where it is locked or tagged out.

Lockout (or Tagout) procedure

Entry No.	(Description)
1.	*Name of company*
2.	*Type(s) and magnitude(s)* of energy and hazards
3.	*Name(s)/job title(s)* of employees authorized to lockout or tagout
4.	*Name(s)/job title(s)* of affected employees and how to notify
5.	*Type(s) and location* of energy isolating means
6	*Type(s) of stored energy*-methods to dissipate or restrain
7.	*Method(s) Selected* i.e., locks, tags, additional safety measures, etc.
8.	*Type(s) of Equipment* checked to ensure disconnections
9.	*Name(s)/Job Title(s)* of employees authorized for group lockout or tagout

Energy-isolating devices

Your primary tool for providing protection is the energy-isolating device, which is the mechanism that prevents the transmission or release of energy and to which locks or tags are attached. This device guards against accidental startup or the unexpected reenergization in machines or equipment during servicing or maintenance. There are two types of energy-isolating devices: those capable of being locked and those that are not. OSHA differentiates between the existence of these two conditions and the use of tagout when either condition exists.

When the energy-isolating device cannot be locked out, you must use tagout or you can modify or replace the device to make it capable of being locked out. When using tagout, you will need to comply with all tagout-related requirements and, in addition to the normal training required for all employees, you must train your employees in the following limitations of tags:

- Tags are essentially warning devices affixed to energy-isolating devices and do not provide the physical restraint of a lock.
- When a tag is attached to an isolating means, it is not to be removed except by the person who applied it, and it is never to be bypassed, ignored, or otherwise defeated.
- Tags must be legible and understandable by all employees.
- Tags and their means of attachment must be made of materials that will withstand the environmental conditions encountered in the workplace.
- Tags may evoke a false sense of security. They are only one part of an overall energy control program.
- Tags must be securely attached to the energy-isolating devices so that they cannot be detached accidentally during use.

If the energy-isolating device is lockable, use locks unless you can demonstrate that the use of tags would provide protection at least as effective as locks to ensure full employee protection.

Full employee protection includes complying with all tagout-related provisions plus implementing additional safety measures that can provide the level of safety equivalent to that obtained by using lockout. This might include removing and isolating a circuit element, blocking a controlling switch, opening an extra disconnecting device, or removing a valve handle to reduce the potential for any inadvertent energization while tags are attached.

OSHA requires that whenever major replacement, repair, renovation, or modification of machines or equipment is performed and whenever new machines or equipment are installed, you must ensure that the ener-

gy-isolating devices for such machines or equipment are lockable. Such modifications and/or new purchases are most effectively and efficiently made as part of the normal equipment replacement cycle. All newly purchased equipment must be lockable.

Requirements for lockout/tagout devices

When correctly attached to an energy-isolating device, both lockout and tagout devices help protect employees from hazardous energy. A lockout device provides protection by preventing the machine or equipment from becoming energized. A tagout device does so by identifying the energy-isolating device as a source of potential danger — it indicates that the energy-isolating device and the equipment being controlled may not be operated while the tagout device is in place. Whichever devices are used, they must be singularly identified, must be the only devices used for controlling hazardous energy, and must meet the following requirements:

Durable — Lockout and tagout devices must withstand the environment to which they are exposed for the maximum duration of the expected exposure. Tagout devices must be constructed and printed so that they do not deteriorate or become illegible, especially when used in corrosive (acid and alkali chemicals) or wet environments.

Standardized — Both lockout and tagout devices must be standardized within your company according to either color, shape, or size. Tagout devices must also be standardized according to print and format.

Substantial — Lockout and tagout devices must be substantial enough to minimize early or accidental removal. Locks must be substantial to prevent removal except by excessive force of special tools such as bolt cutters or other metal cutting tools. Tag means of attachment must be nonreusable, attachable by hand, self-locking, and nonreleasable, with a minimum unlocking strength of no less than 50 pounds. The device for attaching the tag also must have the general design and basic characteristics equivalent to a one-piece nylon cable tie that will withstand all environments and conditions.

Identifiable — Locks and tags must clearly identify the employee who applies them. Tags also must warn against hazardous conditions if the machine or equipment is energized and must include a legend such as: DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, DO NOT OPERATE.

Employee training

Employees affected by lockout/tagout procedures must have initial training and retraining as necessary, and you must certify the training has been given. Include each employee's name and dates of training on the certification.

The Lockout/Tagout standard specifies three types of employees who need to be trained — authorized, affected, and other. The amount and kind of training that each employee receives is based on the relationship of that employee's job to the machine or equipment being locked or tagged out, and the degree of knowledge relevant to hazardous energy that he or she must possess. For example, your training program for authorized employees (those who have the responsibility for implementing the energy control procedures and performing the servicing or maintenance) must cover, at a minimum, the following areas:

- Recognition of applicable hazardous energy sources,
- Details about the type and magnitude of the hazardous energy sources present in the workplace, and
- Methods and means necessary to isolate and control those energy sources (i.e., the elements of the energy control procedures).

By contrast, affected employees (usually the machine operators or users) and all other employees need only be able to recognize when the control procedure is being used, and understand the purpose of the procedure and the importance of not attempting to start up or use the equipment that has been locked or tagged out.

Because an "affected" or "other" employee is not performing the servicing or maintenance, that employee's responsibilities under the energy control program are simple. Whenever there is a lockout or tagout device

in place on an energy-isolating device, the affected or other employee must leave it alone and not attempt to energize or operate the equipment.

Every employee training program must ensure that all employees understand the purpose, function, and restrictions of the energy control program and that authorized employees possess the knowledge and skills necessary for the safe application, use, and removal of energy controls.

Training programs for authorized employees should deal with the equipment, type(s) of energy, and hazard(s) specific to the workplace being covered.

Retraining must be provided whenever there is a change in job assignments, a change in machines, equipment or processes that present a new hazard, or a change in energy control procedures. Conduct additional retraining whenever a periodic inspection reveals, or whenever you have reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedure.

Periodic inspections

A periodic inspection of each procedure, when used at least once a year, must be performed at least annually to ensure that the energy control procedures continue to be implemented properly and that the employees are familiar with their responsibilities under those procedures. Design the periodic inspections to correct any deviations or inadequacies that are observed. An authorized employee other than the one(s) using the energy control procedure must perform the periodic inspections.

In addition, certify that the periodic inspections have been performed. The certification has to include:

- Identify the machine or equipment on which the energy control procedure was used,
- Date of the inspection,
- Employees included in the inspection, and
- Name of the person performing the inspection.

For a lockout procedure, the periodic inspection must include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected. When a tagout procedure is inspected, a review on the limitation of tags, in addition to the above requirements, must also be included with each affected and authorized employee.

Consultants performing lockout/tagout periodic inspections

In an interpretative letter dated October 29, 1996 OSHA clarified what constitutes inspections conducted by authorized employees, including consultants.

"... [Y]ou inquired whether it is the intent of OSHA by stating that "an authorized employee" shall conduct periodic inspections in the Lockout/Tagout standard, to preclude consultants and other third parties from conducting required periodic inspections and audits of a company's energy control program. Pursuant to 1910.147(c)(6)(i)(A), a periodic inspection must be performed by an authorized employee.

For the purpose of complying with the intent of this standard, authorized employee means a qualified person whom the authority and responsibility to perform a specific lockout or tagout inspection has been given by the employer. A qualified person is a person who has been trained and has demonstrated proficiency, in compliance with 1910.147(c)(7), to perform servicing and maintenance on the machine or equipment to be inspected.

Therefore, please note that the function of conducting periodic inspections by consultants would meet the above criteria for the purpose of complying with the lockout/tagout standard requirement."

Applying controls and lockout/tagout devices

The established procedure of applying energy controls includes the specific elements and actions that must be implemented in sequence. These are briefly identified as:

(1) Prepare for shut down,

(2) Shut down the machine or equipment,

(3) Disconnect the energy isolating device,

(4) Apply the lockout or tagout device. Lockout/tagout programs should be based on the principle of only one key for each lock the worker controls. This means that:

- Workers are assigned individual locks operable by only one key for use in securing energy control devices (breaker panels, control valves, manual override switches, etc.).
- Each worker maintains custody of the key for each of his or her assigned locks. Use of master keys should be reserved for unusual circumstances when the worker is absent from the workplace. However, if master keys are necessary, keep them under supervisory control. List the proper procedures for using them in the written program for controlling hazardous energy.
- Each lock is labeled with a durable tag or other means that identifies its owner.
- When work is performed by more than one worker, each worker applies his or her own lock to the energy-securing device. Scissors-type hasps made of hardened steel are available to facilitate the use of more than one lock to secure an energy control device.
- All de-energized circuits and systems are clearly labeled with durable tags.
- The worker who installs a lock is the one who removes it after all work has been completed.
- If work is not complete when the shift changes, workers arriving on shift apply their locks before departing workers remove their locks.
- Because tags can be easily removed, they are not a substitute for locks. Workers are safest with a program that uses both locks and warning tags to prevent systems from being inadvertently reenergized.

(5) Render safe all stored or residual energy. This may involve isolating or blocking the energy. To isolate or block energy, take the following steps:

- Disconnect or shut down engines or motors that power mechanical systems.
- Deenergize electrical circuits by disconnecting the power source from the circuit.
- Block fluid flow (gas, liquid, or vapor) in hydraulic, pneumatic, or steam systems by using control valves or by capping or blanking the lines (lines can be blanked by inserting a solid plate between the flanges of a joint).
- Block machine parts against motion that might result from gravity (falling).

Some forms of energy must also be dissipated after a system has been deenergized. System components such as electrical capacitors, hydraulic accumulators, or air reservoirs may retain sufficient energy to cause serious injury or death even though the component has been deenergized, isolated, or blocked from the system and locked out. Energy can be dissipated by taking the following steps:

- Vent fluids from pressure vessels, tanks, or accumulators until internal pressure is at atmospheric levels. However, do not vent vessels or tanks containing toxic, flammable, or explosive substances directly to the atmosphere.
- Discharge capacitors by grounding.
- Release or block springs that are under tension or compression.
- Dissipate inertial forces by allowing the system to come to a complete stop after the machine or equipment has been shut down and isolated from its energy sources.

(6) Verify the isolation and deenergization of the machine or equipment. This verification should ensure that all energy sources (including stored energy) are controlled (that is, deenergized, isolated, blocked, and/or dissipated) before work begins. Appropriate testing equipment should be required as needed.

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Removing locks and tags

Before lockout or tagout devices are removed and energy is restored to the machine or equipment, the authorized employee(s) must take the following actions or observe the following procedures:

(1) Inspect the work area to ensure that non-essential items have been removed and that machine or equipment components are intact and capable of operating properly. To ensure that equipment will operate as expected when it is reenergized, you should require qualified persons to inspect completed installation, maintenance, service, or repair work. The inspection should verify that installation, repairs, and modifications were performed correctly and that the correct replacement parts were used. When equivalent or updated parts must be substituted for original parts, the system may need to be modified. Reenergized equipment should be closely monitored for several operating cycles to ensure that it is functioning correctly and safely.

(2) Check the area around the machine or equipment to ensure that all employees have been safely positioned or removed.

(3) Make sure that locks or tags are removed only by those employees who attached them. In the very few instances when this is not possible, the device may be removed under the direction of the employer provided that he or she strictly adheres to the specific procedures; and

(4) Notify affected employees after removing locks or tags and before starting equipment or machines.

Additional safety requirements

Special circumstances exist when machines need to be tested or repositioned during servicing, outside (contractor) personnel are at the worksite, servicing or maintenance is performed by a group (rather than one specific person), and shifts or personnel changes occur during servicing or maintenance.

Testing or positioning of machines — OSHA allows the temporary removal of locks or tags and the reenergization of the machine or equipment only when necessary under special conditions, such as when power is needed for the testing or positioning of machines, equipment, or components. The reenergization must be conducted as follows:

- Clear the machines or equipment of tools and materials,
- Remove employees from the machines or equipment area,
- Remove the lockout or tagout devices as specified,
- Energize and proceed with testing or positioning, and
- Deenergize all systems, isolate the machine or equipment from the energy source, and reapply lockout or tagout devices as specified.

Outside personnel (contractors) — The onsite employer and the outside employer must inform each other of their respective lockout or tagout procedures. Each employer must ensure that his or her personnel understand and comply with all restrictions and/or prohibitions of the other employer's energy control program.

Group lockout or tagout — When servicing and/or maintenance is performed by a crew, craft, department or other group, they must utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

Shift operations — During shift operations either maintain continuous control of the energy-isolating devices or require that the oncoming shift verify deenergization and lockout/tagout.

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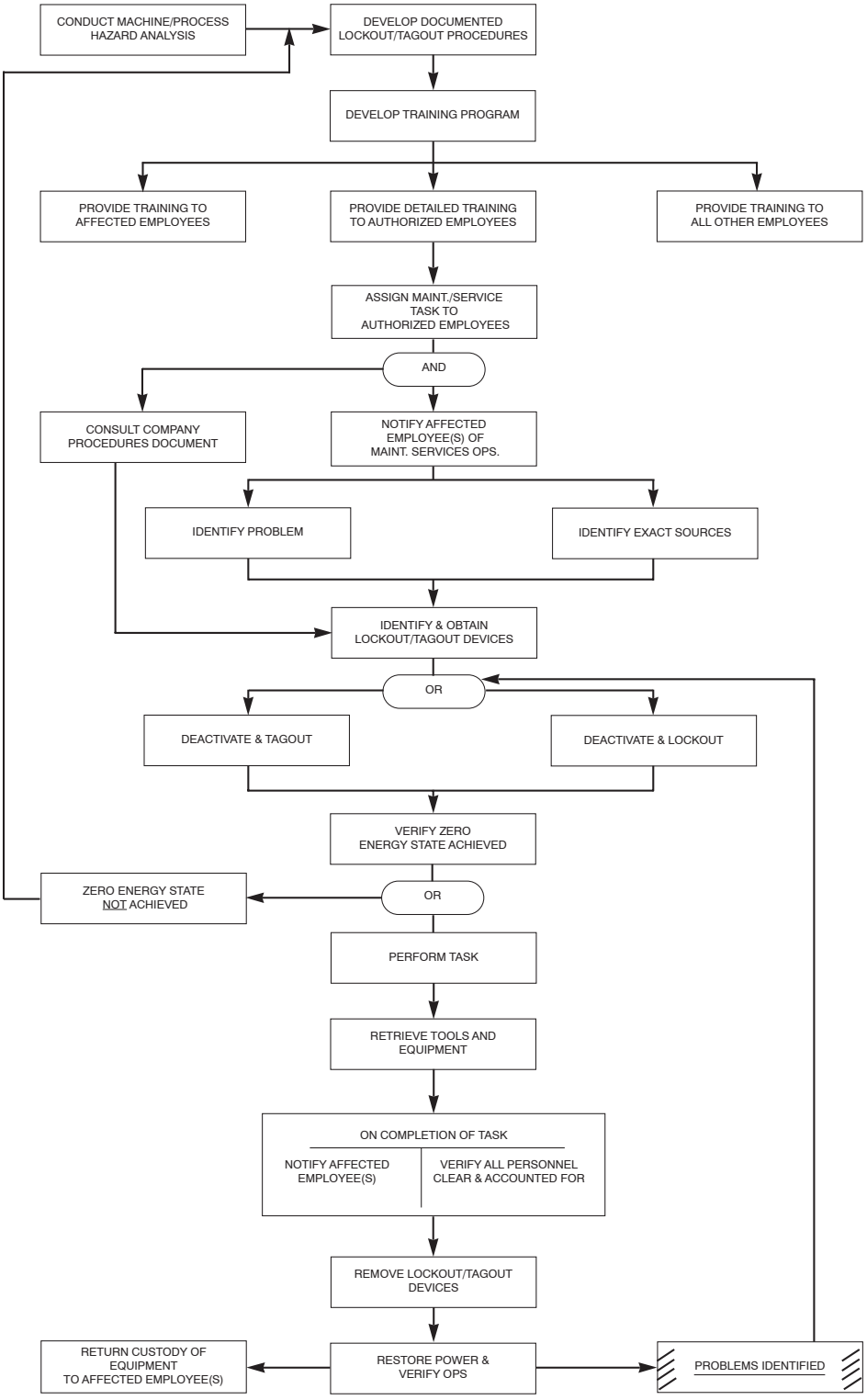
EXAMPLE – FUNCTIONAL FLOW DIAGRAM FOR IMPLEMENTATION OF LOCKOUT/TAGOUT REQUIREMENTS



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Lockout/tagout terminology

Affected employee — An employee who performs the duties of his or her job in an area in which the energy control procedure is implemented and servicing or maintenance operations are performed. An affected employee does not perform servicing or maintenance on machines or equipment and, consequently, is not responsible for implementing the energy control procedure. An affected employee becomes an "authorized" employee whenever he or she performs servicing or maintenance functions on machines or equipment that must be locked or tagged.

Authorized employee — An employee who performs servicing or maintenance on machines and equipment. Lockout or tagout is used by these employees for their own protection.

Capable of being locked out — An energy-isolating device is considered capable of being locked out if it meets one of the following requirements:

- It is designed with a hasp to which a lock can be attached;
- It is designed with any other integral part through which a lock can be affixed;
- It has a locking mechanism built into it; or
- It can be locked without dismantling, rebuilding, or replacing the energy isolating device or permanently altering its energy control capability.

Energized — Machines and equipment are energized when (1) they are connected to an energy source or (2) they contain residual or stored energy.

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

Energy source — Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

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

Energy control program — A program intended to prevent the unexpected energizing or the release of stored energy in machines or equipment on which servicing and maintenance is being performed by employees. The program consists of energy control procedure(s), an employee training program, and periodic inspections.

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

Lockout device — Any device that uses positive means such as a lock, either key or combination type, to hold an energy-isolating device in a safe position, thereby preventing the energizing of machinery or equipment. When properly installed, a blank flange or bolted slip blind are considered equivalent to lockout devices.

Tagout — The placement of a tagout device on an energy-isolating device, in accordance with an established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout device — Any prominent warning device, such as a tag and a means of attachment, that can be securely fastened to an energy-isolating device in accordance with an established procedure. The tag indicates that the machine or equipment to which it is attached is not to be operated until the tagout device is removed in accordance with the energy control procedure.

Uncontrolled hazardous energy case studies

Workers may be exposed to hazardous energy in several forms and combinations during installation, maintenance, service, or repair work. A comprehensive hazardous energy control program should address all forms of hazardous energy:

- Kinetic (mechanical) energy in the moving parts of mechanical systems.
- Potential energy stored in pressure vessels, gas tanks, hydraulic or pneumatic systems, and springs (potential energy can be released as hazardous kinetic energy).
- Electrical energy from generated electrical power, static sources, or electrical storage devices (such as batteries or capacitors).
- Thermal energy (high or low temperature) resulting from mechanical work, radiation, chemical reaction, or electrical resistance.

Case studies

Between 1982 and 1997, The National Institute for Occupational Safety and Health (NIOSH) investigated 152 fatal incidents in which workers contacted uncontrolled hazardous energy. The following case reports summarize five of these investigations.

1. Uncontrolled kinetic energy

A 25-year-old male worker at a concrete pipe manufacturing facility died from injuries he received while cleaning a ribbon-type concrete mixer. The victim's daily tasks included cleaning out the concrete mixer at the end of the shift. The clean-out procedure was to shut off the power at the breaker panel (approximately 35 feet from the mixer), push the toggle switch by the mixer to make sure that the power was off, and then enter the mixer to clean it.

No one witnessed the event, but investigators concluded that the mixer operator had shut off the main breaker and then made a telephone call instead of following the normal procedure for checking the mixer before anyone entered it. The victim did not know that the operator had de-energized the mixer at the breaker. Thinking he was turning the mixer off, he activated the breaker switch and energized the mixer. The victim then entered the mixer and began cleaning without first pushing the toggle switch to make sure that the equipment was deenergized. The mixer operator returned from making his telephone call and pushed the toggle switch to check that the mixer was deenergized. The mixer started, and the operator heard the victim scream. He went immediately to the main breaker panel and shut off the mixer.

Within 30 minutes, the emergency medical service (EMS) transported the victim to a local hospital and then to a local trauma center. He died approximately 4 hours later [NIOSH 1995].

2. Uncontrolled electrical energy

A 53-year-old journeyman wireman was electrocuted when he contacted two energized, 6.9-kilovolt buss terminals. The victim and two coworkers (all contract employees) were installing electrical components of a sulfur dioxide emission control system in a 14-compartment switch house.

The circuit breaker protecting the internal buss (a conducting bar, rod, or tube that carries heavy currents to supply several electric circuits) within the switch house had been tripped out and marked with a tag — but it had not been secured by locking. This procedure was consistent with the hazardous energy control procedures of the power plant.

The victim and his coworkers were wiping down the individual compartments before a pre-startup inspection by power plant personnel. Without the knowledge of the victim and his coworkers, power plant personnel had energized the internal buss in the switch house. When the victim began to wipe down one of the compartments

at the south end of the switch house, he contacted the A-phase buss terminal with his right hand and the C-phase buss terminal with his left hand. This act completed a path between phases, and the victim was electrocuted.

A coworker walking past the victim during the incident was blown backward by the arcing and received first-degree flash burns on his face and neck. A second coworker at the north end of the switch house heard the explosion and came to help. He notified the contractor's safety coordinator by radio and requested EMS. The EMS responded in about 15 minutes and transported the victim to a local hospital emergency room where he was pronounced dead [NIOSH 1994].

3. Uncontrolled kinetic energy

A 38-year-old worker at a county sanitary landfill died after falling into a large trash compactor used to bale cardboard for recycling. The cardboard was lifted 20 feet by a belt conveyor and fed through a 20- by 44-inch opening into a hopper. The hopper had automatic controls that activated the baler when enough material collected in the baling chamber. When the baler was activated, material in the chamber was compressed by a ram that entered the chamber from the side. Excess material above the chamber was trimmed by a shearer.

On the day of the incident, cardboard jammed at the conveyor discharge opening. Without stopping, deenergizing, or locking out the equipment, the victim rode the conveyor up to the discharge opening to clear the jam. He fell into the hopper and the baling cycle was automatically activated, amputating his legs. The victim bled to death before he could be removed from the machine [Colorado Department of Public Health and Environment 1994].

4. Uncontrolled potential energy

The 32-year-old owner of a heavy equipment maintenance business died after a wheel and tire assembly exploded during repair work. The victim was removing the assembly from a test roller when it exploded and struck him with the flying split rim of the wheel.

The test roller was a large, two-wheeled cart that carried about 60,000 pounds of concrete weights. The roller was used in highway construction to test road surfaces for proper compaction.

The victim had been working as a subcontractor to repair the wheel and tire assembly, which had been smoking earlier in the day and was believed to be rubbing against the concrete weights. The assembly consisted of a two-piece outside rim and an inside ring retainer that was held together and mounted on the axle by 20 wheel bolts and nuts. Normal air pressure for the mounted tire was 70 psi.

The victim raised and blocked the roller. Without discharging the air from the tire and using no personal protective equipment, he began to remove the wheel nuts using a pneumatic impact wrench. He had no training or experience with this type of work or in the servicing of this type of wheel. He did not realize that only some of the bolts held the wheel tire assembly to the axle. The remainder held the outer half of the rim to the inside half, securing the tire to the wheel. As the victim removed the nineteenth wheel nut, the pressurized air in the tire discharged explosively, causing the split rim to fly off the wheel and strike him. He died from cerebral contusions and lacerations [Minnesota Department of Health 1992].

5. Uncontrolled kinetic and thermal energy

A 33-year-old janitorial worker died after he was trapped inside a linen dryer at a hospital laundry while cleaning plastic debris from the inside of the dryer drum. The cleaning task (which usually took 15 minutes to an hour) involved propping open the door to the dryer with a piece of wood and entering the 4- by 8-foot dryer drum. The melted debris was removed by scraping and chiseling it with screwdrivers and chisels. The dryer was part of an automated system that delivered wet laundry from the washer through an overhead conveyor to the dryer, where it was dried during a 6-minute cycle with air temperatures of 217° to 230° F. The system control panel was equipped with an error light that was activated if the dryer door was open, indicating that the dryer was out of service.

On the night of the incident, the victim propped the door open and entered the dryer drum without deenergizing or locking out the dryer. He began to clean the inside of the drum. Although the error light had been activated when the door was propped open, the signal was misinterpreted by a coworker, who restarted the system. When the system was restarted, the overhead conveyor delivered a 200-pound load of wet laundryto the dryer — knocking out the wooden door prop, trapping the victim inside, and automatically starting the drying cycle. The victim remained trapped inside until the cycle was completed and was discovered when the load was discharged from the dryer. He died thirty minutes later of severe burns and blunt head trauma [Massachusetts Department of Public Health 1992].

Conclusions

Review of the NIOSH data indicates that three related factors contribute to injuries and deaths that occur when workers perform installation, maintenance, service, or repair work near hazardous energy sources:

- Failure to completely deenergize, isolate, block, and/or dissipate the hazardous energy source.
- Failure to lockout and tagout energy control devices and isolation points after the hazardous energy source has been deenergized.
- Failure to verify that the hazardous energy source was deenergized before beginning work.

These fatalities could have been prevented if comprehensive hazardous energy control procedures had been implemented and followed.

NIOSH recommends that employers implement the following steps to prevent injuries and deaths of workers who must work with hazardous energy in their jobs:

1. Comply with OSHA regulations.
2. Develop and implement a hazardous energy control program.
3. Identify and label all hazardous energy sources.
4. Deenergize, isolate, block, and/or dissipate all forms of hazardous energy before work begins.
5. Establish lockout/tagout programs that:
    - Require workers to secure energy control devices with their own individually assigned locks and keys — only one key for each lock the worker controls (Use of master keys should be reserved for unusual circumstances when the worker is absent from the workplace. However, if master keys are necessary, keep them under supervisory control. List the proper procedures for using them in the written program for controlling hazardous energy.);
    - Require that each lock used to secure an energy control device be clearly labeled with durable tags to identify the worker assigned to the lock;
    - Make sure that the worker who installs a lock is the one who removes it after all work has been completed; and
    - If work is not completed when the shift changes, workers arriving on shift should apply their locks before departing workers remove their locks.
6. Verify by test and/or observation that all energy sources are deenergized before work begins.
7. Inspect repair work before reactivating the equipment.
8. Make sure that all workers are clear of danger points before reenergizing the system.
9. Train all workers in the basic concepts of hazardous energy control.

10. Include a hazardous energy control program with any confined space entry program.
11. Encourage manufacturers to design machines and systems that make it easy to control hazardous energy.

Hot topics: Group lockout or tagout

Group lockout and tagout procedures

Whenever servicing and/or maintenance is performed by a group of employees, the employer must develop and implement an energy control procedure that provides authorized and affected employees with the same level of protection as a personal lockout or tagout device. The requirements for group lockout or tagout are set out in section 1910.147(f)(3).

Servicing and maintenance operations performed by a group of employees are often more complex than servicing or maintenance performed by an individual. As a result, group lockout or tagout operations typically require more coordination and communication than personal lockout or tagout operations. Greater coordination between employees is particularly important when more than one craft or department must be involved to complete the task.

Under the standard's group lockout/tagout requirements, a single authorized employee must assume the overall responsibility for the control of hazardous energy for all members of the group while the servicing or maintenance work is in progress.

The authorized employee with the overall responsibility must implement the energy control procedures, communicate the purpose of the operation to the servicing and maintenance employees, coordinate the operation, and ensure that all procedural steps have been properly completed. In such operations, it is critical that each authorized employee involved in the group lockout/tagout activity be familiar with the type and magnitude of energy that may be present during the servicing and maintenance work.

In addition, each employee must affix his/her personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism, before engaging in the servicing and maintenance operation. This enables the authorized employee to have control over his/her own protection, and verify that the equipment has been properly deenergized. Additionally, the lockout or tagout device will inform other persons that the employee is working on the equipment, and as long as the device remains attached, the authorized person in charge of the group lockout or tagout knows that the work has not been completed and that it is not safe to reenergize the equipment.

The servicing employee will continue to be protected by his/her lockout or tagout device until it is removed. The authorized employee in charge of the group lockout or tagout must not remove the group lockout or tagout device until each employee in the group has removed his/her personal device, indicating that he/she is no longer exposed to the hazards from the servicing operation.

When the activities involving group lockout or tagout extend into another workshift, or there is a change of authorized employees, the provisions for shift or personnel changes must also be followed.

Work authorization permits

Work authorization permits may play a role in an employer's group lockout/tagout procedures. A work authorization permit is a document authorizing employees to perform specific tasks. While the Lockout/Tagout standard does not specifically require the use of a work authorization permit, these documents may be used as a means of achieving compliance with the group lockout or tagout requirements.

If a work authorization permit is used to achieve compliance with group lockout/tagout provisions, it must be included in the employer's written procedures. The permit must identify the equipment to be serviced, the types and unique energy characteristics to be encountered, methods for safe work, and the process or procedures to be used to accomplish the task.

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Hot topics: Multiple energy sources/Multiple items of equipment

Multiple energy sources

Equipment or machines that are subject to the Lockout/Tagout standard may possess more than one type of hazardous energy. These may be in the form of mechanical, hydraulic, pneumatic, chemical, thermal, or other types of energy. Any such hazardous energy sources must be locked out/tagged out and all stored energy dissipated and/or restrained before an authorized employee engages in any servicing and maintenance activity.

Hazardous energy from interconnected or nearby machines or equipment

When authorized employees implement an energy control procedure for a particular machine or equipment without regard for other machines or equipment in the area, they could still be subject to hazardous energy from interconnected or nearby machines or equipment.

Interconnected machines or equipment

If an authorized employee is exposed to the unexpected energization, start up, or release of stored energy from interconnected machines or equipment, the energy control procedures for all interconnected machines or pieces of equipment must be implemented.

Example: An authorized employee is changing a snapped belt on a motor. The authorized employee has deenergized and locked out the motor according to the energy control procedure for that piece of equipment. The motor is located directly over the interconnected conveyor, which is stopped but has not been deenergized or locked out. The conveyor has a different energy isolation point than the motor and may have an auxiliary power source or the capacity to release stored energy and startup unexpectedly. The authorized employee must stand on the conveyor in order to replace the belt. If the conveyor were unexpectedly started, the authorized employee could be severely injured. Since the conveyor is interconnected and exposes the authorized employee to the potential for injury from unexpected startup, the energy control procedures for the motor must ensure that servicing and maintenance employees are not exposed to hazards posed by the conveyor. The energy control procedures for the motor must require that energy control procedures for the conveyor be implemented, as well.

Nearby machines or equipment

If an authorized employee, in performing service and maintenance work on a machine or piece of equipment, is exposed to hazardous energy from nearby machines or equipment, the employer is required to provide the employee with protection from these hazardous energy sources.

Example: Using the belt replacement scenario above, the authorized employee could be subject to the hazardous energy associated with a nearby production process where a robot arm is operating. When the robot arm operates, it could strike the authorized employee replacing the belt. In this event, the employer must provide protection from the hazardous energy associated with the nearby robot arm by either:

- Complying with the machine safeguarding standards and effectively guarding the nearby robot arm to not only protect the operators of the equipment but to protect servicing and maintenance employees replacing the belt.
- Locking out or tagging out the nearby robot arm if:
  - the guarding is not adequate, or
  - the design or installation of the equipment would not permit such machine safeguarding, or
  - compliance with the Lockout/Tagout standard, 1910.147, provides the only feasible method.

In either instance, the employer must ensure that servicing and maintenance employees are not subject to hazardous energy from nearby machinery and equipment while carrying out servicing and maintenance activities on machines or equipment.

Hot topics: Lockout/tagout and machine guarding

Hazard of unexpected energization

The Lockout/Tagout standard does not apply to servicing and maintenance operations if employees are not exposed to the risk of injury from the unexpected energization, start up, or release of hazardous energy while performing service or maintenance tasks.

Some servicing or maintenance activities do not expose workers to potential harm from the unexpected energization, startup, or release of hazardous energy because precautions taken by the employer provide effective employee protection when performing servicing and maintenance operations. These measures may include the use of a multi-step startup procedure, time delays, or audible warnings. In such relatively uncommon situations, lockout/tagout requirements do not apply. However, such alternative precautions must be carefully evaluated for their effectiveness in light of the configuration of the machinery, the reliability of the alternative measures, employee training, and other factors.

The Lockout/Tagout standard does not apply to servicing or maintaining cord- and plug-connected electrical equipment when the equipment is unplugged from its energy source and the plug is under the exclusive control of the employee performing the service and/or maintenance activity. “Under the exclusive control” refers to instances in which the plug is physically in the possession of the employee, or in arm’s reach and in the line of sight of the employee, or in which the employee has affixed a lockout/tagout device to the plug. This enables the employee to prevent the equipment from becoming reenergized during servicing or maintenance.

Normal production operations vs. servicing and/or maintenance

The Lockout/Tagout standard makes a distinction between two types of workplace activities: servicing and/or maintenance and normal production operations. It is intended to provide employees with protection from the unexpected energization, start up, or release of stored energy, while performing servicing and/or maintenance operations. The machine guarding standards are intended to provide employee protection against the hazardous energy associated with normal production operations. However, certain types of servicing and/or maintenance performed during normal production operations are also subject to the Lockout/Tagout standard.

Under the Lockout/Tagout standard, normal production operations are defined as the utilization of a machine or equipment to perform its intended production function.

Normal production operation is the mode in which an energized machine or equipment operates to either manufacture a product or perform a function necessary to assist in the manufacturing process. This mode of operation may present additional hazards to employees, including points of operation; e.g. ingoing nip points, crushing hazards due to the motion of the machine or equipment and due to the movement of the power transmission apparatus. The machine guarding standards establish provisions for employee protection against hazardous energy and points of operation while the equipment is energized in order to perform its intended production function.

Employee protection from hazardous energy during normal production operations is generally accomplished by compliance with applicable machine guarding standards. However, if a servicing or maintenance operation takes place during normal production operations, and the employee is required to remove or bypass machine guarding required by Subpart O, or to place part of his/her body into an area in which he/she is exposed to the unexpected energization or activation of the equipment, the protections of the Lockout/Tagout standard would apply. In these circumstances, the employee performing servicing or maintenance would be subjected to hazards that are not encountered as part of the normal production operation.

Servicing and/or maintenance is defined as workplace activities, including installing, setting up, inspecting, adjusting, repairing, replacing, constructing, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment, and making

adjustments or tool changes, during which the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy. Setting up would include any work performed to prepare a machine or equipment to perform its normal production operation.

Many servicing and/or maintenance activities require the machine, equipment, or its components to be disassembled or dismantled. These tasks are typically performed with the equipment stopped. Other servicing and maintenance activities would not require the employer to disassemble or dismantle the machine or equipment but would nonetheless require shutdown of the equipment or machine. This would cause the associated production process to be discontinued during the servicing and maintenance.

Servicing and/or maintenance activities may expose an employee to the unexpected energization, start up, or release of stored energy. The Lockout/Tagout standard establishes provisions to deenergize equipment in such cases and to render all potentially hazardous energy safe, prior to engaging in servicing and maintenance activities. These provisions are intended to protect employees from the equipment being energized or started while servicing and/or maintenance is being performed.

Minor servicing exception

Some servicing operations performed during normal production operations are excepted from coverage under the Lockout/Tagout standard. This exception is referred to as the minor servicing exception. The Lockout/Tagout standard is not intended to cover minor servicing activities that are necessary to carry out the production process provided that associated danger zones are properly guarded. The machine guarding standards cover these types of operations.

The Lockout/Tagout standard contains specific criteria that must be met for the minor servicing exception to apply. Minor tool changes and adjustments,and other minor servicing activities that take place during normal production operations, are not covered by the standard if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

If the servicing operation is routine, repetitive, and must be performed as part of the production process, the employer must use alternative protective methods or safeguarding devices (such as remote oilers and specially designed servicing tools), to protect employees.

Three specific criteria can be used to determine if the minor servicing exception would apply to a particular activity.

First, the activity must be conducted during normal production operations, i.e., while the machine or equipment is actually performing its intended production function.

Second, the activity must be:

- Routine: The activity must be a regular course of procedure and be in accordance with established practices.
- Repetitive: The activity must be regularly repeated as part of the production process.
- Integral: The activity must be essential to the production process.

Third, if all of these apply, the employer must use alternative measures to provide effective protection from the hazardous energy. Some acceptable alternative measures include specially designed tools, remote devices, interlocked barrier guards, local disconnects, or control switches which are under the exclusive control of the employer performing the minor servicing. These alternative measures must enable the employee to safely perform the servicing task without being exposed to the unexpected energization or activation of the equipment, or the release of stored energy.

If the minor servicing exception is not met in full, the Lockout/Tagout standard is applicable and the machine or equipment must be deenergized and all potentially hazardous energy rendered safe.

OSHA COMPLIANCE MANUAL

Examples of servicing and maintenance vs. normal production operations and minor servicing

Printing shop

In a printing shop, when a printing press is being used to produce printed materials, there is often the need to make minor adjustments such as to correct for paper misalignment while the press is running. This is a part of the production process, and is subject to the machine guarding requirements. The use of remote control devices which keep the employees from reaching beyond the machine guards, or the use of inch (or jog) devices that permit machine speed control for test purposesobviate the need for lockout/tagout. However, printing presses may jam, requiring an employee to bypass the machine guards in order to reach the area of the jam and clear it. Although the need to unjam the machine arises during normal production operations, it is a servicing activity that involves employee exposure to unexpected activation of the machine or release of energy, and is covered under the Lockout/Tagout standard.

Machine shop

In a machine shop, a milling machine operator must adjust the flow of coolant oil to parts being milled while the cutting tool is in operation. This operation, which is part of the normal production process for the machine, is covered by the machine guarding requirements, which prevent employee contact with nip points and other points of operation. However, if it becomes necessary to perform an adjustment which requires the employee to bypass a guard or to place any part of his/her body in an area where work is performed on the material or where a danger zone exists during the machine's operating cycle, the Lockout/Tagout standard applies. If this step is performed without having to bypass the guard, reach into a danger zone, or otherwise expose the employee to the potential release of energy or the unexpected activation of the machine, the Lockout/Tagout standard would not apply.

Plastic sheet application machine

An employee is operating a machine that applies and seals a clear plastic sheet around a packaged product. There is a blade on the machine that cuts the plastic sheets, and this blade must be cleaned periodically during the production process. Since the process must be stopped to clean off the blade, that this operation is more in the nature of servicing or maintenance than normal production; on the other hand, since it must be performed frequently during production, it is arguable also part of the production process. Because the requirements of the Lockout/Tagout standard and Subpart O dovetail, protection must be provided regardless of whether the above operation is considered to be production or servicing. If it is considered by the employer to be production, the employee must be fully protected from the dangers of contacting the blade or other harmful machine parts; the cleaning must be done with special tools and procedures to provide the necessary protection. However, if it is considered to be servicing, outside of production, and the employee is exposed to a point of operation or an associated danger zone, the provisions of the Lockout/Tagout standard would apply.

Group lockout/tagout

The following information provides OSHA enforcement guidelines, policy, and examples of various group LO/TO procedures. It is taken from Chapter 4 of OSHA's compliance directive, CPL 02-00-147 *The Control of Hazardous Energy — Enforcement Policy and Inspection Procedures.*

NOTE: As a result of a legal settlement with the National Association of Manufacturers (NAM), OSHA incorporated group LOTO language into OSHA Instruction STD 17.3, dated September 11, 1990. This chapter contains and references the policy that previously was contained in sections I.7, I.8 and Appendix C, Section B of the directive, which was cancelled February 11, 2008.

I. **Definitions.** Group LOTO terms are defined in Chapter 1, Section IX of this document.

II. **Background.** Group LOTO procedures described in this standard and instruction require each authorized employee to be in control of potentially hazardous energy hazards while performing servicing/maintenance work. A significant rulemaking issue involved group energy control procedures' level of protection and the degree of individual employee control over hazardous energy sources. The proposed rule for group lockout initially specified that an authorized employee would have a primary lock, to be affixed when the equipment is de-energized, and removed when the job is completed. It did not provide for the use of individual lockout or tagout devices by the individual employees in the group. Based on a re-examination of the issue, the final rule required an additional element that was deemed essential for the safety of employees: *Each employee in the group needs to be able to affix her personal lockout or tagout device as part of the group lockout* [LOTO procedure].

OSHA determined that this additional protection, contained in paragraph 29 CFR 1910.147(f)(3)(ii)(D) of the final rule, was necessary for the following reasons:

A. The placement of a personal LOTO device would provide that employee with direct control over her own protection (until the device is removed), rather than having to rely completely on other people;

B. The use of a personal device will reinforce the right of the servicing and maintenance employee to verify that the equipment or machinery has been properly de-energized and isolated in accordance with the energy control procedure; and

C. The presence of the individual employee's lockout or tagout device on an energy isolating device will inform all other persons, including the other authorized employees and supervisors, that the employee is still working on the equipment or machine and that it is not safe to re-energize the system.

III. **Group Lockout/Tagout: Organizational Structure.** Under paragraph 1910.147(f)(3)(i), employers are required to use a procedure that affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device when a crew, craft, department, or other group lockout or tagout device is used. The other elements for group LOTO, contained in paragraph 1910.147(f)(3)(ii), address personal lockout or tagout devices, workforce coordination and overall managerial procedure responsibilities.

Although there are various ways to establish a compliant group energy control program, a group energy control procedure might have the following basic organizational structure.

A. Primary Authorized Employee Designation. A primary authorized employee would be designated. This employee would exercise primary responsibility for implementation and coordination of the overall LOTO of hazardous energy sources for the equipment to be serviced. [§1910.147(f)(3)(ii)(C).]

B. Primary Authorized Employee Coordination. A primary authorized employee would coordinate authorized employee changes and affected workforces (multiple work crews) with equipment operators before and after completion of servicing and maintenance operations that require LOTO. He also has the responsibility to ensure continuity of protection with respect to multi-shift energy isolation (e.g., through the use of group continuity devices, such as "Job Lock" or "Operations Lock" procedures). [§1910.147(f)(3)(ii)(C).]

C. Principal Authorized Employee Designation. Principal authorized employee(s) would be designated for each workforce or crew. When more than one crew, craft, department, etc., is involved, one principal authorized employee would account for a single group of servicing/maintenance personnel. Each principal employee is responsible (to the primary authorized employee) for maintaining accountability and for the individual exposure status of each employee in that specific group in conformance with the company procedure. [§§ 1910.147 (f)(3)(ii)(A) and (B).]

D. Verification System. A verification system is implemented to ensure the continued isolation and de-energization of hazardous energy sources during the course of maintenance and servicing operations. Once the equipment is shut down and the hazardous energy has been controlled, maintenance/servicing personnel, sometimes in conjunction with operations personnel, must test the machinery or equipment to verify that the isolation of the equipment's energy source(s) is effective. The employees may walk through the affected work area to verify isolation. If there is a potential for the release or re-accumulation of hazardous energy, verification of isolation must be continued.

OSHA has accepted an alternative to the individual employee verification requirement where complex LOTO operations involve many employees and numerous energy isolating devices. In such situations, the employer may designate a primary authorized employee, with the primary responsibility for a set number of employees working under the group LOTO device(s). The primary authorized employee must implement and coordinate the LOTO of hazardous energy sources and verify that the steps taken, in accordance with the specific energy control procedure, have in fact isolated the machine or equipment effectively from the hazardous energy sources. This must be accomplished before individual authorized employees participating in the group LOTO affix their personal lockout or tagout device to the group LOTO box and before they perform servicing/maintenance activities.

When a primary authorized employee verifies isolation, all of the authorized employees participating in the group LOTO must be informed of their right also to verify the effectiveness of the lockout measures and must be allowed to personally verify that hazardous energy sources have been effectively isolated, if they so choose. An authorized employee who opts to verify the effectiveness of the isolation measures must perform this verification after affixing his personal lockout or tagout device to the lock box and before performing servicing/maintenance activities.

E. Authorized Employees. Each authorized employee must affix a personal LOTO device to the group lockout device, group lock-box or comparable mechanism and remove that device when she is finished with the servicing or maintenance activity [§1910.147(f)(3)(ii)(D)]. No person may attach or remove another person's LOTO device, including signing on or signing off for another person, unless the provisions of the exception to 29 CFR §1910.147(e)(3) are met.

For example, the authorized employee in charge of a crew ("Principal Authorized Employee") does not remove the group lockout or tagout mechanism from the energy isolating devices until each employee in the group has removed her personal device. Individual employee device removal indicates that employees are no longer exposed to the hazards from the

servicing or maintenance operation. Most importantly, these group LOTO devices (personal lockout or tagout devices; group LOTO mechanisms) ensure that the equipment LOTO devices are maintained on energy isolating devices throughout the "life of the job."

IV. **Group Lockout/Tagout Overview.** Group LOTO is required when more than one employee is engaged in the performance of servicing and/or maintenance activities. Group energy control procedures may need to be tailored to the specific industrial operation, but regardless of the situation, each employee performing servicing or maintenance activities must be in control of the associated hazardous energy throughout the entire period of her exposure. Absent compliance with the §1910.147(e)(3) exception, no employee may affix (or remove) the personal LOTO device of another employee.

The following energy control procedure overview addresses the employer's group LOTO requirements, and is intended to supplement other policy contained in this manual:

A. Shutdown Preparation. Before the machine or equipment is turned off or shut down, each authorized employee (who is to be involved during the servicing/maintenance operation) must have knowledge of the type and magnitude of the hazards related to the energy to be controlled and of the means to control the energy. [§1910.147(d)(1).] In the event that the machine or equipment was shut down on a previous shift, the authorized employee must be made aware of these elements before beginning his work.

B. Shutdown. An orderly shutdown of the machine or equipment must be conducted that conforms to the appropriate documented company procedure for the machine or equipment. The shutdown must be implemented in a manner that ensures that no new or increased hazards are created by the shutdown. [§1910.147(d)(2).]

C. Affected Employee Notification. The employer or an authorized employee must notify affected employees prior to applying LOTO devices. Such notification ensures that employees do not attempt to reactivate a machine or piece of equipment that has been taken out of service. [§1910.147(c)(9).]

D. Isolation. All energy isolating devices needed to control the hazardous energy to the machine or equipment must be physically located and operated so that they isolate the machine or equipment from the source(s) of energy. [§1910.147 (d)(3).]

E. Application of Lockout/Tagout Devices. Each authorized employee(s) must personally affix a lockout or tagout device to each energy isolating device (or the group LOTO mechanism associated with the energy isolating devices) and no employee may affix a personal LOTO device for another employee. [§1910.147 (d)(4)(i).] During all group LOTO operations where the release of hazardous energy is possible, each authorized employee performing servicing or maintenance shall be protected by his personal lockout or tagout device and by the company procedure.

NOTE: Paragraph 1910.147 (f)(3)(ii)(D) requires each employee in a group to affix his personal LOTO device as part of the group LOTO. Verbal accountability methods do not afford protection equivalent to that provided by the implementation of a personal LOTO device. The Occupational Safety and Health Commission (OSHRC) affirmed a citation on this matter by stating that this requirement clearly and explicitly mandates the use of a personal lockout or tagout device in a tagging situation because the core concept of LOTO is *personal* protection. See Exelon Generating Corp., LaSalle County Station, OSHRC (Docket No. 00-1198, 2005).

1. The guidance contained in this chapter illustrates various types of compliant group energy control procedures. For example, a single lock on each energy isolating device, together with the use of a lockbox for retention of the locks' keys, would permit authorized employees personal control of the hazardous energy source(s), if each authorized

employee personally locked the lock-box. See the Type B group lockout illustration for further details on this technique. [§1910.147(f)(3)(i).]

2. Locks shall be affixed in a manner that will hold the energy isolating device in a safe (off) position. [§1910.147(d)(4)(ii).]

3. Tagout devices, where used, shall be affixed at the same location as would a lock if such fittings are provided, or shall be affixed in a manner that will clearly indicate that movement of the isolating device is prohibited. [§1910.147(d)(4)(iii).]

F. Stored Energy. Following the application of locks or tags, all potentially hazardous stored energy or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe. [§1910.147(d)(5)(i).]

If there is a possibility of re-accumulation of stored energy, verification of energy isolation must be continued until the servicing or maintenance work is completed or the hazard no longer exists [§1910.147(d)(5)(ii).]

Monitoring may be accomplished, for example, by visual observation and/or with the aid of a monitoring device (test instrument) that will sound an alarm if a hazardous energy level is being approached. The standard requires the employer to continue to verify isolation when energy leaks may reach dangerous levels. This may involve means such as continuous monitoring for the displacement of oxygen or the buildup of flammable gases or vapors to concentrations approaching and exceeding the lower explosive level of a substance.

G. Verification of Isolation. Depending upon the measures necessary to detect the presence of hazardous energy, the verification of isolation may involve the use of a test instrument (e.g., combustible gas indicator), a visual inspection, and/or a deliberate attempt to start-up machines or equipment. Authorized employees shall take whatever means are necessary to test the machine or equipment to reliably verify that isolation and de-energization have been effectively accomplished before starting servicing/maintenance work on machines or equipment that has been locked or tagged out. [§1910.147(d)(6).] Energy control procedures must include these specific requirements for the testing of machine(s) or equipment to determine the effectiveness of LOTO devices and other control measures. [§1910.147 (c)(4)(ii)(D).]

Verification must be performed by each authorized employee before starting work following a shift change unless the employer elects to incorporate the primary authorized employee verification system alternative described in Chapter 3, Section XV and in Section III.D of this chapter. Specific procedures that will ensure the continuity of the LOTO protections during shift or personnel changes are required by paragraph (f)(4) of the standard. Paragraph (f)(4) also requires specific procedures on the transfer of LOTO device protection between off-going employees and on-coming employees.

NOTE: In multi-shift group LOTO servicing/maintenance operations, individual oncoming employees must be provided an opportunity to verify that the equipment or machine has been de-energized. The oncoming employees may not depend upon the actions of another employee or supervisor from an earlier shift for assurance that the job is safe to work.

H. Servicing/Maintenance. Servicing or maintenance work is performed on the locked out or tagged out machine or equipment.

I. Release from Lockout/Tagout. Release from LOTO shall be accomplished in compliance with the requirements at §1910.147(e).

1. *Inspection*. The machine or equipment area shall be inspected to ensure that it is cleared of nonessential items, which could result in employee injuries, and to ensure the

machine or equipment components are operationally intact (e.g., to check that safeguards are properly applied and functioning). [§1910.147(e)(1).]

2. *Employee Removal of Lockout/Tagout Device*. Each authorized employee must remove their respective lockout or tagout device from the energy isolating devices or from the group lock-box(es) following the procedure established by the company. [§1910.147(e)(3).]

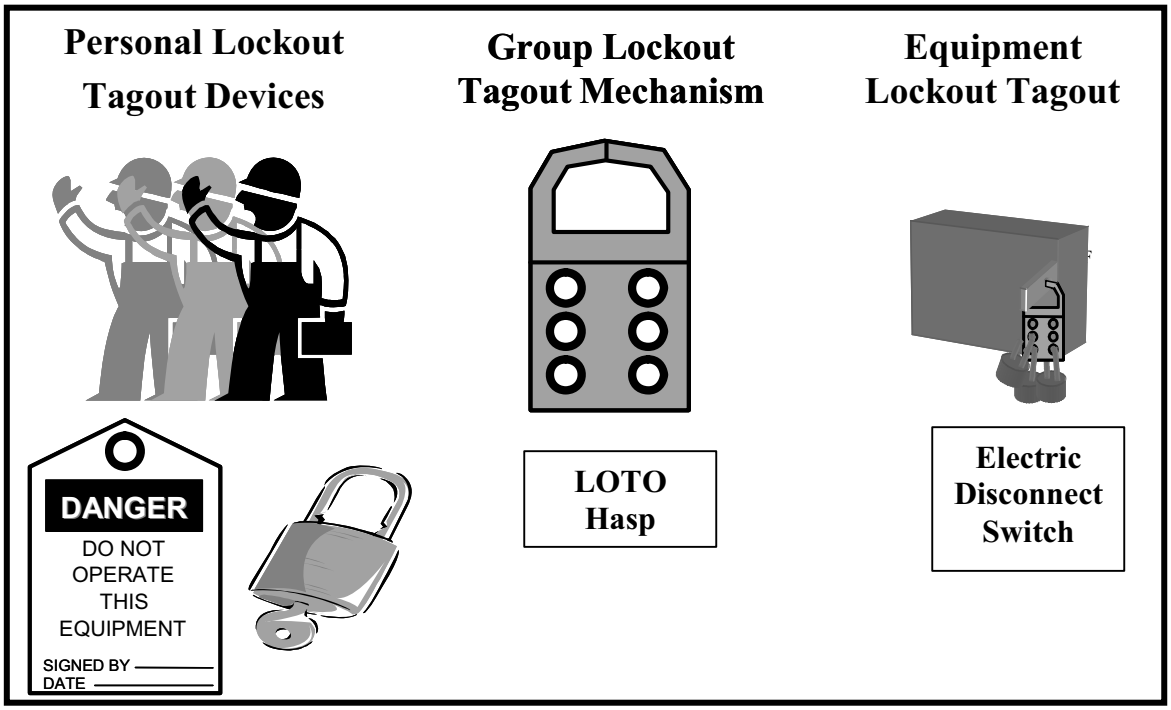
3. *Employee Positioning*. Before re-energization, all employees in the machine or equipment area shall be safely positioned or moved from the area. [§1910147(e)(2).]

4. *Affected Employee Notification*. After the LOTO devices have been removed, affected employees must be notified by the employer or an authorized employee that the control devices have been removed. This notification must be given prior to the starting of a machine or piece of equipment. This communication alerts employees that the machine(s) or equipment is capable of being started up. [§§ 1910.147 (c)(9) and (e)(2)(ii).]

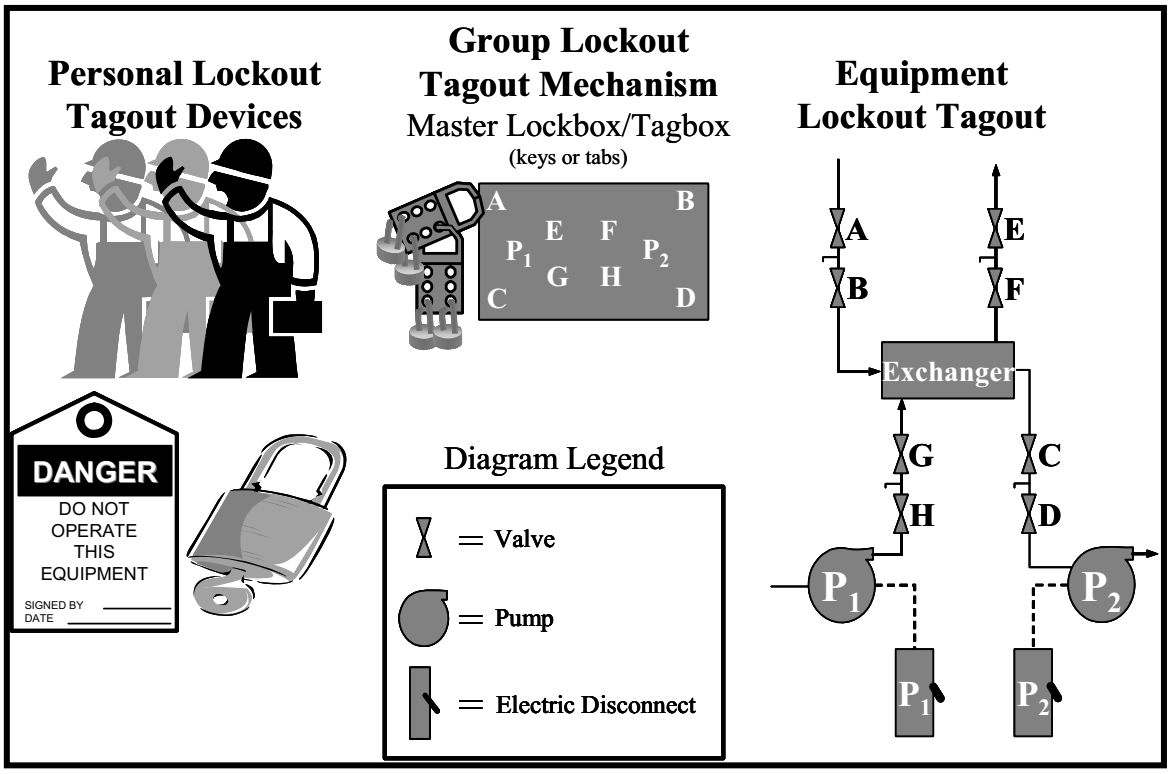
J. Re-energization. Energy may be restored to the machine or equipment.

V. **Conventional Group Lockout/Tagout Procedures.** Conventional group LOTO procedures require the affixing of individual LOTO devices by each authorized employee to a group LOTO mechanism as discussed in this instruction. The following types of procedures and illustrative examples address circumstances ranging from a small group of servicing/maintenance personnel during a one-shift operation to a comprehensive operation involving many employees over a longer period. These examples are not intended to represent the only acceptable procedures for conducting group operations; instead, they illustrate several *feasible alternatives* for having authorized employees affix personal LOTO devices in a group LOTO setting.

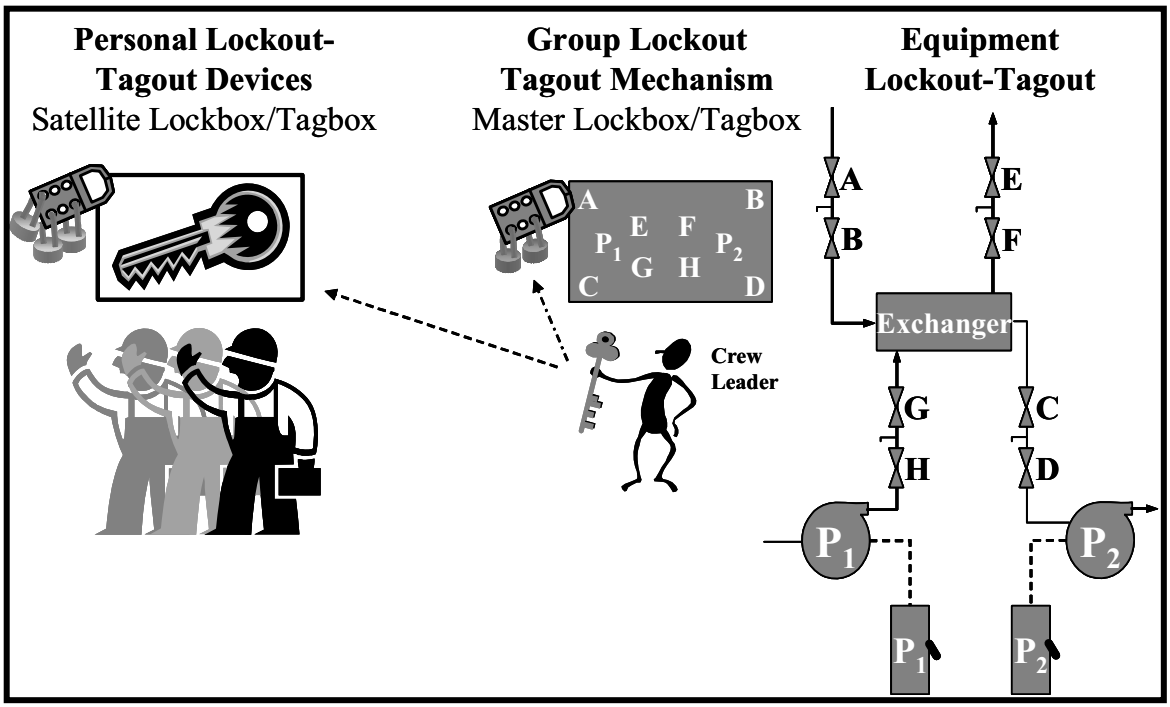
Basic Group LOTO – Type A. Each authorized employee places his personal lock or tagout device on each energy isolating device and removes it upon completion of the assignment. Each authorized employee verifies or observes the de-energization of the equipment.



Master Lockbox/Tagbox – Type B. Under a lock-box procedure, a lock or job-tag with tab is placed on each energy isolation device after de-energization. The key(s) and/or removed tab(s) are then placed into a lock-box. Each authorized employee assigned to the job then affixes his/her personal lock or tag to the lock-box. As a member of a group, each assigned authorized employee verifies that all hazardous energy has been rendered safe. The LOTO devices cannot be removed or the energy isolating device turned on until each individual employee removes their personal lock or tag from the lockbox. Then each appropriate key or tab is matched to its lock or tag, and the machinery/equipment can be re-energized.



Satellite Lockbox/Tagbox –Type C. After each energy isolating device is locked/tagged out and the keys/tabs placed into a master lockbox, each servicing/maintenance group principal authorized employee places his personal lock or tag on the master lockbox. Then each principal authorized employee (Crew Leader) inserts his key into a satellite lockbox to which each authorized employee in that specific group affixes his personal lock or tag. Each authorized employee verifies that all hazardous energy has been rendered safe. Only after the servicing/maintenance functions of the specific subgroup have been concluded and the personal locks or tags of the respective employees within the group have been removed from the satellite lock-box can the principal authorized employee remove his key from the satellite box and remove his lock from the master lock-box.



Job Lock – Type D. During operations to be conducted over more than one shift (or even many days or weeks), a system incorporating a job lock might be used in order to ensure continuation of LOTO protection for employees during shift or personnel changes. First, a primary authorized employee secures the master lock-box/tag-box with a job-lock after all the keys/tag stubs (from the LOTO devices that were affixed to the equipment) are inside the lock-box/tag-box. This step is completed before subsequent locks are applied to the group LOTO mechanism by the various types of authorized employees as described in the above (Type A, B and C) procedures.

NOTE: A job-lock may have multiple keys if they are in the sole possession of the various primary authorized employees (one on each shift). Refer to Chapter 3, Section XV for additional information on LOTO continuity devices.

Thereafter, each authorized employee, through the established group LOTO procedures, affixes their personal lock/tag to a master or satellite (via a principal authorized employee) lock-box/tag-box system. After individual LOTO devices are affixed, each authorized employee then verifies that all hazardous energy has been rendered safe or the primary authorized employee (if designated to do so by the employer's energy control procedure) may verify isolation on behalf of a group of

authorized employees, as described in this chapter. In this manner, the continuity of LOTO protection for authorized employees is maintained during shift and during personnel changes while the procedure also provides the primary authorized employee flexibility and control over the equipment at any appropriate time or shift.

VI. **Alternative Group Lockout/Tagout (Control and Accountability) Procedures.** Under most circumstances, where servicing or maintenance is to be conducted during only one shift by a small number of persons, the installation of each individual's LOTO device would not be a burdensome procedure. When complex equipment is being serviced or maintained, when there are many sources of energy, and/or when servicing/maintenance work extends over more than one work shift, OSHA permits employers to utilize an alternative procedure to each employee locking or tagging out each energy isolating device.

However, consideration must be given to the procedure's organizational structure, as previously described, in order to ensure the safety and control of each of the employees involved. For example, in the servicing and maintenance of sophisticated and complex equipment, such as process equipment in petroleum refining, petroleum production, and chemical production, there may be a need for the adaptation and modification of normal group energy control procedures in order to ensure the safety of employees.

To permit implementation of a pragmatic system, while accommodating the special constraints of the standard's requirement for ensuring employees a level of protection equivalent to that provided by the use of a personal lockout or tagout device, an alternative procedure may be implemented. Lockout/tagout, blanking, blocking, etc. is often supplemented in these situations by the use of work authorization permits and a system (e.g., master tagging systems) of continuous employee accountability.

For example, master tagging systems and work authorization permits are sometimes used to supplement hazardous energy control measures (e.g., locks, tags, blanking, blocking) through a system that provides for individual employee control and continuous employee accountability.

In evaluating whether the equipment being serviced or maintained is so complex as to necessitate a departure from the conventional group lockout/tagout procedures, the following factors (often occurring simultaneously) are among those which must be evaluated:

A. Physical size and extent of the equipment being serviced/maintained;

B. Relative inaccessibility of the energy isolating devices;

C. Number of employees performing the servicing/maintenance;

D. Number of energy isolating devices to be locked/tagged out; and

E. Interdependence and interrelationship of the components in the system or between different systems.

Once the equipment is shut down and the hazardous energy has been controlled, maintenance/servicing personnel, together with operations personnel, must test the machinery or equipment to verify that the isolation of the equipment's energy source(s) is effective. The employees may walk through the affected work area to verify isolation. If there is a potential for the release or re-accumulation of hazardous energy, verification of isolation must be continued. The servicing/maintenance employees may further verify the effectiveness of the isolation by the procedures that are used in doing the work (e.g., using a bleeder valve to verify depressurization, use of combustible gas test instruments to check for the presence of flammable vapor/gases; flange-breaking techniques, etc.). Throughout the maintenance and/or servicing activity, operations personnel normally maintain control of the equipment.

The following procedures are presented as examples to illustrate the implementation of a group energy control procedure involving many energy isolating devices and/or many servicing/maintenance personnel. Specific issues related to the control of hazardous energy in complex process equipment are described below. This discussion is intended only as an example and is not anticipated to reflect operations at any specific facility.

A. Complex process equipment, which is scheduled for servicing/maintenance operations, is generally identified by plant supervision. Plant supervision would issue specific work orders regarding the operations to be performed.

B. In many instances where complex process equipment is to be serviced or maintained, the process equipment operators conduct the shutdown procedure. This is generally due to their in-depth knowledge of the equipment and the need to conduct the shut-down procedure in a safe, cost-effective and orderly sequence.

C. The operations personnel normally prepare the equipment for LOTO as they proceed with the shutdown and identify the locations for blanks, blocks, etc., by placing operations locks and/or tags (Job Locks) on the equipment. The operations personnel can be expected to isolate the hazardous energy, and drain and flush fluids from the process equipment following a standard procedure or a specific work permit procedure.

D. An employer representative or an authorized employee notifies affected employees prior to applying LOTO devices.

E. Upon completion of shutdown, the operations personnel would review the intended job with the servicing and maintenance crew(s) and would ensure their full comprehension of the energy controls necessary to conduct the servicing or maintenance safely. During or immediately after the review of the job, the servicing and maintenance crew(s) would install locks, tags and/or special isolating devices at previously identified equipment locations following the specified work permit procedure.

F. Line openings necessary for the isolation of the equipment would normally be permitted only by special work permits issued by operations personnel. (Such line openings should be monitored by operations personnel as an added safety measure.)

G. All of the previous steps must be documented by a master system of accountability and should be retained at the primary equipment control station for the duration of the job. The master system of accountability may manifest itself as a Master Tag, which is subsequently signed by all of the maintenance/servicing employees protected by the master tag if they fully comprehend the details of the job and the energy isolation devices actuated or put in place. Signing by the respective employees further establishes that energy isolation training relative to this operation has been conducted.

H. After the system has been rendered safe, the authorized employees verify the effectiveness of energy controls in controlling hazardous energy.

NOTE: OSHA has recognized the need for an alternative to the verification requirement where complex LOTO operations involve many employees and numerous energy isolating devices. In such situations, the employer may designate a primary authorized employee (PAE), with the responsibility for a set number of employees working under the group LOTO device(s). The primary authorized employee must implement and coordinate the LOTO of hazardous energy sources and verify that the steps taken, in accordance with the specific energy control procedure, have in fact isolated the machine or equipment effectively from the hazardous energy sources.

In addition to the primary authorized employee, each authorized employee participating in the group LOTO must be informed of his right to verify the effectiveness of the lockout measures, and each authorized employee must be allowed to personally verify, if he so chooses, that hazardous

energy sources have been effectively isolated. An authorized employee who opts to verify the effectiveness of the isolation measures must perform this verification simultaneously with or after the PAE verifies the accomplishment of energy isolation and after the authorized employee affixes her personal lockout or tagout device to the group LOTO mechanism. These steps must be taken before authorized employees perform servicing/maintenance activities.

I. Specific work functions are controlled by work permits, which are issued for each shift. Each day each authorized employee assigned must sign in on the work permit at the time of arrival to the job and sign out at departure. Signature, date, and time for sign-in and sign-out would be recorded, reviewed and retained by the applicable crew supervisor who, upon completion of the permit requirements, would return the permit to the operations supervisor. Work permits could extend beyond a single shift and may consequently be the responsibility of several supervisors.

J. Upon completion of the tasks required by the work permit, the authorized employees' names could be signed off the Master Tag by their supervisor once all employees have signed off the work permit. The work permit is then attached to the Master Tag so that the accountability of exposed employees is maintained.

K. As the work is completed by the various crews, the work permits and the accountability of personnel are reconciled jointly by the primary authorized employee and the operations supervisor.

L. During the progress of the work, inspection audits are conducted.

M. Upon completion of all work, the equipment is returned to the operations personnel after the maintenance and servicing crews have removed their LOTO devices, including all completed work permits, and/or special isolating devices following the company procedure.

N. At this time, all authorized employees who were assigned to the tasks are again accounted for and verified to be clear from the equipment area.

O. After the completion of the servicing/ maintenance work, operations personnel remove the LOTO devices originally placed to accomplish energy isolation.

P. After the LOTO devices have been removed, notify affected employees that the control devices have been removed. [This notification must be given prior to the starting of a machine or piece of equipment to alert affected employees that the equipment is capable of being started up.]

Q. Operations personnel then begin inspection and testing of the equipment prior to its being returned to production service.

In summary, the use of the work permit and/or master tag system, combined with the verification of hazardous energy control, work procedures, and walk-through, is an acceptable approach to compliance with the group LOTO and shift transfer provisions, as long as the control and accountability procedure provides a level of protection equivalent to each individual authorized employee affixing her lockout device to the energy isolating device. Work authorization permits, when used, must be included as a component of the company's energy control procedure and would additionally require that the company procedure clearly contain, in conjunction with other energy control procedures, the specific requirements detailed in paragraph 1910.147(c)(4) of the standard.

NOTE: A work authorization permit system fulfilling the *Personal Tagout (Accountability) Device* definitional requirements is considered a *Tagout Device* and, as such, all of the tagout provisions of the standard must be met if this system is used. This includes additional employee training and additional periodic inspection requirements.

Furthermore, as the preceding example procedure illustrates, each employee must sign on/off the permit, and the crew leader (*Principal Authorized Employee*) must present this permit documentation to the person responsible for coordinating group LOTO activities (*Primary Authorized Employee*). The crew leader signs off the master tag only after all crew members are accounted for and after all of the crew member signatures (i.e.,

sign offs) are obtained on the work permit. To ensure a system of continuous employee accountability, the crew leader gives the completed master tag (with signed permit) to the primary authorized employee who is responsible for the overall group LOTO procedure coordination.

This work permit example is an extension of and meets the *Master Tag* definition because the crew leader utilizes the work permit as a satellite control and accountability mechanism. This is similar to the previously described master and satellite lock-box (Type C) example; except that it employs a system of administrative control and continuous employee accountability through a master tag and work permit system instead of personal LOTO devices on satellite- and master-lock boxes.

Energy control safety program (lockout/tagout)

Purpose

This procedure establishes this company's requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment, in accordance with the requirements of OSHA's 1910.147. It is used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

This program applies to all work operations at _____ where employees must deal with lockout/tagout situations as part of their job duties.

Authorized and affected employees

Authorized employees subject to the requirements of this program and to be trained on their duties within it include: _____.

Affected employees subject to the requirements of this program and to be trained on their duties within it include: _____.

Machinery and equipment

The machinery and equipment in this facility that falls under the Control of Hazardous Energy Standard includes the following: _____.

Lockout is the preferred method of isolating machines or equipment from energy sources. Tagout is to be performed instead of lockout only when there is no way to lockout a machine. The following pieces of machinery subject to the Control of Hazardous Energy Standard are not able to be locked out and thus must be tagged out: _____.

Lockout/tagout procedures

Affected employees are notified when their machine is to be locked out according to the following method: _____.

The machinery and equipment listed above follows these shutdown, isolation, blocking and securing procedures for lockout/tagout: _____.

The machinery and equipment listed above follows these lockout placement, removal, transfer, and responsibility procedures: _____. The machinery and equipment listed above follows this procedure to test the machines to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures: _____.

Periodic inspection

A periodic inspection is done, looking at the energy control procedures performed to ensure that the procedure and requirements of the standard are being followed. This inspection is performed _____ _____.

Administrative duties

_____ has overall responsibility for coordinating safety and health programs in this company. _____ is the person having overall responsibility for the Lockout/Tagout Program.

_____ will review and update the program, as necessary. Copies of the written program may be obtained from _____ in _____.

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ELECTRICAL HAZARDS

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Electrical hazards

Introduction

Electricity is such an integral part of everyday life that its power is often taken for granted. In the workplace, employees accept it as a source of power for lights, tools, and equipment — without giving much thought to the significant hazards involved.

One in seven electrical shocks kill. Each year, electrocution is the cause of about nine percent of all work-related deaths and numerous injuries. And often, the victim is not someone whose job it is to install or repair electrical equipment. It's the employee who didn't realize that a worn electrical cord needed replacement, or that special protective equipment was needed to work in the vicinity of exposed live parts or overhead lines.

Between January 1, 2009 and December 31, 2009, federal OSHA statistics show that violations of the electrical standards ranked high in citations. Overall, OSHA cited the electrical standards for 7,835 violations during 2009, not including state-plan states which account for half of the total states. Violations to the three most-cited electrical standards include:

- §1910.303 cited 2,634 times for $2,642,438 initial penalties, averaging $1,003 per penalty.
- §1910.304 cited 695 times for $764,951 initial penalties, averaging $1,100 per penalty.
- §1910.305 cited 3,252 times for $3,018,238 initial penalties, averaging $928 per penalty.

OSHA requires employers to provide employees with a workplace that is free of hazards. Through hazard assessments to identify electrical problem areas, taking corrective actions, and providing workers with appropriate training and PPE, you will be taking a step in the right direction by heightening employee awareness and providing a workplace that is safe from accidents caused by faulty electrical systems or equipment.

The electrical standards address concerns that electricity has long been recognized as a serious workplace hazard, exposing employees to such dangers as electric shock, electrocution, burns, fires, and explosions. In 2007, for example, the Bureau of Labor Statistics reported that 5,488 work-related deaths occurred in private sector workplaces. Two hundred and twelve deaths were the result of contact with electric currents at work. While the number of work-related electrocutions remains relatively unchanged from previous years, the statistics are still tragic because, for the most part, these fatalities could have been easily avoided. For more details, see the Bureau of Labor Statistics reports in the RECORDKEEPING chapter.

OSHA's electrical standards

OSHA's general industry electrical standards, found in Subpart S, §1910.301 through §1910.399 are based on the National Fire Protection Association's Standard NFPA 70E, *Electrical Safety Requirements for Employee Workplaces*, and the *National Electrical Code* (NEC). In addition to general industry, they apply to shipyard employment, longshoring, and marine terminals.

OSHA also has electrical standards for construction, but recommends that employers in this industry follow the general industry electrical standards whenever possible for hazards that are not addressed by their industry-specific standards.

The electrical standards help minimize potential electric-related hazards by specifying safety aspects in the design and use of electrical equipment and systems. Currently, the standards cover only those parts of any electrical system that an employee would normally use or contact. For example, the exposed and/or operating elements of an electrical installation — lighting, equipment, motors, machines, appliances, switches, controls, and enclosures — must be constructed and installed so as to minimize workplace electrical dangers.

OSHA revises design and installation requirements

On February 14, 2007, OSHA issued a revised standard for the design and installation of electric equipment. It is the first revision to the electrical installation requirements since 1981. The changes reflect current industry practices by drawing heavily from the 2000 edition of the National Fire Protection Association's (NFPA) *Electrical Safety Requirements for Employee Workplaces* (NFPA 70E), and the 2002 edition of the *National Electrical Code* (NEC).

The revised provisions, which were effective August 13, 2007, are intended to help eliminate inconsistencies and confusion between OSHA's requirements and many state and local building codes which have adopted updated NFPA and NEC provisions. They also address stakeholder requests to revise the standard so that it conforms with the most recent edition of NFPA 70E with requirements for:

- Identifying multi-wire branch circuits;
- Providing signage for on-site emergency power sources; and
- Marking and listing power sources for power-limited fire alarm circuit power sources.

For workplaces covered by the changes, the impact is far-reaching. "Qualified" employees have new "workmanship" requirements and new rules for replacing equipment. "Unqualified" employees (such as safety supervisors) have new requirements for locking out and tagging disconnecting means for certain electrical equipment.

Qualified versus unqualified workers

For some time, OSHA has divided employees into two groups regarding the training and experience levels needed to work on electrical systems. OSHA uses the term "qualified" and "unqualified" to distinguish between those employees.

The qualified person must know when, where, and how to place barriers; how to lockout and tag a disconnecting means; and how to work on the system. Some new requirements specifically for qualified employees address:

- Workmanship when installing electrical equipment such as rat's nest and wiring packed too tight (fire hazard).
- Working space around electrical equipment (elbow room).
- Procedures for replacing electrical equipment such as new receptacles.

Unqualified employees, those that do not work directly with electrical systems, still have to be able to recognize electrical hazards, stay clear of barricaded areas when qualified employees are working on electrical systems, and recognize appropriate lockout/tagout implementation. Additionally, they have to ensure that portable tools and extension cords are plugged into Ground Fault Circuit Interrupters (GFCIs) and that equipment with flexible cords (i.e., the cords that came with the equipment) are plugged directly into a receptacle.

The following section provides an overview of basic electrical safety for individuals with little or limited training or familiarity with electrical hazards. The concepts and principles presented will help further an understanding of OSHA's electrical safety standards.

How electricity acts

Electricity is essential to modern life, both at home and on the job. Some employees work with electricity directly, as is the case with engineers, electricians, electronic technicians, and power line workers. Others, such as office workers and sales people, work with it indirectly. As a source of power, electricity is accepted

without much thought to the hazards encountered. Perhaps because it has become such a familiar part of our surroundings, it often is not treated with the respect it deserves.

To handle electricity safely, it is necessary to understand how it acts, how it can be directed, what hazards it presents, and how these hazards can be controlled. Operating an electric switch may be considered analogous to turning on a water faucet. Behind the faucet or switch there must be a source of water or electricity, with something to transport it, and with pressure to make it flow. In the case of water, the source is a reservoir or pumping station; the transportation is through pipes; and the force to make it flow is pressure, provided by a pump. For electricity, the source is the power generating station; current travels through electric conductors in the form of wires; and pressure, measured in volts, is provided by a generator.

Resistance to the flow of electricity is measured in ohms and varies widely. It is determined by three factors:

- Nature of the substance itself,
- Length and cross-sectional area (size) of the substance, and
- Temperature of the substance.

Some substances, such as metals, offer very little resistance to the flow of electric current and are called conductors. Other substances, such as bakelite, porcelain, pottery, and dry wood, offer such a high resistance that they can be used to prevent the flow of electric current and are called insulators.

Dry wood has a high resistance, but when saturated with water its resistance drops to the point where it will readily conduct electricity. The same thing is true of human skin.

When it is dry, skin has a fairly high resistance to electric current; but when it is moist, there is a radical drop in resistance. Pure water is a poor conductor, but small amounts of impurities, such as salt and acid (both of which are contained in perspiration), make it a ready conductor. When water is present either in the environment or on the skin, anyone working with electricity should exercise even more caution than they normally would.

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Electrical accidents

Electrical accidents, when initially studied, often appear to be caused by circumstances that are varied and peculiar to the particular incidents involved. However, further consideration usually reveals the underlying cause to be a combination of three possible factors:

- Work involving unsafe equipment and installations;
- Workplaces made unsafe by the environment; and
- Unsafe work performance (unsafe acts).

The first two factors are sometimes combined and simply referred to as "unsafe conditions." Thus, electrical accidents can be generally considered as being caused by unsafe conditions, unsafe acts, or, in what is usually the case, combinations of the two. Additionally, inadequate maintenance can cause equipment or installations which were originally considered safe to deteriorate, resulting in an unsafe condition.

Some unsafe electric equipment and installations can be identified by the presence of:

- Faulty insulation,
- Improper grounding,
- Loose connections,
- Defective parts,
- Ground faults in equipment,
- Unguarded live parts, and
- Underrated equipment.

The environment can also be a contributory factor to electrical accidents in a number of ways. Environments containing flammable vapors, liquids or gases; areas containing corrosive atmospheres; and wet and damp locations are some unsafe environments affecting electrical safety.

Finally, unsafe acts include the failure to deenergize electric equipment when it is being repaired or inspected, the use of obviously defective and unsafe tools, or the use of tools or equipment too close to energized parts.

How shocks occur

Electricity travels in closed circuits, and its normal route is through a conductor. Electric shock occurs when the body becomes a part of the electric circuit. The current must enter the body at one point and leave at another. Electric shock normally occurs in one of three ways. Individuals, while in contact with the ground, must come in contact with:

1. Both wires of the electric circuit,
2. One wire of an energized circuit and the ground, or
3. A metallic part that has become "hot" by contact with an energized conductor.

The metal parts of electric tools and machines may become energized if there is a break in the insulation of the tool or machine wiring. The worker using these tools and machines is made less vulnerable to electric shock when there is a low-resistance path from the metallic case of the tool or machine to the ground. This is done through the use of an equipment grounding conductor, a low-resistance wire that causes the unwanted current to pass directly to the ground, thereby greatly reducing the amount of current passing through the body of the person in contact with the tool or machine. If the equipment grounding conductor has been properly installed, it has a low resistance to ground, and the worker is protected.

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Severity of the shock

The severity of the shock received when a person becomes a part of an electric circuit is affected by three primary factors:

- Amount of current flowing through the body (measured in amperes),
- Path of the current through the body, and
- Length of time the body is in the circuit.

Other factors that may affect the severity of shock are the frequency of the current, the phase of the heart cycle when shock occurs, and the general health of the person.

The effects of electric shock depend upon the type of circuit, its voltage, resistance, current, pathway through the body, and duration of the contact. Effects can range from a barely perceptible tingle to immediate cardiac arrest. Although there are no absolute limits or even known values that show the exact injury from any given current, the table below shows the general relationship between the degree of injury and amount of current for a 60-cycle hand-to-foot path of one second's duration of shock.

The table also illustrates that a difference of less than 100 milliamperes exists between a current that is barely perceptible and one that can kill. Muscular contraction caused by stimulation may not allow the victim to free himself or herself from the circuit, and the increased duration of exposure increases the dangers to the shock victim. For example, a current of 100 milliamperes for three seconds is equivalent to a current of 900 milliamperes applied for .03 seconds in causing ventricular fibrillation. The so-called low voltages can be extremely dangerous because, all other factors being equal, the degree of injury is proportional to the length of time the body is in the circuit.

LOW VOLTAGE DOES NOT IMPLY LOW HAZARD!

A severe shock can cause considerably more damage to the body than is visible. For example, a person may suffer internal hemorrhages and destruction of tissues, nerves, and muscles. In addition, shock is often only the beginning in a chain of events. The final injury may well be from a fall, cuts, bums, or broken bones.

Effects of electric current in the human body

Current	Reaction
1 Milliampere	Perception level. Just a faint tingle.
5 Milliamperes	Slight shock felt; not painful but disturbing. Average individual can let go. However, strong involuntary reactions to shocks in this range can lead to injuries.
6-25 Milliamperes (women)	Painful shock, muscular control is lost.
9-30 Milliamperes (men)	This is called the freezing current or "let-go" range.
50-150 Milliamperes	Extreme pain, respiratory arrest, severe muscular contractions*. Individual cannot let go. Death is possible.
1,000-4,300 Milliamperes	Ventricular fibrillation. (The rhythmic pumping action of the heart ceases.) Muscular contraction and nerve damage occur. Death is most likely.
10,000-Milliamperes	Cardiac arrest, severe burns and probable death.

*If the extensor muscles are excited by the electric shock, the person may be thrown away from the circuit. Source: W.B. Kouwenhoven, *Human Safety and Electric Shock, Electrical Safety Practices*, Monograph, 112, Instrument Society of America, p. 93. (Papers delivered at the third presentation of the Electrical Safety Course given in Wilmington, DE, in November 1968.)

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Burns and other injuries

The most common shock-related injury is a burn. Burns suffered in electrical accidents may be of three types: electrical burns, arc burns, and thermal contact burns.

Electrical burns

Electrical burns are the result of the electric current flowing through tissues or bone. Tissue damage is caused by the heat generated by the current flow through the body. Electrical burns are one of the most serious injuries you can receive and should be given immediate attention.

Arc or flash burns

Arc or flash burns, on the other hand, are the result of high temperatures near the body and are produced by an electric arc or explosion. They should also be attended to promptly.

Thermal contact burns

Finally, thermal contact burns are those normally experienced when the skin comes in contact with hot surfaces of overheated electric conductors, conduits, or other energized equipment. Additionally, clothing may be ignited in an electrical accident and a thermal burn will result. All three types of burns may be produced simultaneously.

Electric current, even as low as three milliamperes, can also cause injuries of an indirect or secondary nature in which involuntary muscle reaction from the electric shock can cause bruises, bone fractures, and even death resulting from collisions or falls. In some cases, injuries caused by electric shock can be a contributory cause of delayed fatalities.

In addition to shock and burn hazards, electricity poses other dangers. For example, when a short circuit occurs, hazards are created from the resulting arcs. If high current is involved, these arcs can cause injury or start a fire. Extremely high-energy arcs can damage equipment, causing fragmented metal to fly in all directions. Even low-energy arcs can cause violent explosions in atmospheres that contain flammable gases, vapors, or combustible dusts.

Protective measures

There are various ways of protecting people from the hazards caused by electricity, including insulation, guarding live parts, grounding, electrical protective devices, and safe work practices.

Insulation

One way to safeguard individuals from electrically energized wires and parts is through insulation. An insulator is any material with high resistance to electric current. To be effective, the insulation must be appropriate for the voltage, and the insulating material must be undamaged, clean, and dry.

Insulators — such as glass, mica, rubber, and plastic — are put on conductors to prevent shock, fires, and short circuits. Before employees prepare to work with electric equipment, it is always a good idea for them to check the insulation before making a connection to a power source to be sure there are no exposed wires. The insulation of flexible cords, such as extension cords, is particularly vulnerable to damage.

The insulation that covers conductors is regulated by Subpart S, Part 1910.302, Design Safety Standards for Electrical Systems. Subpart S generally requires that circuit conductors (the material through which current flows) be insulated to prevent people from coming into accidental contact with the current. Also, the insulation should be suitable for the voltage and existing conditions, such as temperature, moisture, oil, gasoline, or corrosive fumes. All these factors must be evaluated before the proper choice of insulation can be made.

Conductors and cables are marked by the manufacturer to show the maximum voltage and American Wire Gage size, the type letter of the insulation, and the manufacturer's name or trademark. Insulation is often color coded. In general, insulated wires used as equipment grounding conductors are either continuous green or green with yellow stripes. The grounded conductors that complete a circuit are generally covered with continuous white or natural gray-colored insulation. The ungrounded conductors, or "hot wires," may be any color other than green, white, or gray. They are often colored black or red.

Guarding

Live parts of electric equipment operating at 50 volts or more must be guarded against accidental contact. Guarding of live parts may be accomplished by:

- Location in a room, vault, or similar enclosure accessible only to qualified persons.
- Use of permanent, substantial partitions or screens to exclude unqualified persons.
- Location on a suitable balcony, gallery, or platform elevated and arranged to exclude unqualified persons; or
- Elevation of 8 feet (2.44 meters) or more above the floor.

Entrances to rooms and other guarded locations containing exposed live parts must be marked with conspicuous warning signs forbidding unqualified persons to enter.

Indoor electric wiring more than 600 volts and that is open to unqualified persons must be made with metal-enclosed equipment or enclosed in a vault or area controlled by a lock. In addition, equipment must be marked with appropriate caution signs.

Grounding

Grounding is another method of protecting employees from electric shock; however, it is normally a secondary protective measure. The ten-n "ground" refers to a conductive body, usually the earth, and means a conductive connection, whether intentional or accidental, by which an electric circuit or equipment is connected to earth or the ground plane.

By "grounding" a tool or electrical system, a low-resistance path to the earth is intentionally created. When properly done, this path offers sufficiently low resistance and has sufficient current carrying capacity to prevent the buildup of voltages that may result in a personnel hazard. This does not guarantee that no one will receive a shock, be injured, or be killed. It will, however, substantially reduce the possibility of such accidents, especially when used in combination with other safety measures discussed in this section.

There are two kinds of grounds required in OSHA's electrical standard. One of these is called the "service or system ground." In this instance, one wire, called "the neutral conductor" or "grounded conductor," is grounded. In an ordinary low-voltage circuit, the white (or gray) wire is grounded at the generator or transformer and again at the service entrance of the building. This type of ground is primarily designed to protect machines, tools, and insulation against damage.

To offer enhanced protection to the workers themselves, an additional ground, called the "equipment ground," must be furnished by providing another path from the tool or machine through which the current can flow to the ground. This additional ground safeguards the electric equipment operator in the event that a malfunction causes the metal frame of the tool to become accidentally energized. The resulting heavy surge of current will then activate the circuit protection devices and open the circuit.

Circuit protection devices

Circuit protection devices are designed to automatically limit or shut off the flow of electricity in the event of a ground-fault, overload, or short circuit in the wiring system. Fuses, circuit breakers, and ground-fault circuit interrupters are three well known examples of such devices.

Fuses and circuit breakers are over-current devices that are placed in circuits to monitor the amount of current that the circuit will carry. They automatically open or break the circuit when the amount of current

flow becomes excessive and therefore unsafe. Fuses are designed to melt when too much current flows through them. Circuit breakers, on the other hand, are designed to trip open the circuit by electro-mechanical means.

Fuses and circuit breakers are intended primarily for the protection of conductors and equipment. They prevent over-heating of wires and components that might otherwise create hazards for operators. They also open the circuit under certain hazardous ground-fault conditions.

The ground-fault circuit interrupter, or GFCI, is designed to shutoff electric power within as little as $^1/_{40}$ of a second. It works by comparing the amount of current going to electric equipment against the amount of current returning from the equipment along the circuit conductors. If the current difference exceeds six milliamperes, the GFCI interrupts the current quickly enough to prevent electrocution. The GFCI is used in high-risk areas such as wet locations and construction sites.

Safe work practices

Employees and others working with electric equipment need to use safe work practices. Electrical safety-related work practice requirements are contained in Subpart S, Sections 1910.331-1910.335. These include:

- Deenergizing electric equipment before inspecting or making repairs,
- Using electric tools that are in good repair,
- Using good judgment when working near energized lines, and
- Using appropriate protective equipment.

Training

To ensure that they use safe work practices, employees must be aware of the electrical hazards to which they will be exposed. Employees must be trained in safety-related work practices as well as any other procedures necessary for safety from electrical hazards.

Deenergizing electrical equipment

The accidental or unexpected sudden starting of electrical equipment can cause severe injury or death. Before ANY inspections or repairs are made — even on the so-called low-voltage circuits — the current must be turned off at the switch box and the switch padlocked in the OFF position. At the same time, the switch or controls of the machine or other equipment being locked out of service must be securely tagged to show which equipment or circuits are being worked on.

Maintenance employees should be qualified electricians who have been well instructed in lockout procedures. No two locks should be alike; each key should fit only one lock, and only one key should be issued to each maintenance employee. If more than one employee is repairing a piece of equipment, each should lock out the switch with his or her own lock and never permit anyone else to remove it. The maintenance worker should at all times be certain that he or she is not exposing other employees to danger.

Overhead lines

If work is to be performed near overhead power lines, the lines must be deenergized and grounded by the owner or operator of the lines, or other protective measures must be provided before work is started. Protective measures (such as guarding or insulating the lines) must be designed to prevent employees from contacting the lines.

Unqualified employees and mechanical equipment must stay at least 10 feet away from overhead power lines. If the voltage is more than 50,000 volts, the clearance must be increased by 4 inches for each additional 10,000 volts.

When mechanical equipment is being operated near overhead lines, employees standing on the ground may not contact the equipment unless it is located so that the required clearance cannot be violated even at the maximum reach of the equipment.

Protective equipment

Employees whose occupations require them to work directly with electricity must use the personal protective equipment required for the jobs they perform. This equipment may consist of rubber insulating gloves, hoods, sleeves, matting, blankets, line hose, and industrial protective helmets.

Tools

To maximize his or her own safety, an employee should always use tools that work properly. Tools must be inspected before use, and those found questionable, removed from service and properly tagged. Tools and other equipment should be regularly maintained. Inadequate maintenance can cause equipment to deteriorate, resulting in an unsafe condition.

Tools that are used by employees to handle energized conductors must be designed and constructed to withstand the voltages and stresses to which they are exposed.

Good judgment

Perhaps the single most successful defense against electrical accidents is the continuous exercising of good judgment or common sense. All employees should be thoroughly familiar with the safety procedures for their particular jobs. When work is performed on electrical equipment, for example, some basic procedures are:

- Have the equipment deenergized;
- Ensure that the equipment remains deenergized by using some type of lockout and tag procedure;
- Use insulating protective equipment; and
- Keep a safe distance from energized parts.

The control of electrical hazards is an important part of every safety and health program. The measures suggested in this section should be of help in establishing such a program of control. The responsibility for this program should be delegated to individuals who have a complete knowledge of electricity, electrical work practices, and the appropriate OSHA standards for installation and performance.

Everyone has the right to work in a safe environment. Through cooperative efforts, employers and employees can learn to identify and eliminate or control electrical hazards.

Electrical safety-related work practices: Excerpts from OSHA Instruction STD 1-16.7

The following excerpts are from an instructional document that was issued by OSHA to its inspectors. The document establishes policies and provides guidelines to ensure uniform enforcement of §1910.331 through §1910.335, the Electrical Safety-Related Work Practices standard. You, the employer, can use this document to determine how OSHA expects the electrical standard to be implemented in the workplace.

Inspection guidelines

In so far as possible, the compliance officer shall integrate inspection procedures for this standard with those of §1910.147 (lockout/tagout standard). The following guidance provides a general framework to assist the compliance officer during all inspections:

a. The employer's written procedures required under §1910.333(b)(2)(i) shall be reviewed to determine if they cover the hazards likely to be encountered.

   (1) A copy of paragraph (b) of §1910.333 maintained by the employer will fulfill this requirement.

   (2) A copy of the written procedures for locking and tagging required by §1910.147 will also comply with this requirement, provided those procedures address the electrical safety hazards covered by Subpart S and provided the procedures conform to §1910.333(b).

   (3) If the employer has chosen to utilize procedures developed to comply with 1910.147 for electrical as well as other hazards, the written procedures must include steps corresponding to requirements in §1910.333 for application of locks and tags and verification of deenergized conditions (§1910.333(b)(2)(iii)(D) and (b)(2)(iv)(B)).

b. Beginning August 6, 1991, the training practices of the employer for qualified and unqualified employees shall be evaluated to assess whether the training provided is appropriate to the tasks being performed or to be performed.

   (1) All employees who face a risk of electric shock, burns or other related injuries, not reduced to a safe level by the installation safety requirements of Subpart S, must be trained in safety-related work practices required by §1910.331-.335.

   (2) In addition to being trained in and familiar with safety related work practices, unqualified employees must be trained in the inherent hazards of electricity, such as high voltages, electric current, arcing, grounding, and lack of guarding. Any electrically related safety practices not specifically addressed by §§1910.331 through 1910.335 but necessary for safety in specific workplace conditions shall be included.

   (3) The training of qualified employees must include at the minimum the following:

      (a) The ability to distinguish exposed live parts from other parts of electric equipment.

      (b) The ability to determine the nominal voltage of live parts.

      (c) The knowledge of clearance and/or approach distances specified in §1910.333(c).

   (4) During walkaround inspections, compliance officers shall evaluate any electrical-related work being performed to ascertain conformance with the employer's written procedures as required by §1910.333(b)(2)(i) and all safety-related work practices in §§1910.333 through 1910.335. (See J. of this instruction for clarification.)

   (5) Any violations found must be documented adequately, including the actual voltage level.

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Interpretative guidance

The following guidance is provided relative to specific provisions of the standard for Electrical Safety-Related Work Practices:

1. *Definitions: Qualified/Unqualified persons*

    a. The standard defines a qualified person as one familiar with the construction and operation of the equipment and the hazards involved. "Qualified Persons" are intended to be only those who are well acquainted with and thoroughly conversant in the electric equipment and electrical hazards involved with the work being performed.

        (1) Whether an employee is considered to be a "qualified person" will depend on various circumstances in the workplace. It is possible and, in fact, likely for an individual to be considered "qualified" with regard to certain equipment in the workplace, but "unqualified" as to other equipment. (See §1910.332(b)(3) for training requirements that specifically apply to qualified persons.) Only qualified persons may place and remove locks and tags.

        (2) An employee who is undergoing on-the-job training, who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training, and who is under the direct supervision of a qualified person, is considered to be a qualified person for the performance of those duties.

    b. Where the term "may not" is used in these standards, the term bears the same meaning as "shall not".

    c. Training requirements apply to all employees in occupations that carry a risk of injury due to electrical hazards that are not sufficiently controlled under §§1910.303 through 1910.308.

2. *Scope/Coverage*

    a. The provisions of the standard cover all employees working on, near or with premises wiring; wiring for connection to supply; other wiring such as outside conductors on the premises; and optical fiber cable where the fiber cable installations are made along with electric conductors and the optical fiber cable types are those that contain noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers.

    b. The standard does not cover qualified workers (but does cover unqualified workers) performing work on the following:

        (1) Electric power generation, transmission, and distribution installations located in buildings used for such purposes or located outdoors.

            NOTE: Work on the *specified* electrical installations is excluded, but work on other electric equipment in the buildings is not excluded.

        (2) Communications installations covered under §1910.268.

        (3) Installations in ships, watercraft, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles.

        (4) Installations of railways for generation, transformation, transmission, or distribution of electrical power used exclusively for rolling stock or installations of railways used exclusively for signaling and communication purposes.

c. The standard for Electrical Safety-Related Work Practices was developed to complement the existing electrical standards. The new standard includes requirements for work performed on or near exposed energized and deenergized parts of electric equipment, use of electrical protective equipment, and the safe use of electrical equipment.

d. Exposure to unexpected electrical energy release that could result in electric shock or burns or in an explosion caused by an electric arc is covered by the standard for Electrical Safety-Related Work Practices. Safeguarding workers from other hazards related to the unexpected release of hazardous energy during servicing and maintenance operations is covered by §1910.147, the lockout/tagout standard.

(1) Section 1910.333(a)(1) requires that live parts be deenergized before a potentially exposed employee works on or near them. OSHA believes that this is the preferred method for protecting employees from electrical hazards. The employer is permitted to allow employees to work on or near exposed live parts only:

(a) If the employer can demonstrate that deenergizing introduces additional or increased hazards, or

(b) If the employer can demonstrate that deenergizing is infeasible due to equipment design or operational limitations.

(2) Under §1910.333(a)(2) if the employer does not deenergize (under the conditions permitted in §1910.333(a)(1)), then suitable safe work practices for the conditions under which the work is to be performed shall be included in the written procedures and strictly enforced. These work practices are given in §§1910.333(c) and 1910.335.

(3) Only qualified persons shall be allowed to work on energized parts or equipment.

3. *Working on deenergized parts*

a. Circuit parts that cannot be deenergized using the procedures outlined in §1910.333(b)(2) must be treated as energized (as specified in §1910.333(b)(1)), regardless of whether the parts are, in fact, deenergized.

b. Deenergized parts are required to be locked and tagged unless exempted under §§1910.333(b)(2)(iii)(C) or 1910.333(b)(2)(iii)(E), as discussed below. If so exempted, either a lock or tag is required.

(1) If a tag is used without a lock, it shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by the use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

(2) A lock may be placed without a tag only under the following conditions:

(a) Only one circuit or piece of equipment is deenergized, and

(b) The lockout period does not extend beyond the work shift, and

(c) Employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with this procedure.

4. *Verification of deenergization is mandatory*. This verification must be done by a qualified person.

a. The qualified person shall activate the equipment operating controls or otherwise verify that the equipment cannot be restarted.

b. Test equipment shall be used to ensure that electrical parts and circuit elements have been deenergized.

c. Testing instruments and equipment shall be visually inspected for external defects or damage before being used to determine deenergization (29 CFR 1910.334(c)(2)).

d. For circuits over 600 volts nominal, the test equipment shall be checked for proper operation immediately before and immediately after the test.

5. *Reenergization*. The following requirements shall be met, in the order given, before circuits or equipment are reenergized, even temporarily.

a. A qualified person shall conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed so that the circuits and equipment can be safely energized.

b. Potentially exposed employees shall be warned to stay clear of circuits and equipment prior to reenergizing.

c. Each lock and tag shall be removed by the employee who applied it. However, if the employee is absent from the workplace, then the lock or tag may be removed by a qualified person designated to perform this task provided that the employer ensures:

(1) That the employee who applied the lock or tag is not available at the workplace,

(2) That the employee is informed that the lock or tag has been removed before he or she resumes work at the workplace, and

(3) That there is to be a visual determination that all employees are clear of the circuits and equipment prior to lock and tag removal.

6. *Working on or near overhead power lines (§1910.333(c)(3))*

a. OSHA believes that the preferred method of protecting employees working near overhead power lines is to deenergize and ground the lines when work is to be performed near them.

b. In addition to other operations, this standard also applies to tree trimming operations performed by tree workers who are not “qualified persons”. In this respect the exclusion in §1910.333(c)(1) applies only to “qualified persons” performing line-clearance tree trimming (trimming trees that are closer than 10 feet to overhead power lines).

c. The standard does not prohibit workers who are not “qualified persons” from working in a tree that is closer than 10 feet to power lines so long as that person or any object he or she may be using, does not come within 10 feet of a power line. However, it would require “qualified persons” to perform the work if the worker or any object he or she may be using will come within 10 feet of an exposed energized part or if a branch being cut may be expected to come within 10 feet of an exposed energized part while falling from the tree. (See §1910.333(c)(3)(ii).)

d. The purpose for the approach distance requirements is to prevent contact with and/or arcing from energized overhead power lines. The approach distance applies to tools used by employees as well as the employees themselves. Table S-5 calls for the following approach distances for *qualified employees only:*

Voltage range (AC) (phase to phase)	Minimum approach distance
300V and less	Avoid contact
Over 300V, not over 750V	1 ft. 0 in. (30.5 cm)
Over 750V, not over 2kV	1 ft. 6 in. (46 cm)
Over 2kV, not over 15kV	2 ft. 0 in. (61 cm)
Over 15kV, not over 37kV	3 ft. 0.in. (91 cm)
Over 37kV, not over 87.5kV	3 ft. 6 in. (107 cm)
Over 87.5kV, not over 121kV	4 ft. 0 in. (122 cm)
Over 121kV, not over 140 kV	4 ft. 6 in. (137 cm)

NOTE: *Unqualified employees are required to adhere to the 10 ft. minimum.*

e. Employees working on or around vehicles and mechanical equipment, such as gin-pole trucks, forklifts, cherry pickers, garbage trucks, cranes and elevating platforms, who are potentially exposed to hazards related to equipment component contact with overhead lines, shall have been trained by their employers in the inherent hazards of electricity and means of avoiding exposure to such hazards.

f. The standard for Electrical Safety-Related Work Practices can be applied with respect to electrical hazards related to any size, utilization or configuration of overhead power lines in general industry; e.g., residential power lines, remotely located overhead power lines, temporarily rigged overhead power lines, and overhead power lines along streets and alleys.

7. *Portable ladders*. Such ladders may not have conductive siderails in situations where the employee or the ladder could contact exposed energized parts. All ladders shall be in compliance with requirements of the standards found elsewhere in Part 1910.

8. *Conductive apparel*. Articles of jewelry and clothing such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear shall not be worn if there is a possibility of contacting exposed energized parts. However, such articles may be worn if they are rendered nonconductive by covering, wrapping, or other insulating means (§1910.333(c)(8)).

9. *Housekeeping duties*. The employer has the burden to provide adequate safeguards (such as insulating equipment or barriers) where live parts present an electrical contact hazard to employees who are performing housekeeping duties. Electrically conductive cleaning materials (such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) may not be used in proximity to energized parts unless procedures are followed which will prevent electrical contact.

10. *Electrical safety interlocks*. Interlocks found on panels, covers and guards are designed to deenergize circuits to prevent electric shock to persons using equipment or performing minor maintenance or adjustments and shall not be defeated or bypassed by an unqualified person.

11. *Cord- and plug-connected equipment*. Energized equipment here means either the equipment being plugged or the receptacle into which it is being plugged, or both (§1910.334(a)(5)(i)).

12. *Eye and face protection*. Section 1910.335(a)(1)(v) requires employees to wear protective equipment for the eyes or face wherever there is danger of injury to the eyes or face from electric arcs or flashes or from flying objects resulting from electrical explosion.

13. *Insulated tool*. This means a tool encased within material of composition and thickness that is recognized as electrical insulation.

J. *Enforcement/Citation guidance*

1. A deficiency in the employer's program that could contribute to a potential exposure capable of producing serious physical harm or death shall be cited as a serious violation.

2. The failure to train "qualified" and "unqualified" employees as required for their respective classifications shall normally be cited as a serious violation.

3. Paperwork deficiencies in the safe work practice program where effective safe work practice procedures are in place shall be cited as other-than-serious.

Electrical safety program

General company policy

The purpose of this program is to inform interested persons, including employees, that our company is complying with the OSHA Electrical Safety Standard at §1910.333 by determining that this workplace needs written procedures for preventing electric shock or other injuries resulting from direct/indirect electrical contacts to employees working on or near energized or deenergized parts. This program applies to all work operations at _____ where employees may be exposed to live parts and/or those parts that have been deenergized.

_____ has overall responsibility for coordinating safety and health programs in this company. _____ is the person having overall responsibility for the Electrical Safety Program. _____ will review and update the program, as necessary.

Copies of the written program may be obtained from _____ in _____. Under this program, our employees receive instructions in the purpose and use of energy control procedures, as well as the other required elements of the Control of Hazardous Energy standard. This instruction includes the deenergizing of equipment, applying locks and tags, verifying deenergization, and equipment reenergizing.

We encourage all suggestions because we are committed to creating a safe workplace for all our employees and a successful electrical safety program is an important component of our overall safety plan. We strive for clear understanding, safe work practices, and involvement in the program from every level of the company.

Hazard analysis report

To determine areas of _____ that need to be included in the Electrical Safety Program, _____ has conducted a hazard analysis of our workplace. This analysis located in _____, has provided us with information identifying which departments have equipment using electricity, various types of wiring installations, and the types of employee functions that must be covered by the Electrical Safety Program. The departments/areas of our company identified as having electrically operated equipment and/or wiring installations are _____.

Electrically operated equipment that must be deenergized before work can be done on it and where it is located includes _____.

Employees of our company who are qualified to work on, near, or with energized electric circuits and equipment are _____.

Employees working on, near, or with energized electric circuits and equipment who have limited knowledge of electrical circuitry are _____.

Training program

Every employee in our company who faces the risk of electric shock from working on or near energized or deenergized electrical sources receives training in electrical related safety work practices pertaining to the individual's job assignment.

The goal of our electrical safety training program is to ensure that all employees understand the hazards associated with electric energy and that they are capable of performing the necessary steps to protect themselves and their co workers.

Our electrical training program covers these basic elements:

- Lockout and tagging of conductors and parts of electrical equipment.
- Safe procedures for deenergizing circuits and equipment.
- Application of locks and tags.
- Verification that the equipment has been deenergized.
- Procedures for reenergizing the circuits or equipment.
- Other electrically related information which is necessary for employee safety.

In our facility, all the persons working on or near energized or deenergized electric sources are considered "qualified" to work safely with electrical energy and have received the appropriate training and certification to do so. In addition to the basic training elements, our "qualified" employees are trained in the skills and techniques necessary to identify exposed live parts, determine nominal voltages, and clearance distances and corresponding voltages. This group of employees has also received additional training that includes _____.

The format we follow for our training program is _____.

The procedures we follow when training new employees who will be working on or near electrical equipment or circuitry are _____. When changes involving electrical elements occur in our company, we provide additional employee training to ensure the safety of all affected workers. In this case, we follow these procedures: _____.

_____ conducts the electrical safety training for all employees. Every employee who participates in the Electrical Safety Program receives a certificate which they sign verifying that they have completed the course, that they understand the information presented, and that they will follow all company policies and procedures regarding electrical safety. These signed certificates of training as well as all training materials and documentation are kept by _____.

Lockout/tagout program

It is our company's policy that circuits and equipment must be disconnected from all electric energy sources before work on them begins. We use lockout and tagging devices to prevent the accidental reenergization of this equipment. These lockout and tagging procedures are the main component of our electrical safety program. The safety procedures that make up our lockout and tagging program include these elements:

- **Deenergizing circuits and equipment.** We disconnect the circuits and equipment to be worked on from all electric energy sources and we release stored energy that could accidentally reenergize equipment.
- **Application of locks and tags.** Only authorized employees are allowed to place a lock and tag on each disconnecting means used to deenergize our circuits or equipment before work begins. Our locks prevent unauthorized persons from reenergizing the equipment or circuits and the tags prohibit unauthorized operation of the disconnecting device.

- **Verification of deenergized condition of circuits and equipment.** Prior to work on the equipment, we require that a "qualified" employee verifiy that the equipment is deenergized and cannot be restarted.
- **Reenergizing circuits and equipment.** Before circuits or equipment are reenergized, we follow these steps in this order:
  - A "qualified" employee conducts tests and verifies that all tools and devices have been removed.
  - All exposed employees are warned to stay clear of circuits and equipment.
  - Authorized employees remove their own locks and tags.
  - We do a visual inspection of the area to be sure all employees are clear of the circuits and equipment.

In addition to these lockout/tagout elements, we _____.

_____ are the employees trained and authorized to deenergize, verify, and reenergize electric circuits and equipment in our company.

Enforcement

Constant awareness of and respect for electrical hazards, and compliance with all safety rules are considered conditions of employment. Supervisors and individuals in the Safety and Personnel Department reserve the right to issue disciplinary warnings to employees, up to and including termination, for failure to follow the guidelines of this program.

Appendix

We have attached to this plan any lists, samples, or procedures we thought would ensure better understanding of our written program.

Electric power, generation, transmission, and distribution

In January of 1994, OSHA issued a new standard, 1910.269, to protect the safety and health of workers who operate and maintain electric power generation, transmission and distribution installations. It also revised the electrical protective equipment requirements for general industry with performance-oriented rules and issued standards for the safe use and care of electrical protective equipment. Compliance with OSHA's rule and related revisions is expected to prevent about 60 worker deaths and more than 1,600 serious injuries annually which are caused by inadequate electrical protective equipment and training.

Background

Existing electrical regulations contained in Subpart S of the General Industry Standards (29 CFR Part 1910) address electric utilization systems. Subpart S protects most employees from the hazards associated with such electric utilization equipment as lighting fixtures, appliances and portable electric tools and with the premises wiring that supplies this equipment.

However, Subpart S does not contain requirements protecting employees from the hazards arising out of the operation and maintenance of electric power generation, transmission or distribution installations. Employees performing work on or nearby these installations face far greater electrical hazards than those faced by other workers performing work on or nearby electric utilization systems covered by Subpart S. The voltages involved are much higher, and a large part of their work involves potential exposure to energized parts of the power system.

Employees engaged in the construction of electric power transmission or distribution systems are protected by the provisions of Subpart V of the Construction Standards (29 CFR Part 1926).

Management and labor representatives from the electric utility industry requested OSHA to adopt a set of rules on the operation and maintenance of power generation, transmission and distribution installations. Toward this end, these representatives of management and labor developed a draft standard and submitted it to OSHA. The agency used their draft, along with relevant national consensus standards, as a basis for a rule.

The final rules add a section addressing electric power generation, transmission and distribution to Subpart R of the General Industry Standards (29 CFR Part 1910) and revise the electrical protective equipment section of Subpart I—Personal Protective Equipment.

Elements of the rule

Provisions of the rule protect workers engaged in the operation and maintenance of electric power generation, transmission and installations including those doing the high-voltage and high-power testing associated with such systems.

29 CFR 1910.269 covers the following types of work operations:

- training
- enclosed spaces
- hazardous energy control
- working on or near energized parts
- deenergizing lines and equipment
- grounding for employee protection
- work on underground electrical installations and overhead lines
- line-clearance tree trimming
- work in substations and generating plants
- other special conditions and equipment unique to the generation, transmission and distribution of electric energy

This regulation applies to electric power generation, transmission and distribution installations, whether owned by a utility or not. The electric utility, other general industry and associated contract employers must comply with this standard.

Industrial generation, transmission and distribution installations at industrial plants are essentially the same as those of an electric utility, and their operation and maintenance is similar.

Reserved

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TEMPERATURE EXTREMES

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Reserved

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Temperature extremes

Introduction

A comfortable work environment is the result of a balance between temperature, humidity, and air distribution. The ambient environment is important because it influences the rate at which a person's body heat is exchanged with the environment and consequently, the ease with which the body maintains a normal temperature. Ideally, everyone should have a comfortable working environment; however, there are some jobs that require people to work in extremely cold or hot temperatures. If you have employees who are exposed to extreme temperature conditions, you need to ensure that they are adequately protected.

Hot environments

Many people spend at least part of their working day in a hot environment. Hot workplace conditions can lead to harmful heat stress. Heat stress may result in several illnesses as well as decreased productivity and increased likelihood of injuries. In foundries, steel mills, bakeries, smelters, and glass factories, extremely hot or molten material is the main source of heat. Outdoor occupations such as construction, road repair, logging, telecommunications, electric power utilities, and agriculture expose workers to summer sunshine and heat. In laundries, restaurant kitchens, and canneries, high humidity adds to the heat burden. All these situations have the potential to create a work environment which can overcome the body's ability to deal with heat.

Cold environments

People who work in freezer plants, meat-packing houses, cold storage facilities, lumbering, telecommunications, and electric utilities are often exposed to cold environments. The frequency of worker accidents is higher in cold environments because nerve impulses are inhibited and hands can stiffen and become clumsy. Temperature-related safety problems include ice, snow blindness, reflections from snow, and burns from skin contact with cold, metal surfaces.

The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness or metal, inadequate clothing, age, and general health. Contributing physical conditions include allergies, vascular disease, excessive smoking and drinking, sedative drugs, and some medicines. Cold disorders are classified as generalized as in hypothermia or localized such as frostbite.

The following information provides guidance to help make your workers' job conditions as comfortable as possible without compromising their safety and health.

Protecting workers in hot environments

Many workers spend some part of their working day in a hot environment. Workers in foundries, laundries, construction projects, and bakeries — to name a few industries — often face hot conditions which pose special hazards to safety and health. Heat stress results from a combination of internal (body) heat production from doing work and external heat exposure from the environment. Both aspects need to be controlled to reduce heat stress.

Environmental factors

Four environmental factors affect the amount of stress a worker faces in a hot work area:

- High temperatures (90°F or above can cause heat stress);
- High humidity (sweat doesn't evaporate rapidly);
- Intense radiant heat (such as from the sun or a furnace); and
- Low air velocity (lowers the rate at which sweat evaporates).

Physical factors

Perhaps most important to the level of stress an individual faces are personal characteristics such as age, weight, fitness, medical conditions, and acclimatization to the heat.

The body reacts to high external temperature by circulating blood to the skin which increases skin temperature and allows the body to give off its excess heat through the skin. However, if the muscles are being used for physical labor, less blood is available to flow to the skin and release the heat.

Sweating is another means the body uses to maintain a stable internal body temperature in the face of heat. Sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost are adequately replaced.

Of course there are many steps a person might choose to take to reduce the risk of heat stress, such as moving to a cooler place, reducing the work pace or load, or removing or loosening some clothing. But, if the body cannot dispose of excess heat, it will store it. When this happens, the body's core temperature rises and the heart rate increases. As the body continues to store heat, the individual begins to lose concentration and has difficulty focusing on a task, may become irritable or sick and often loses the desire to drink. The next stage is most often fainting and death is possible if the heat stress is not relieved.

Heat disorders

Heat stroke, the most serious health problem for workers in hot environments, is caused by the failure of the body's internal mechanism to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. Signs include:

- Mental confusion, delirium, loss of consciousness, convulsions or coma;
- Rapid pulse;
- Body temperature of 106°F or higher; and
- Hot dry skin which may be red, mottled, or bluish.

Shock may result and victims of heat stroke will die unless treated promptly. While awaiting medical help, move the person to a cool area and soak his or her clothing with cool water. Fan vigorously to increase cooling. Prompt first aid can prevent permanent injury to the brain and other vital organs.

Heat exhaustion results from loss of fluid through sweating when a person fails to drink enough fluids or take in enough salt or both. The worker with heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pale or flushed, and the body temperature normal or slightly higher.

Treatment is usually simple: the victim should rest in a cool place and drink an electrolyte solution (a beverage that quickly restores potassium, calcium, and magnesium salts). Severe cases may involve vomiting or loss of consciousness and require longer treatment under medical supervision.

Heat cramps are painful muscle spasms that are caused when workers drink large quantities of water but fail to replace their bodies' salt loss. Tired muscles — those used for performing the work such as the arms and legs — are usually the ones most susceptible to cramps.

Cramps may occur during or after working hours and can be relieved by drinking adequate amounts of liquids and salt at meals. Salt tablets are not recommended. If quick relief is necessary, a saline solution will be given intravenously.

Fainting (heat syncope) can be a problem for the worker unacclimatized to a hot environment who simply stands still in the heat. Dehydration causes blood volume to decrease. The blood pools in dilated blood vessels of the skin on the lower body, making less blood available to the brain.

Victims usually recover quickly after a brief period of lying down. Moving around, rather than standing still, will usually reduce the possibility of fainting.

Heat rash, also known as prickly heat, occurs in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impedes a worker's performance or even results in temporary total disability. It can be prevented by keeping the skin clean and dry. Showering after working in a hot environment is helpful to prevent heat rash.

Preventing heat disorders

Most heat-related health problems can be prevented or the risk of developing them reduced. The two most important methods of preventing heat disorders are hydration and acclimatization because the increase the ability of the body to tolerate heat stress. Engineering and administrative controls are also important to reduce exposures. Use the following suggestions to lessen the risk of heat stress.

1. A variety of **engineering controls** including general ventilation and spot cooling by local exhaust ventilation at points of high heat production can lower heat levels. Shielding provides a source of protection from radiant heat sources. Evaporative cooling and mechanical refrigeration will reduce heat. Additionally:
    - Eliminate steam leaks;
    - Use cooling fans;
    - Modify equipment;
    - Use power tools to reduce manual labor; and
    - Provide personal cooling devices or protective clothing to reduce the hazards of heat exposure.
2. **Work practices** such as providing plenty of drinking water — as much as a quart per worker per hour — at the workplace can help reduce the risk of heat disorders. Train first aid workers to recognize and treat heat stress disorders. Provide the names of trained staff to all workers.

    Consider an individual worker's physical condition when determining his or her fitness for working in hot environments. Older workers, obese workers, and those on some types of medication are at greater risk.
3. Alternating **work and rest** periods with longer rest periods in a cool area can help workers avoid heat stress. If possible, schedule heavy work during the cooler parts of the day and provide protective clothing. Train supervisors to detect early signs of heat stress. Allow stressed workers to interrupt their work if they are extremely uncomfortable.
4. **Acclimatization** to the heat through short exposures followed by longer periods of work in the hot environment can reduce heat stress. A physiological adaptation occurs with repeated exposure to hot environments:
    - Heart rate will decrease,
    - Sweating will increase,
    - Sweat will become more dilute, and
    - Body temperature will be lower.

    The ability to acclimatize varies among workers. Generally, individuals in good physical condition acclimatize more rapidly than those in poor condition.

    Approximately one week of gradually increasing the workload and time spent in the hot environment will usually lead to full acclimatization. On the first day the individual performs 50 percent of the normal workload and spends 50 percent of the time in the hot environment. Each day an additional 10 percent of the normal workload and time is added, so that by day six, the worker is performing the full workload for an entire day. The exposure time should be at least two hours per day for acclimatization to occur.

Acclimatization is lost when exposure to hot environments does not occur for several days. After a one week absence, a worker needs to reacclimatize by following a schedule similar to that for initial acclimatization. The acclimatization will occur more rapidly, so increases in workload and time can increase by approximately 20 percent each day after the first day, reaching normal work conditions by day four.

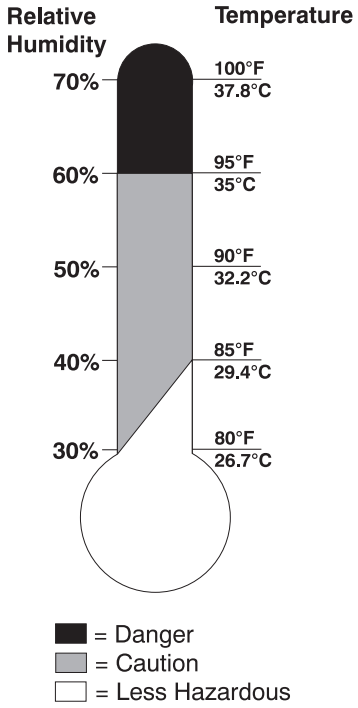
New employees and workers returning from an absence of two weeks or more should have five-day period of acclimatization. This period should begin with 50 percent of the normal workload and time exposure the first day and gradually building up to 100 percent on the fifth day.

5. **Employee education** is vital so that workers are aware of the need to replace fluids and salt lost through sweat and can recognize dehydration, exhaustion, fainting, heat cramps, salt deficiency, heat exhaustion, and heat stroke as heat disorders. They need to know they should be drinking at least five to seven ounces of cool water every 15-20 minutes and to avoid taking salt tablets. Salt tablets irritate the stomach and can lead to vomiting, which can result in further dehydration.

Heat-related emergencies

When the body is unable to cool itself through sweating, serious heat illnesses may occur. The most severe heat-induced illnesses are heat exhaustion and heat stroke. If actions are not taken to treat heat exhaustion, the illness could progress to heat stroke and possible death.

THE HEAT EQUATION: High Temperature + High Humidity + Physical Work = Heat Illness



Heat exhaustion

What happens to the body?
• Headache and nausea. • Dizziness and fainting or passing out. • Fatigue and weakness. • Moist, clammy skin — pale or flushed. • Decreased and dark colored urine. • Rapid pulse. • Normal or slightly elevated temperature.
What should be done?
• Move victim to a cool shaded area to rest. Don't leave individual alone. • If the victim appears dizzy or light headed, have the individual lie on his/her back and raise the legs about 6-8 inches. • If nauseated, have the victim lie on his/her side. • Loosen and remove any heavy clothing. • Provide a small cup of cool water every 15 minutes (if the victim is not nauseated). • Cool by fanning, misting the skin with cool water, or applying a wet cloth. • If the victim does not feel better in a few minutes, call for emergency help.

NOTE: If heat exhaustion is not treated, the illness may advance to heat stroke.

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Heat stroke — A medical emergency

What happens to the body?
• Hot, dry skin (usually no sweating).
• Skin red, mottled, or bluish.
• Rapid pulse.
• Confused, loss of consciousness, convulsions.
What should be done?
• Call for emergency help and start cooling the victim immediately.
• Move the victim to a cool shaded area.
• Lay the victim on his/her back. If the individual is having convulsions, remove any objects close by to prevent striking against them.
• If nauseated, have the victim lie on his/her side.
• Remove any heavy and outer clothing.
• Provide a small cup of cool water every 15 minutes (if the victim is alert and not nauseated).
• Cool by fanning, misting the skin with cool water, or applying a wet cloth or sheet.
• If ice is available, place ice packs under the victim's arm pits and groin area.

How to protect your employees

Provide employees with information regarding heat-induced illnesses. Train them to recognize the signs and symptoms of these illnesses; possible adverse health effects of exposure to heat; appropriated medical treatments to help themselves and fellow employees; and who to contact if a heat-related emergency occurs.

Other safety tips include drinking plenty of cool water (one small cup every 15-20 minutes); wearing light, loose-fitting, breathable (like cotton) clothing; and avoiding eating large meals before working in hot environments. They should avoid caffeine and alcoholic beverages because these beverages make the body lose water and increase the risk for heat illnesses.

Allow employees to:

- Slowly build up tolerance to the heat and the work activity (usually takes about two weeks).
- Perform the heaviest work in the coolest part of the day.
- Take frequent short breaks in cool shaded areas. This allows their body's to cool down.
- Drink plenty of cool fluids.

Risks for heat-induced illnesses increase when:

- Taking certain medications. Have employees check with their doctor, nurse, or pharmacy to find out if any medicines they are taking are affected by hot environments.
- Individuals have had a heat-induced illness in the past.
- Wearing personal protective equipment (like respirators or protective suits).

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OSHA and hot environments

Although federal OSHA does not have a specific regulation covering heat stress hazards, the General Duty Clause of the Occupational Safety and Health Act of 1970 requires employers to furnish a place of employment that is free from recognized hazards that are causing or are likely to cause death or serious physical harm. OSHA has used the General Duty Clause to cite employers that have allowed employees to be exposed to potential serious physical harm from excessively hot work environments.

Protecting workers in cold environments

When the weather becomes "frightful" during winter months, workers who have to brave the outdoor conditions face the occupational hazard of exposure to the cold. Prolonged exposure to freezing temperatures can result in health problems as serious as trench foot, frostbite, and hypothermia. Workers in such industries as construction, utilities, commercial fishing, and agriculture need to be especially mindful of the weather, its effects on the body, proper prevention techniques, and how to treat cold-related disorders.

The cold environment

An individual gains body heat from food and muscular activity and loses it through convection, conduction, radiation, and sweating to maintain a constant body temperature. When body temperature drops even a few degrees below its normal temperature of 98.6°F (37°C), the blood vessels constrict. Constricted vessels decrease peripheral blood flow to the skin surface, thus reducing heat loss. Shivering generates heat by increasing the body's metabolic rate.

The four environmental conditions that cause cold-related stress are:

1. Low temperatures,
2. High/cool winds,
3. Dampness, and
4. Cold water.

Wind chill, a combination of temperature and velocity, is a crucial factor to evaluate when working outside. For example, when the actual air temperature of the wind is 40°F (4°C) and its velocity is 35 mph, the exposed skin receives conditions equivalent to the still-air temperature being 11°F (-11°C). A dangerous situation of rapid heat loss may arise for any individual exposed to high winds and cold temperatures.

Major risk factors for increasing cold-related stresses

- Wearing inadequate or wet clothing increases the effects of cold on the body.
- Taking certain drugs or medications such as alcohol, nicotine, caffeine, and medication that inhibits the body's response to the cold or impairs judgment.
- Having a cold or certain diseases, such as diabetes, heart, vascular, and thyroid problems, may make a person more susceptible to the winter elements.
- Being a male increases a person's risk to cold-related stresses. Men experience far greater death rates due to cold exposure than women, perhaps due to inherent risk-taking activities, body-fat composition, or other physiological differences.
- Becoming exhausted or immobilized, especially due to injury or entrapment, may speed up the effects of cold weather.
- Aging — the elderly are more vulnerable to the effects of harsh winter weather.

Effects of cold on the body

Trench foot is caused by long, continuous exposure to a wet, cold environment or actual immersion in water. Workers, such as commercial fisherman who experience these types of cold, wet environments daily, need to be especially cautious. Symptoms include:

- Tingling and/or itching sensation,
- Burning, pain, and
- Swelling, sometimes forming blisters in more extreme cases.

Treatment includes moving individuals with trench foot to a warm, dry area where the affected tissue can be treated. Carefully wash and dry the area, rewarm, and slightly elevate. Seek medical assistance as soon as possible.

Frostbite occurs when the skin tissue actually freezes, causing ice crystals to form between cells and draw water from them. This leads to cellular dehydration. Although frostbite typically occurs at temperatures below 30°F (-1°C), wind chill effects can cause frostbite at above-freezing temperatures. Ears, fingers, toes, cheeks, and noses are primarily affected. Symptoms of the exposed area include:

- Uncomfortable sensations of coldness;
- Tingling, stinging, or aching feeling followed by numbness; and
- Skin appears white and cold to the touch (varies depending on whether rewarming has occurred).

Deeper frostbite involves freezing of deeper tissues, such as muscles and tendons, causing exposed areas to become numb, painless, hard to the touch.

To treat frostbitten parts, cover with dry, sterile gauze or soft, clean cloth bandages. Do not massage frostbitten tissue because this sometimes causes greater injury. Severe cases may require hospitalization and even amputation of affected tissue. Take measures to prevent further cold injury.

If you suspect frostbite, seek medical assistance immediately. However, if hypothermia exists, it should be treated first.

General hypothermia occurs when body temperature falls to a level where normal muscular and cerebral functions are impaired. While hypothermia is generally associated with freezing temperatures, it may occur in any climate where a person's body temperature falls below normal. Symptoms include:

- Shivering,
- Inability to do complex motor functions,
- Lethargy, and
- Mild confusion.

These initial symptoms occur as the core body temperature decreases to around 95°F (35°C). As body temperature continue to fall, hypothermia becomes more severe. The individual:

- Falls into a state of dazed consciousness;
- Fails to complete even simple motor functions;
- Speech becomes slurred; and
- Behavior may become irrational.

The most severe state of hypothermia occurs when body temperature falls below 90°F (32°C). At this point, the body moves into a state of hibernation, slowing the heart rate, blood flow, and breathing. Unconsciousness and full heart failure can occur in the severely hypothermic state.

Treatment of hypothermia involves conserving the victim's remaining body heat and providing additional heat sources. Specific measures will vary depending upon the severity and setting (field or hospital). Handle

hypothermic people very carefully because of the increased irritability of the cold heart. Seek medical assistance for persons suspected of being moderately or severely hypothermic.

Assume that a person is suffering from severe hypothermia when he is unresponsive and not shivering. Stop heat loss by:

- Finding shelter,
- Removing wet clothing,
- Adding layers of dry clothing or blankets, or
- Using a pre-warmed sleeping bag.

For mildly hypothermic cases or those more severe cases where medical treatment will be significantly delayed, apply external rewarming techniques. These include:

- Body-to-body contact (e.g., placing the person in a prewarmed sleeping bag with a person of normal body temperature);
- Chemical heat packs; or
- Insulated hot water bottles.

Good areas to place these packs are the armpits, neck, chest, and groin. It is best to have the person lying down when applying external rewarming. You also may give mildly hypothermic people warm fluids orally, but avoid beverages containing alcohol or caffeine.

Preventing cold-related disorders

Personal protective clothing — perhaps the most important step in fighting the elements. Provide adequate layers of insulation, usually at least three layers of clothing:

- An outer layer to break the wind and allow some ventilation (like Gore-Tex® or nylon).
- A middle layer of wool or synthetic fabric (Qualofil® or Pile) to absorb sweat and retain insulation in a damp environment. Down is a useful lightweight insulator; however, it is ineffective once it becomes wet.
- An inner layer of cotton or synthetic weave to allow ventilation.

Pay special attention to protecting feet, hands, face and head. Up to 40 percent of body heat can be lost when the head is exposed. Footgear should be insulated to protect against cold and dampness. Keep a change of clothing available in case work garments become wet.

Engineering controls in the workplace through a variety of practices help reduce the risk of cold-related injuries. Consider using an onsite source of heat, such as air jets, radiant heaters, or contact warm plates or shielding work areas from drafty or windy conditions.

Provide a heated shelter for employees who experience prolonged exposure to equivalent wind-chill temperatures of 20°F (-6°C) or less and use thermal insulating material on equipment handles when temperatures drop below 30°F (-1°C).

Safe work practices are necessary to combat the effects of exceedingly cold weather. Implement changes in work schedules and practices that:

- Allow a period of adjustment to the cold before embarking on a full work schedule.
- Permit employees to set their own pace and take extra “warm-up” work breaks when needed.
- Reduce, as much as possible, the number of activities performed outdoors. When employees have to brave the cold, select the warmest hours of the day and minimize activities that reduce circulation.
- Ensure that employees remain hydrated.

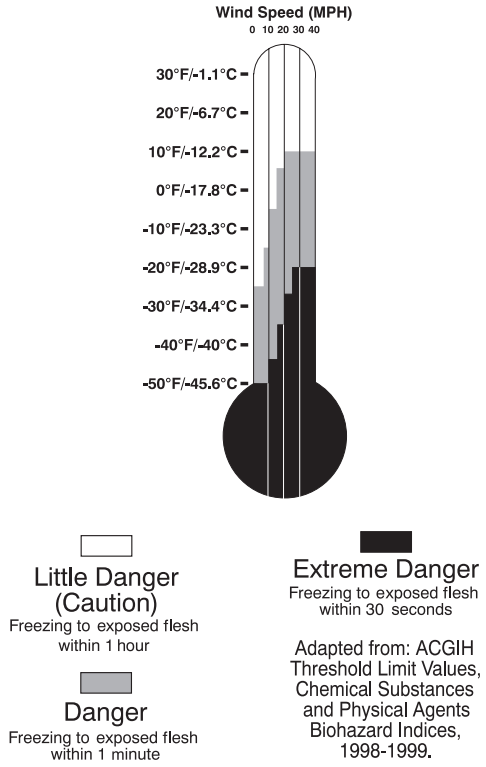
- Establish a buddy system for working outdoors.
- Provide training on the symptoms of cold-related stresses — heavy shivering, uncomfortable coldness, severe fatigue, drowsiness, or euphoria.

The quiet symptoms of potentially deadly cold-related ailments often go undetected until the victim's health is endangered. Knowing the facts on cold exposure and following a few simple guidelines can ensure that outdoor workers stay safe and healthy.

Frost bite and hypothermia

When your body is unable to warm itself, serious cold-related illnesses and injuries can occur and permanent tissue damage and death may result. Hypothermia occurs when *land temperatures* are above freezing or *water temperatures* are below 98.6°F. Cold-related illnesses slowly overcome a person who has been chilled by low temperatures, brisk winds, or wet clothing. The most common cold related illnesses are frostbite, and hypothermia.

THE COLD STRESS EQUATION: Low Temperature + Wind Speed + Wetness + Injuries & Illness



Frost bite

What happens to the body?
• Freezing in deep layers of skin and tissue. • Pale, waxy-white skin color. • Skin becomes hard and numb. • Usually affects the fingers, hands, toes, feet, ears, and nose.
What should be done?
• Move the victim to a warm dry area. Do not leave the individual alone. • Remove wet or tight clothes that may cut off blood flow to the affected area. • **DO NOT** rub the affected area. Rubbing causes damage to the skin and tissue. • Gently place the affected area in a warm (105°F) water bath and monitor the temperature to slowly warm the tissue. Don't pour warm water directly on the affected area because it will warm the tissue too fast causing tissue damage. Warming takes about 25–40 minutes. • After the affected area has been warmed, it may become puffy and blister. The area may have a burning feeling or numbness. When normal feeling, movement, and skin color have returned, dry and wrap the affected area to keep it warm. **Note:**If there is a chance the affected area may get cold again, do not warm the skin. If the skin is warmed and then becomes cold again, it will cause severe tissue damage • Seek medical attention as soon as possible.

Hypothermia — A medical emergency

What happens to the body?
• Normal body temperature (98.6°F) drops to or below 95°F. • Fatigue or drowsiness occurs. • Uncontrolled shivering. • Cool bluish skin. • Slurred speech. • Clumsy movements. • Irritable, irrational, or confused behavior.
What should be done?
• Call for emergency medical help. • Move the victim to a warm, dry area. Don't leave the individual alone. • Remove any wet clothing and replace with warm, dry clothing or wrap the victim in blankets. • Provide warm, sweet drinks (sugar water or sports-type drinks) if the victim is alert. **Avoid drinks with caffeine** (coffee, tea, or hot chocolate) or alcohol. • Have the victim move his/her arms and legs to create muscle heat. If unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. **DO NOT** rub the victim's body or place the individual in a warm water bath. **This may cause cardiac arrest.**

How to protect your employees

Do not allow employees who have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension to work long hours outdoors in winter weather. Also, remember that individuals who are in poor physical condition, have a poor diet, or are older are more susceptible to extreme temperatures. To ensure that employees are protected from the cold elements, provide instructions to:

- Recognize the environmental and worksite conditions that lead to potential cold-induced illnesses and injuries.
- Recognize the signs and symptoms of cold-induced illnesses/injuries and what to do to help a fellow employee.
- Select proper clothing for cold, wet, and windy conditions.
- Layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene).
- Avoid exhaustion or fatigue. Energy is needed to keep muscles warm.
- Use the buddy system (work in pairs).
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.
- Eat warm, high-calorie foods like hot pasta dishes.

Allow your employees to:

- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Work during the warmest part of the day.

Keeping one step ahead of the weather pays off for employee safety and health.

Temperature extremes safety program

Purpose

This Temperature Extremes Safety Program is instituted by this company to protect employees subject to temperature extremes. The plan is accessible to all interested persons, including employees and enforcing agencies. The information here will facilitate measures necessary to prevent inadequate or no protection for employees subject to temperature extreme environments.

This plan has been developed to comply with OSHA's General Duty Clause which states, *Each employer shall furnish to each of his employees employment and a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.*

Administrative duties

_____, our company's Temperature Extremes Safety Program Administrator, is responsible for establishing and implementing the written plan. This person has full authority to make necessary decisions to ensure the success of this plan. _____ is also qualified by appropriate training and experience to coordinate and direct our plan and conduct the required evaluations of the plans effectiveness. _____ understands the factors of temperature extreme stress. These factors include: _____.

Copies of this written program are available from _____. We strive for a comprehensive, integrated prevention system that obtains clear understanding, safe behavior, and involvement in the plan from every level of the company.

Affected persons

The following departments are affected by this plan: _____.

The following persons/teams/departments have specific responsibilities under this plan: _____.

Hazard assessment

_____ performs our company's temperature extreme hazard assessment by: _____.

Our initial hazard assessment revealed the following temperature-related hazards at our workplace: _____.

We understand that, after our initial hazard assessment, additional assessments are necessary. We perform additional hazard assessments when: _____. Our procedures for additional hazard assessments include: _____.

Medical surveillance

At our company, persons will not be assigned to certain temperature extreme tasks unless it has been determined that they are physically able to perform the work. _____ performs medical evaluations using the attached medical questionnaire.

All medical questionnaires are confidential. The questionnaire is administered so that the employee understands its content. All employees are provided an opportunity to discuss the questionnaire and examination results with their physician or other licensed health care professional (PLHCP).

Before any initial examination or medical questionnaire is given, we supply the PLHCP with the following information so that the PLHCP can make the best recommendation concerning an employees ability to work: _____.

Once the PLHCP determines whether the employee has the ability to do the job, the PLHCP sends our company a written opinion containing the following information: _____.

A follow-up medical examination will be provided if _____. It may include: _____.

Employees may contact _____ for a copy of their confidential medical evaluation or questionnaire.

Control measures

We use the following engineering controls to reduce employee risk for temperature-related injury and illness: _____.

We use the following administrative controls to reduce employee risk for temperature-related injury and illness: _____.

Job rotation is used at this company to lower employee exposure to hazards. Our job rotation schedules follow: _____.

We use the following work practice controls to reduce employee risk for temperature-related injury and illness: _____.

Plan implementation

We have developed the following schedule for implementing our plan: _____.

Protective equipment

_____ is responsible for ensuring that the following provisions are met.

All protective equipment, including personal protective equipment (PPE), used at this facility will be provided at no cost to employees. Protective equipment will be chosen based on anticipated hazards and will be provided to employees in the following manner: _____.

The protective equipment we currently require is: _____.

_____ ensures that there is a supply of protective equipment in an adequate range of sizes. This equipment is readily accessible at the work area or is issued to employees through the _____.

All protective equipment will be cleaned, laundered, and disposed of by _____ at no cost to employees. Protective equipment is cleaned and disinfected at the following intervals: _____.

In order to assure the continued reliability of protective equipment, we require that it be inspected on a regular basis. The frequency of inspection is related to the frequency of use and we inspect this equipment at the following intervals: _____.

Protective equipment that fails an inspection or is defective is removed from service, and is discarded, repaired, or adjusted according to the following procedures: _____.

Emergency situations

Our emergency/accident response procedures include the following:_____.

Phone numbers of primary emergency responders include: _____.

Our company provides the following emergency equipment and support: _____. For more information, see the attached copy of our Accident Reporting and Investigation Plan.

Inspections

_____ is qualified to perform inspections for our Temperature Extremes Safety Program on a _____ basis. Inspections are conducted as follows: _____.

Recordkeeping

_____ is responsible for maintaining the following records and associated documents: _____.

Training

Under no circumstances may an employee work under extreme temperature conditions until the employee has successfully completed our company's training program. This includes all new employees, regardless of claimed previous experience. Individuals in the following departments must receive training: _____.

The program administrator will identify trainees in each set of new employees and make arrangements with department management to schedule training. The administrator will also identify those existing employees who need retraining. _____ is responsible for conducting training.

Training is done in-house. Attached is a copy of the current training material and the course outline.

The company training program includes information related to: _____.

Training certification

After the employee has completed the training program, the instructor will determine whether the employee can safely perform the job.

_____ is responsible for keeping records certifying each employee who has successfully completed training. The certificate includes the name of the employee, the date(s) of the training, and the signature of the person who did the training and evaluation.

Performance evaluation

Each trained employee is evaluated _____ to verify that the employee has retained and continues to use the knowledge and skills needed to work safely under temperature extremes. This evaluation is done by _____. If the evaluation shows that the employee is lacking the appropriate skills and knowledge, the employee is retrained by our instructor(s). Additionally, if an employee has an incident or some unsafe work practice is observed, we provide retraining.

Current trained employees

Under no circumstances may an employee work under extreme temperature conditions until the employee has successfully completed the training program. The following list of employees hold current training certification: _____.

Plan evaluation

It is inherent that problems may occasionally arise regarding this program. Although we may not be able to eliminate all risks, we try to eliminate as many as possible to improve employee protection and encourage employee safe practices. By having our plan administrator thoroughly evaluate and revise our plan as necessary, we can eliminate most risk factors effectively.

At this company, the plan evaluation involves the following: _____.

Appendices

Our company has attached the following appendices to this written plan: _____.

Reserved

OSHA COMPLIANCE MANUAL

AIR CONTAMINANTS

OSHA COMPLIANCE MANUAL

Reserved

Air contaminants

What are air contaminants?

An air contaminant is any substance which is accidentally or unwillingly introduced into the air, having the effect of rendering the air toxic or harmful to some degree. The greatest concern when dealing with hazardous materials is air contamination.

Through inhalation, airborne particles of dust, fumes, vapors, mists, and gases may be taken into the body. These particles can irritate the skin, eyes, nose, throat, and lungs. They may be absorbed into the bloodstream and transported to affect additional organs.

Airborne contaminants present a significant threat to worker health and safety. Thus, identification and quantification of these contaminants through air monitoring is an essential component of every company's health and safety program. Reliable measurements of airborne contaminants are useful for:

- Selecting personal protective equipment;
- Delineating areas where protection is needed;
- Assessing the potential health effects of exposure; and
- Determining the need for specific medical monitoring.

PELs and TLVs

OSHA enforces hundreds of permissible exposure limits (PELs) for toxic air contaminants found in U.S. workplaces. These PELs set enforceable limits on the magnitude and duration of employee exposure to each contaminant. The amount of exposure permitted by a given PEL depends on the toxicity and other characteristics of the particular substance. Two different types of measurement are used for PEL determination. The concentration of gases and liquids in the air is measured in *parts per million (ppm)*. Solids and liquids in the form of mists, dusts, or fumes are measured in *milligrams per cubic meter (mg/m^3)*.

Exposure limits called Threshold Limit Values (TLVs) were developed by the American Conference of Governmental Industrial Hygienists (ACGIH). TLVs represent the level of chemicals in the ambient air that most workers can be exposed to on a daily basis without harmful effects.

OSHA's PELs for air contaminants are located in §1910.1000, Tables Z-1, Z-2, and Z-3. The air contaminant limits were adopted by OSHA in 1971 from existing national consensus standards issued by the American Conference of Governmental Industrial Hygienists and the American National Standards Institute (ANSI). Consequently, these PELs, which have not been updated since 1971, reflect the results of research conducted in the 1950s and 1960s.

Court decision affecting PELs

Since the 1970s, much new information has become available which indicates that, in most cases, these early limits are outdated and insufficiently protective of worker health. To correct this situation, OSHA published a proposal in 1988 updating the air contaminant limits. When that proposal became a final rule in 1989, it lowered the existing PELs for 212 toxic air contaminants and established PELs for 164 previously unregulated air contaminants.

In July 1992, the Eleventh Circuit Court of Appeals vacated the 1989 final rule on the grounds that OSHA:

- Failed to establish that existing exposure limits in the workplace presented significant risk of material health impairment or that new standards eliminated or substantially lessened the risk; and

- Did not meet its burden of establishing that its new permissible exposure limits (PELs) were either economically or technologically feasible.

The Court's decision to vacate the rule forced OSHA to revert back to the original protective limits. The Court granted several successive stays following the July 1992 decision, allowing the Agency time to consider further legal steps. A decision was made on March 1993 not to appeal to the Supreme Court, and the Eleventh Circuit Court's decision stands today.

Should you comply with the 1989 PELs, even though they are no longer legally required? OSHA believes the 1989 PELs are more protective, and encourages employers to continue compliance efforts to meet these levels, particularly where engineering and work practice controls have already been implemented. OSHA always encourages employers to go beyond the minimum protections afforded by the standards.

OSHA's plan for updating PELs

In 2010, OSHA launched an initiative to seek creative solutions, both long term and short term, to address what it believes are inadequacies in many PELs. As an initial step, OSHA is soliciting comments from the public to identify the chemicals of concern on which the Agency can focus initial efforts. OSHA asked the public to nominate those chemicals for which the existing PEL is particularly inadequate or for which OSHA has no standard at all.

Methods to lower workplace PELs

According to OSHA policy, engineering controls and work practices are preferred over personal protective equipment to control employee exposures to airborne contaminants.

Engineering controls involve the use of a local exhaust ventilation, general ventilation, isolation of the worker and enclosure of the source of emissions, process modifications, equipment modifications, and substitution of nonhazardous or less hazardous chemicals. These methods may be used alone or in combination, depending upon the industrial processes involved. These controls are widely used and will effectively control exposures either by themselves, or coupled with changes in work practices.

Ventilation

Perhaps the most widely used technique for controlling chemical exposure is the use of ventilation. General ventilation uses the movement of air within the general work space to displace or dilute the contaminant with fresh outside air. General ventilation may not be the preferred control method, however, due to the large volumes of air movement required. Local exhaust ventilation uses a much smaller volume of air and controls emissions at the point or source from which contaminants are generated.

Isolation

Isolation involves placing a physical barrier between the hazardous operation and the worker. Many modern, automated manufacturing processes are now fully enclosed in ventilated cabinets. The effectiveness of such a control technique depends on the frequency with which the workers have to enter the enclosure during normal operations.

In other situations, the worker, rather than the process or machine, can be placed in an enclosure having a controlled atmosphere. Many processes which involve potential chemical exposures are operated remotely by operators from air conditioned booths isolated from the hazardous materials.

Substitution

Substitution refers to the replacement of a toxic chemical in a particular process or work area with another, less toxic or non-toxic product. Properly applied, substitution can be a very effective control technique. However, care must be taken to ensure that the proposed substitute performs in a similar manner to the product being

replaced. In addition, it is essential that the substitute be carefully evaluated to ensure that in controlling one hazard, another different hazard is not inadvertently introduced. The substitute must also be compatible with existing manufacturing equipment and processes.

The success of these engineering control techniques will depend on the physical properties of the chemicals and emissions encountered (boiling point, vapor pressure, etc.) and the process operating conditions. In some cases, particularly with cleaning solvents, substitution may provide the quickest and most effective means of reducing exposure. In other situations, a major effort may be required to alter processes or install or expand local or general dilution ventilation.

OSHA has found that engineering controls and improved work practices are available to reduce exposure levels to the new levels in almost all circumstances. However, in some circumstances, respiratory protection may be necessary to complement engineering controls. Respiratory protection may be necessary to achieve compliance in some specific operations in some industries.

Engineering controls vs. protective equipment

So in other words, the most desirable way to deal with an air contaminant is to alter the process so that the contaminant is no longer produced. If the process cannot be changed or materials substituted, a well designed ventilation system may be the best solution to the problem. If ventilation would require too large a volume of air to reduce the concentration of the contaminant, then respiratory protection may be a necessary short-term solution.

Pitfalls of exposure limits

Even though you have checked the PELs and the TLVs for your chemicals, brought the exposure numbers into the acceptable range, your workers may still be endangered. How could this be?

There are over 600,000 chemicals in use today. Information available for selecting an exposure limit is very scant. Only a small percentage of chemicals is even evaluated. Therefore, supporting data can be weak. Exposure limits are changed when new information becomes available. What is considered “safe” today, may be viewed in a different light tomorrow.

Individual sensitivity is a factor. Even at an acceptable exposure level, a given chemical may have a negative effect on certain people. So even if the exposure limit protects most people, it can not be relied upon to protect *everyone.*

Synergistic effects should be considered. Single substances are assigned individual ratings. Seldom in the real world is only one chemical in use at a time. What happens when several chemicals combine to produce effects far more harmful than those of any one substance?

Exposure limits for air contaminants

In the following tables, you will find the air contaminant levels that OSHA allows in your workplace. For employee protection, these levels must not be exceeded. Engineering out the hazard is the best method to achieve a healthy breathing atmosphere.

Table Z-1—Limits for air contaminants

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Acetaldehyde	75-07-0	200	360	
Acetic Acid	64-19-7	10	25	
Acetic anhydride	108-24-7	5	20	
Acetone	67-64-1	1000	2400	
Acetonitrile	75-05-8	40	70	
2-Acetylaminofluorine; see 1910.1014	53-96-3			
Acetylene dichloride; see 1,2-Dichloroethylene.				
Acetylene tetrabromide	79-27-6	1	14	
Acrolein	107-02-8	0.1	0.25	
Acrylamide	79-06-1	.....	0.3	X
Acrylonitrile; see 1910.1045	107-13-1			
Aldrin	309-00-2	.....	0.25	X
Allyl alcohol	107-18-6	2	5	X
Allyl chloride	107-05-1	1	3	
Allyl glycidyl ether (AGE)	106-92-3	(C)10	(C)45	
Allyl propyl disulfide	2179-59-1	2	12	
alpha-Alumina	1344-28-1			
Total dust		.....	15	
Respirable fraction		.....	5	
Aluminum, metal (as Al)	7429-90-5			
Total dust		.....	15	
Respirable fraction		.....	5	
4-Aminodiphenyl; see 1910.1011	92-67-1			
2-Aminoethanol; see Ethanolamine.				
2-Aminopyridine	504-29-0	0.5	2	
Ammonia	7664-41-7	50	35	
Ammonium sulfamate	7773-06-0			
Total dust		.....	15	
Respirable fraction		.....	5	
n-Amyl acetate	628-63-7	100	525	
sec-Amyl acetate	626-38-0	125	650	
Aniline and homologs	62-53-3	5	19	X
Anisidine (o-, p-isomers)	29191-52-4	.....	0.5	X
Antimony and compounds (as Sb)	7440-36-0	.....	0.5	
ANTU (alpha Naphthylthiourea)	86-88-4	.....	0.3	
Arsenic, inorganic compound (as As); see 1910.1018	7440-38-2			
Arsenic, organic compounds (as As)	7440-38-2	.....	0.5	
Arsine	7784-42-1	0.05	0.2	
Asbestos; see 1910.1001	([4])			
Azinphos-methyl	86-50-0	.....	0.2	X

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Barium, soluble compounds (as Ba)	7440-39-3	.....	0.5	
Barium sulfate	7727-43-7			
Total dust		.....	15	
Respirable Fraction		.....	5	
Benomyl	17804-35-2			
Total dust		.....	15	
Respirable Fraction		.....	5	
Benzene; see 1910.1028	71-43-2			
See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028[d].				
Benzidine; see 1910.1010	92-87-5			
p-Benzoquinone; see Quinone.				
Benzo(a)pyrene; see Coal tar pitch volatiles.				
Benzoyl peroxide	94-36-0	.....	5	
Benzyl chloride	100-44-7	1	5	
Beryllium and beryllium compounds (as Be)	7440-41-7		([2])	
Biphenyl; see Diphenyl.				
Bismuth telluride, Undoped	1304-82-1			
Total dust		.....	15	
Respirable fraction		.....	5	
Boron oxide	1303-86-2			
Total dust		.....	15	
Boron trifluoride	7637-07-2	(C)1	(C)3	
Bromine	7726-95-6	0.1	0.7	
Bromoform	75-25-2	0.5	5	X
Butadiene (1,3-Butadiene); see 29 CFR 1910.1051; 29 CFR 1910.19(l)	106-99-0	1ppm/5ppm STEL		
Butanethiol; see Butyl mercaptan.				
2-Butanone (Methyl ethyl ketone)	78-93-3	200	590	
2-Butoxyethanol	111-76-2	50	240	X
n-Butyl-acetate	123-86-4	150	710	
sec-Butyl acetate	105-46-4	200	950	
tert-Butyl acetate	540-88-5	200	950	
n-Butyl alcohol	71-36-3	100	300	
sec-Butyl alcohol	78-92-2	150	450	
tert-Butyl alcohol	75-65-0	100	300	
Butylamine	109-73-9	(C)5	(C)15	X
tert-Butyl chromate (as $Cr0_3$); see 1910.1026[6]	1189-85-1	.....		
n-Butyl glycidyl ether (BGE)	2426-08-6	50	270	
Butyl mercaptan	109-79-5	10	35	
p-tert-Butyltoluene	98-51-1	10	60	
Cadmium (as Cd); see 1910.1027	7440-43-9			

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Calcium carbonate	1317-65-3			
Total dust		.....	15	
Respirable fraction		.....	5	
Calcium hydroxide	1305-62-0			
Total dust		.....	15	
Respirable fraction		.....	5	
Calcium oxide	1305-78-8	.....	5	
Calcium silicate	1344-95-2			
Total dust		.....	15	
Respirable fraction		.....	5	
Calcium sulfate	7778-18-9			
Total dust		.....	15	
Respirable fraction		.....	5	
Camphor, synthetic	76-22-2	.....	2	
Carbaryl (Sevin)	63-25-2	.....	5	
Carbon black	1333-86-4	.....	3.5	
Carbon dioxide	124-38-9	5000	9000	
Carbon disulfide	75-15-0		([2])	
Carbon monoxide	630-08-0	50	55	
Carbon tetrachloride	56-23-5		([2])	
Cellulose	9004-34-6			
Total dust		.....	15	
Respirable fraction		.....	5	
Chlordane	57-74-9	.....	0.5	X
Chlorinated camphene	8001-35-2	.....	0.5	X
Chlorinated diphenyl oxide	55720-99-5	.....	0.5	
Chlorine	7782-50-5	(C)1	(C)3	
Chlorine dioxide	10049-04-4	0.1	0.3	
Chlorine trifluoride	7790-91-2	(C)0.1	(C)0.4	
Chloroacetaldehyde	107-20-0	(C)1	(C)3	
a-Chloroacetophenone (Phenacylchloride)	532-27-4	0.05	0.3	
Chlorobenzene	108-90-7	75	350	
o-Chlorobenzylidene malononitrile	2698-41-1	0.05	0.4	
Chlorobromomethane	74-97-5	200	1050	
2-Chloro-1,3-butadiene; see beta-Chloroprene				
Chlorodiphenyl (42% Chlorine) (PCB)	53469-21-9	.....	1	X
Chlorodiphenyl (54% Chlorine) (PCB)	11097-69-1	.....	0.5	X
1-Chloro-2,3-epoxypropane; see Epichlorohydrin				
2-Chloroethanol; see Ethylene chlorohydrin				
Chloroethylene; see Vinyl chloride				
Chloroform (Trichloromethane)	67-66-3	(C)50	(C)240	

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
bis(Chloromethyl) ether; see 1910.1008	542-88-1			
Chloromethyl methyl ether; see 1910.1006	107-30-2			
1-Chloro-1-nitropropane	600-25-9	20	100	
Chloropicrin	76-06-2	0.1	0.7	
beta-Chloroprene	126-99-8	25	90	X
2-Chloro-6-(trichloromethyl) pyridine	1929-82-4			
Total dust			15	
Respirable fraction			5	
Chromium (II) compounds(as Cr)	7440-47-3		0.5	
Chromium (III) compounds(as Cr)	7440-47-3		0.5	
Chromium metal and insoluble salts (as Cr)	7440-47-3		1	
Chromium (VI) compounds; see 1910.1026[5]				
Chrysene; see Coal tarpitch volatiles				
Clopidol	2971-90-6			
Total dust			15	
Respirable fraction			5	
Coal dust (less than 5% $Si0_2$), respirable fraction			([3])	
Coal dust (greater than or equal to 5% $Si0_2$), respirable fraction			([3])	
Coal tar pitch volatiles (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene	65966-93-2		0.2	
Cobalt metal, dust, and fume (as Co)	7440-48-4		0.1	
Coke oven emissions; see 1910.1029				
Copper	7440-50-8			
Fume (as Cu)			0.1	
Dusts and mists (as Cu)			1	
Cotton dust[e], see 1910.1043			1	
Crag herbicide (Sesone)	136-78-7			
Total dust			15	
Respirable fraction			5	
Cresol, all isomers	1319-77-3	5	22	X
Crotonaldehyde	123-73-9; 4170-30-3	2	6	
Cumene	98-82-8	50	245	X
Cyanides (as CN)	([4])		5	X
Cyclohexane	110-82-7	300	1050	
Cyclohexanol	108-93-0	50	200	
Cyclohexanone	108-94-1	50	200	
Cyclohexene	110-83-8	300	1015	
Cyclopentadiene	542-92-7	75	200	
2,4-D (Dichlorophenoxyacetic acid)	94-75-7		10	
Decaborane	17702-41-9	0.05	0.3	X

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Demeton (Systox)	8065-48-3	.....	0.1	X
Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone)	123-42-2	50	240	
1,2-Diaminoethane; see Ethylenediamine				
Diazomethane	334-88-3	0.2	0.4	
Diborane	19287-45-7	0.1	0.1	
1,2-Dibromo-3-chloropropane (DBCP); see 1910.1044	96-12-8			
1,2-Dibromoethane; see Ethylene dibromide				
Dibutyl phosphate	107-66-4	1	5	
Dibutyl phthalate	84-74-2	.....	5	
o-Dichlorobenzene	95-50-1	(C)50	(C)300	
p-Dichlorobenzene	106-46-7	75	450	
3,3'-Dichlorobenzidine; see 1910.1007	91-94-1			
Dichlorodifluoromethane	75-71-8	1000	4950	
1,3-Dichloro-5,5-dimethyl hydantoin	118-52-5	.....	0.2	
Dichlorodiphenyltrichloroethane (DDT)	50-29-3	.....	1	X
1,1-Dichloroethane	75-34-3	100	400	
1,2-Dichloroethane; see Ethylene dichloride				
1,2-Dichloroethylene	540-59-0	200	790	
Dichloroethyl ether	111-44-4	(C)15	(C)90	X
Dichloromethane; see Methylene chloride				
Dichloromonofluoromethane	75-43-4	1000	4200	
1,1-Dichloro-1-nitroethane	594-72-9	(C)10	(C)60	
1,2-Dichloropropane; see Propylene dichloride				
Dichlorotetrafluoroethane	76-14-2	1000	7000	
Dichlorvos (DDVP)	62-73-7	.....	1	X
Dicyclopentadienyl iron	102-54-5			
Total dust		.....	15	
Respirable fraction		.....	5	
Dieldrin	60-57-1	.....	0.25	X
Diethylamine	109-89-7	25	75	
2-Diethylaminoethanol	100-37-8	10	50	X
Diethyl ether; see Ethyl ether				
Difluorodibromomethane	75-61-6	100	860	
Diglycidyl ether (DGE)	2238-07-5	(C)0.5	(C)2.8	
Dihydroxybenzene; see Hydroquinone				
Diisobutyl ketone	108-83-8	50	290	
Diisopropylamine	108-18-9	5	20	X
4-Dimethylaminoazobenzene; see 1910.1015	60-11-7			
Dimethoxymethane; see Methylal				
Dimethyl acetamide	127-19-5	10	35	X
Dimethylamine	124-40-3	10	18	

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Dimethylaminobenzene; see Xylidine				
Dimethylaniline (N,N-Dimethylaniline)	121-69-7	5	25	X
Dimethylbenzene; see Xylene				
Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphate	300-76-5	.....	3	
Dimethylformamide	68-12-2	10	30	X
2,6-Dimethyl-4-heptanone; see Diisobutyl ketone				
1,1-Dimethylhydrazine	57-14-7	0.5	1	X
Dimethylphthalate	131-11-3	.....	5	
Dimethyl sulfate	77-78-1	1	5	X
Dinitrobenzene (all isomers)			1	X
(ortho)	528-29-0			
(meta)	99-65-0			
(para)	100-25-4			
Dinitro-o-cresol	534-52-1	.....	0.2	X
Dinitrotoluene	25321-14-6	.....	1.5	X
Dioxane (Diethylene dioxide)	123-91-1	100	360	X
Diphenyl (Biphenyl)	92-52-4	0.2	1	
Diphenylmethane diisocyanate; see Methylene bisphenyl isocyanate				
Dipropylene glycol methyl ether	34590-94-8	100	600	X
Di-sec octyl phthalate (Di-(2-ethylhexyl)phthalate)	117-81-7	.....	5	
Emery	12415-34-8			
Total dust		.....	15	
Respirable fraction		.....	5	
Endrin	72-20-8	.....	0.1	X
Epichlorohydrin	106-89-8	5	19	X
EPN	2104-64-5	.....	0.5	X
1,2-Epoxypropane; see Propylene oxide				
2,3-Epoxy-1-propanol; see Glycidol				
Ethanethiol; see Ethyl mercaptan				
Ethanolamine	141-43-5	3	6	
2-Ethoxyethanol (Cellosolve)	110-80-5	200	740	X
2-Ethoxyethyl acetate (Cellosolve acetate)	111-15-9	100	540	X
Ethyl acetate	141-78-6	400	1400	
Ethyl acrylate	140-88-5	25	100	X
Ethyl alcohol (Ethanol)	64-17-5	1000	1900	
Ethylamine	75-04-7	10	18	
Ethyl amyl ketone (5-Methyl-3-heptanone)	541-85-5	25	130	
Ethyl benzene	100-41-4	100	435	
Ethyl bromide	74-96-4	200	890	
Ethyl butyl ketone (3-Heptanone)	106-35-4	50	230	
Ethyl chloride	75-00-3	1000	2600	

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Ethyl ether	60-29-7	400	1200	
Ethyl formate	109-94-4	100	300	
Ethyl mercaptan	75-08-1	(C)10	(C)25	
Ethyl silicate	78-10-4	100	850	
Ethylene chlorohydrin	107-07-3	5	16	X
Ethylenediamine	107-15-3	10	25	
Ethylene dibromide	106-93-4		([2])	
Ethylene dichloride (1,2-Dichloroethane)	107-06-2		([2])	
Ethylene glycol dinitrate	628-96-6	(C)0.2	(C)1	X
Ethylene glycol methyl acetate; see Methyl cellosolve acetate				
Ethyleneimine; see 1910.1012	151-56-4			
Ethylene oxide; see 1910.1047	75-21-8			
Ethylidene chloride; see 1,1-Dichloroethane				
N-Ethylmorpholine	100-74-3	20	94	X
Ferbam	14484-64-1			
Total dust		.....	15	
Ferrovanadium dust	12604-58-9	.....	1	
Fluorides (as F)	([4])	.....	2.5	
Fluorine	7782-41-4	0.1	0.2	
Fluorotrichloromethane (Trichlorofluoromethane)	75-69-4	1000	5600	
Formaldehyde; see 1910.1048	50-00-0			
Formic acid	64-18-6	5	9	
Furfural	98-01-1	5	20	X
Furfuryl alcohol	98-00-0	50	200	
Grain dust (oat, wheat, barley)	.....	.....	10	
Glycerin (mist)	56-81-5			
Total dust		.....	15	
Respirable fraction		.....	5	
Glycidol	556-52-5	50	150	
Glycol monoethyl ether; see 2-Ethoxyethanol				
Graphite, natural respirable dust	7782-42-5		([3])	
Graphite, synthetic				
Total dust		.....	15	
Respirable fraction		.....	5	
Guthion; see Azinphos methyl				
Gypsum	13397-24-5			
Total dust		.....	15	
Respirable fraction		.....	5	
Hafnium	7440-58-6	.....	0.5	
Heptachlor	76-44-8	.....	0.5	X

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Heptane (n-Heptane)	142-82-5	500	2000	
Hexachloroethane	67-72-1	1	10	X
Hexachloronaphthalene	1335-87-1	.....	0.2	X
n-Hexane	110-54-3	500	1800	
2-Hexanone (Methyl n-butyl ketone)	591-78-6	100	410	
Hexone (Methyl isobutyl ketone)	108-10-1	100	410	
sec-Hexyl acetate	108-84-9	50	300	
Hydrazine	302-01-2	1	1.3	X
Hydrogen bromide	10035-10-6	3	10	
Hydrogen chloride	7647-01-0	(C)5	(C)7	
Hydrogen cyanide	74-90-8	10	11	X
Hydrogen fluoride (as F)	7664-39-3		([2])	
Hydrogen peroxide	7722-84-1	1	1.4	
Hydrogen selenide (as Se)	7783-07-5	0.05	0.2	
Hydrogen sulfide	7783-06-4		([2])	
Hydroquinone	123-31-9	.....	2	
Iodine	7553-56-2	(C)0.1	(C)1	
Iron oxide fume	1309-37-1	.....	10	
Isoamyl acetate	123-92-2	100	525	
Isoamyl alcohol (primary and secondary)	123-51-3	100	360	
Isobutyl acetate	110-19-0	150	700	
Isobutyl alcohol	78-83-1	100	300	
Isophorone	78-59-1	25	140	
Isopropyl acetate	108-21-4	250	950	
Isopropyl alcohol	67-63-0	400	980	
Isopropylamine	75-31-0	5	12	
Isopropyl ether	108-20-3	500	2100	
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240	
Kaolin	1332-58-7			
Total dust		.....	15	
Respirable fraction		.....	5	
Ketene	463-51-4	0.5	0.9	
Lead inorganic (as Pb); see 1910.1025	7439-92-1			
Limestone	1317-65-3			
Total dust		.....	15	
Respirable fraction		.....	5	
Lindane	58-89-9	.....	0.5	X
Lithium hydride	7580-67-8	.....	0.025	
L.P.G. (Liquefied petroleum gas)	68476-85-7	1000	1800	

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Magnesite	546-93-0			
Total dust		.....	15	
Respirable fraction		.....	5	
Magnesium oxide fume	1309-48-4			
Total particulate		.....	15	
Malathion	121-75-5			
Total dust		.....	15	X
Maleic anhydride	108-31-6	0.25	1	
Manganese compounds (as Mn)	7439-96-5	.....	(C)5	
Manganese fume (as Mn)	7439-96-5	.....	(C)5	
Marble	1317-65-3			
Total dust		.....	15	
Respirable fraction		.....	5	
Mercury (aryl and inorganic) (as Hg)	7439-97-6		([2])	
Mercury (organo) alkyl compounds (as Hg)	7439-97-6		([2])	
Mercury (vapor) (as Hg)	7439-97-6		([2])	
Mesityl oxide	141-79-7	25	100	
Methanethiol; see Methyl mercaptan				
Methoxychlor	72-43-5			
Total dust		.....	15	
2-Methoxyethanol (Methyl cellosolve)	109-86-4	25	80	X
2-Methoxyethyl acetate (Methyl cellosolve acetate)	110-49-6	25	120	X
Methyl acetate	79-20-9	200	610	
Methyl acetylene (Propyne)	74-99-7	1000	1650	
Methyl acetylene-propadiene mixture (MAPP)		1000	1800	
Methyl acrylate	96-33-3	10	35	X
Methylal (Dimethoxy-methane)	109-87-5	1000	3100	
Methyl alcohol	67-56-1	200	260	
Methylamine	74-89-5	10	12	
Methyl amyl alcohol; see Methyl Isobutyl carbinol				
Methyl n-amyl ketone	110-43-0	100	465	
Methyl bromide	74-83-9	(C)20	(C)80	X
Methyl butyl ketone; see 2-hexanone				
Methyl cellosolve; see 2-Methoxyethanol				
Methyl cellosolve acetate; see 2-Methoxyethyl acetate				
Methyl chloride	74-87-3		([2])	
Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	350	1900	
Methylcyclohexane	108-87-2	500	2000	
Methylcyclohexanol	25639-42-3	100	470	
o-Methylcyclohexanone	583-60-8	100	460	X

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Methylene chloride	75-09-2		([2])	
Methyl ethyl ketone (MEK); see 2-Butanone				
Methyl formate	107-31-3	100	250	
Methyl hydrazine (Monomethyl hydrazine)	60-34-4	(C)0.2	(C)0.35	X
Methyl iodide	74-88-4	5	28	X
Methyl isoamyl ketone	110-12-3	100	475	
Methyl isobutyl carbinol	108-11-2	25	100	X
Methyl isobutyl ketone; see Hexone				
Methyl isocyanate	624-83-9	0.02	0.05	X
Methyl mercaptan	74-93-1	(C)10	(C)20	
Methyl methacrylate	80-62-6	100	410	
Methyl propyl ketone; see 2-Pentanone				
alpha-Methyl styrene	98-83-9	(C)100	(C)480	
Methylene bisphenyl isocyanate (MDI)	101-68-8	(C)0.02	(C)0.2	
Mica; see Silicates				
Molybdenum (as Mo)	7439-98-7			
Soluble compounds		.....	5	
Insoluble compounds				
Total dust		.....	15	
Monomethyl aniline	100-61-8	2	9	X
Monomethyl hydrazine; see Methyl hydrazine				
Morpholine	110-91-8	20	70	X
Naphtha (Coal tar)	8030-30-6	100	400	
Naphthalene	91-20-3	10	50	
alpha-Naphthylamine; see 1910.1004	134-32-7			
beta-Naphthylamine; see 1910.1009	91-59-8			
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	
Nickel, metal and insoluble compounds (as Ni)	7440-02-0	.....	1	
Nickel, soluble compounds (as Ni)	7440-02-0	.....	1	
Nicotine	54-11-5	.....	0.5	X
Nitric acid	7697-37-2	2	5	
Nitric oxide	10102-43-9	25	30	
p-Nitroaniline	100-01-6	1	6	X
Nitrobenzene	98-95-3	1	5	X
p-Nitrochlorobenzene	100-00-5	.....	1	X
4-Nitrodiphenyl; see 1910.1003	92-93-3			
Nitroethane	79-24-3	100	310	
Nitrogen dioxide	10102-44-0	(C)5	(C)9	
Nitrogen trifluoride	7783-54-2	10	29	

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Nitroglycerin	55-63-0	(C)0.2	(C)2	X
Nitromethane	75-52-5	100	250	
1-Nitropropane	108-03-2	25	90	
2-Nitropropane	79-46-9	25	90	
N-Nitrosodimethylamine; see 1910.1016				
Nitrotoluene (all isomers)		5	30	X
o-isomer	88-72-2			
m-isomer	99-08-1			
p-isomer	99-99-0			
Nitrotrichloromethane; see Chloropicrin				
Octachloronaphthalene	2234-13-1	.....	0.1	X
Octane	111-65-9	500	2350	
Oil mist, mineral	8012-95-1	.....	5	
Osmium tetroxide (as Os)	20816-12-0	.....	0.002	
Oxalic acid	144-62-7	.....	1	
Oxygen difluoride	7783-41-7	0.05	0.1	
Ozone	10028-15-6	0.1	0.2	
Paraquat, respirable dust	4685-14-7; 1910-42-5; 2074-50-2	.....	0.5	X
Parathion	56-38-2	.....	0.1	X
Particulates not otherwise regulated (PNOR)[f].				
Total dust		.....	15	
Respirable fraction		.....	5	
PCB; see Chlorodiphenyl (42% and 54% chlorine)				
Pentaborane	19624-22-7	0.005	0.01	
Pentachloronaphthalene	1321-64-8	.....	0.5	X
Pentachlorophenol	87-86-5	.....	0.5	X
Pentaerythritol	115-77-5			
Total dust		.....	15	
Respirable fraction		.....	5	
Pentane	109-66-0	1000	2950	
2-Pentanone (Methyl propyl ketone)	107-87-9	200	700	
Perchloroethylene (Tetrachloroethylene)	127-18-4		([2])	
Perchloromethyl mercaptan	594-42-3	0.1	0.8	
Perchloryl fluoride	7616-94-6	3	13.5	
Petroleum distillates (Naphtha) (Rubber Solvent)		500	2000	
Phenol	108-95-2	5	19	X
p-Phenylene diamine	106-50-3	.....	0.1	X

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Phenyl ether, vapor	101-84-8	1	7	
Phenyl ether-biphenyl mixture, vapors		1	7	
Phenylethylene; see Styrene				
Phenyl glycidyl ether (PGE)	122-60-1	10	60	
Phenylhydrazine	100-63-0	5	22	X
Phosdrin (Mevinphos)	7786-34-7	.....	0.1	X
Phosgene (Carbonyl chloride)	75-44-5	0.1	0.4	
Phosphine	7803-51-2	0.3	0.4	
Phosphoric acid	7664-38-2	.....	1	
Phosphorus (yellow)	7723-14-0	.....	0.1	
Phosphorus pentachloride	10026-13-8	.....	1	
Phosphorus pentasulfide	1314-80-3	.....	1	
Phosphorus trichloride	7719-12-2	0.5	3	
Phthalic anhydride	85-44-9	2	12	
Picloram	1918-02-1			
Total dust		.....	15	
Respirable fraction		.....	5	
Picric acid	88-89-1	.....	0.1	X
Pindone (2-Pivalyl-1,3-indandione)	83-26-1	.....	0.1	
Plaster of Paris	26499-65-0			
Total dust		.....	15	
Respirable fraction		.....	5	
Platinum (as Pt)	7440-06-4			
Metal		.....	.....	
Soluble salts		.....	0.002	
Portland cement	65997-15-1			
Total dust		.....	15	
Respirable fraction		.....	5	
Propane	74-98-6	1000	1800	
beta-Propiolactone; see 1910.1013	57-57-8			
n-Propyl acetate	109-60-4	200	840	
n-Propyl alcohol	71-23-8	200	500	
n-Propyl nitrate	627-13-4	25	110	
Propylene dichloride	78-87-5	75	350	
Propylene imine	75-55-8	2	5	X
Propylene oxide	75-56-9	100	240	
Propyne; see Methyl acetylene				
Pyrethrum	8003-34-7	.....	5	
Pyridine	110-86-1	5	15	
Quinone	106-51-4	0.1	0.4	
RDX; see Cyclonite				

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Rhodium (as Rh), metal fume and insoluble compounds	7440-16-6	.....	0.1	
Rhodium (as Rh), soluble compounds	7440-16-6	.....	0.001	
Ronnel	299-84-3	.....	15	
Rotenone	83-79-4	.....	5	
Rouge				
Total dust		.....	15	
Respirable fraction		.....	5	
Selenium compounds (as Se)	7782-49-2	.....	0.2	
Selenium hexafluoride (as Se)	7783-79-1	0.05	0.4	
Silica, amorphous, precipitated and gel	112926-00-8		([3])	
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica	61790-53-2		([3])	
Silica, crystalline cristobalite, respirable dust	14464-46-1		([3])	
Silica, crystalline quartz, respirable dust	14808-60-7		([3])	
Silica, crystalline tripoli (as quartz) respirable dust	1317-95-9		([3])	
Silica, crystalline tridymite, respirable dust	15468-32-3		([3])	
Silica, fused, respirable dust	60676-86-0		([3])	
Silicates (less than 1% crystalline silica)				
Mica (respirable dust)	12001-26-2		([3])	
Soapstone, total dust			([3])	
Soapstone, respirable dust			([3])	
Talc (containing asbestos): use asbestos limit; see 29 CFR 1910.1001			([3])	
Talc (containing no asbestos) respirable dust	14807-96-6		([3])	
Tremolite, asbestiform; see 1910.1001				
Silicon	7440-21-3			
Total dust		.....	15	
Respirable fraction		.....	5	
Silicon carbide	409-21-2			
Total dust		.....	15	
Respirable fraction		.....	5	
Silver, metal and soluble compounds (as Ag)	7440-22-4	.....	0.01	
Soapstone; see Silicates				
Sodium fluoroacetate	62-74-8	.....	0.05	X
Sodium hydroxide	1310-73-2	.....	2	
Starch	9005-25-8			
Total dust		.....	15	
Respirable fraction		.....	5	
Stibine	7803-52-3	0.1	0.5	
Stoddard solvent	8052-41-3	500	2900	
Strychnine	57-24-9	.....	0.15	
Styrene	100-42-5		([2])	

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Sucrose	57-50-1			
Total dust		.....	15	
Respirable fraction		.....	5	
Sulfur dioxide	7446-09-5	5	13	
Sulfur hexafluoride	2551-62-4	1000	6000	
Sulfuric acid	7664-93-9	.....	1	
Sulfur monochloride	10025-67-9	1	6	
Sulfur pentafluoride	5714-22-7	0.025	0.25	
Sulfuryl fluoride	2699-79-8	5	20	
Systox, see Demeton				
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	93-76-5	.....	10	
Talc; see Silicates				
Tantalum, metal and oxide dust	7440-25-7	.....	5	
TEDP (Sulfotep)	3689-24-5	.....	0.2	X
Tellurium and compounds (as Te)	13494-80-9	.....	0.1	
Tellurium hexafluoride (as Te)	7783-80-4	0.02	0.2	
Temephos	3383-96-8			
Total dust		.....	15	
Respirable fraction		.....	5	
TEPP (Tetraethyl pyrophosphate)	107-49-3	.....	0.05	X
Terphenyls	26140-60-3	(C)1	(C)9	
1,1,1,2-Tetrachloro-2,2-difluoroethane	76-11-9	500	4170	
1,1,2,2-Tetrachloro-1,2-difluoroethane	76-12-0	500	4170	
1,1,2,2-Tetrachloroethane	79-34-5	5	35	X
Tetrachloroethylene; see Perchloroethylene				
Tetrachloromethane; see Carbon tetrachloride				
Tetrachloronaphthalene	1335-88-2	.....	2	X
Tetraethyl lead (as Pb)	78-00-2	.....	0.075	X
Tetrahydrofuran	109-99-9	200	590	
Tetramethyl lead, (as Pb)	75-74-1	.....	0.075	X
Tetramethyl succinonitrile	3333-52-6	0.5	3	X
Tetranitromethane	509-14-8	1	8	
Tetryl (2,4,6-Trinitrophenylmethylnitramine)	479-45-8	.....	1.5	X
Thallium, soluble compounds (as Tl)	7440-28-0	.....	0.1	X
4,4´-Thiobis (6-tert, Butyl-m-cresol)	96-69-5			
Total dust		.....	15	
Respirable fraction			5	
Thiram	137-26-8	.....	5	
Tin, inorganic compounds (except oxides) (as Sn)	7440-31-5	.....	2	
Tin, organic compounds (as Sn)	7440-31-5	.....	0.1	
Titanium dioxide	13463-67-7			

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Total dust		.....	15	
Toluene	108-88-3		([2])	
Toluene-2,4-diisocyanate (TDI)	584-84-9	(C)0.02	(C)0.14	
o-Toluidine	95-53-4	5	22	X
Toxaphene; see Chlorinated camphene				
Tremolite; see Silicates.				
Tributyl phosphate	126-73-8	.....	5	
1,1,1-Trichloroethane; see Methyl chloroform				
1,1,2-Trichloroethane	79-00-5	10	45	X
Trichloroethylene	79-01-6		([2])	
Trichloromethane; see Chloroform				
Trichloronaphthalene	1321-65-9	.....	5	X
1,2,3-Trichloropropane	96-18-4	50	300	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1000	7600	
Triethylamine	121-44-8	25	100	
Trifluorobromomethane	75-63-8	1000	6100	
2,4,6-Trinitrophenol; see Picric acid				
2,4,6-Trinitrophenylmethyl nitramine; see Tetryl				
2,4,6-Trinitrotoluene (TNT)	118-96-7	.....	1.5	X
Triorthocresyl phosphate	78-30-8	.....	0.1	
Triphenyl phosphate	115-86-6	.....	3	
Turpentine	8006-64-2	100	560	
Uranium (as U)	7440-61-1			
Soluble compounds		.....	0.05	
Insoluble compounds		.....	0.25	
Vanadium	1314-62-1			
Respirable dust (as V_20_5)		.....	(C)0.5	
Fume (as V_20_5)		.....	(C)0.1	
Vegetable oil mist				
Total dust		.....	15	
Respirable fraction		.....	5	
Vinyl benzene; see Styrene				
Vinyl chloride; see 1910.1017	75-01-4			
Vinyl cyanide; see Acrylonitrile				
Vinyl toluene	25013-15-4	100	480	
Warfarin		.....	0.1	
Xylenes (o-, m-, p-isomers)	1330-20-7	100	435	
Xylidine	1300-73-8	5	25	X
Yttrium	7440-65-5	.....	1	
Zinc chloride fume	7646-85-7	.....	1	
Zinc oxide fume	1314-13-2	.....	5	

Table Z-1—Limits for air contaminants, Continued

Substance	CAS No. (c)	ppm (a)[1]	mg/m^3 (b)[1]	Skin designation
Zinc oxide	1314-13-2			
Total dust		.....	15	
Respirable fraction		.....	5	
Zinc stearate	557-05-1			
Total dust		.....	15	
Respirable fraction		.....	5	
Zirconium compounds (as Zr)	7440-67-7	.....	5	

[1]The PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit. They are to be determined from breathing-zone air samples.
[(a)]Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 torr.
[(b)]Milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.
[(c)]The CAS number is for information only. Enforcement is based on the substance name. For an entry covering more than one metal compound measured as the metal, the CAS number for the metal is given—not CAS numbers for the individual compounds.
[(d)]The final benzene standard in 1910.1028 applies to all occupational exposures to benzene, except in some circumstances the distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures; for the excepted subsegments, the benzene limits in Table Z-2 apply. See 1910.1028 for specific circumstances.
[(e)]This 8-hour TWA applies to respirable dust as measured by a vertical elutriator cotton dust sampler or equivalent instrument. The time-weighted average applies to the cotton waste processing operations of waste recycling (sorting, blending, cleaning and willowing) and garnetting. See also 1910.1043 for cotton dust limits applicable to other sectors.
[(f)]All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the Particulates Not Otherwise Regulated (PNOR) limit which is the same as the inert or nuisance dust limit of Table Z-3.
[2]See Table Z-2.
[3]See Table Z-3.
[4]Varies with compound.
[5]See Table Z-2 for the exposure limit for any operations or sectors where the exposure limit in 1910.1026 is stayed or is otherwise not in effect.
[6]If the exposure limit in 1910.1026 is stayed or is otherwise not in effect, the exposure limit is a ceiling of 0.1 mg/m^3.

Table Z-2—Limits for air contaminants

Substance	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift	
			Concentration	Maximum duration
Benzene[a] Z37.40-1969	10 ppm	25 ppm	50 ppm	10 minutes.
Beryllium and beryllium compounds (Z37.29-1970)	2 µg/m^3	5 µg/m^3	25 µg/m^3	30 minutes.
Cadmium fume[b] (Z37.5-1970)[c]	0.1 mg/m^3	0.3 mg/m^3		
Cadmium dust[b] (Z37.5-1970)[c]	0.2 mg/m^3	0.6 mg/m^3.		
Carbon disulfide (Z37.3-1968)	20 ppm	30 ppm	100 ppm	30 minutes.
Carbon tetrachloride (Z37.17-1967)	10 ppm	25 ppm	200 ppm	5 minutes in any 4 hrs.
Chromic acid and chromates (Z37.7-1971) (as CrO_3)[c]		1 mg/10m^3.		
Ethylene dibromide (Z37.31-1970)	20 ppm	30 ppm	50 ppm	5 minutes.
Ethylene dichloride (Z37.21-1969)	50 ppm	100 ppm	200 ppm	5 minutes in any 3 hrs.
Fluoride as dust (Z37.28-1969)	2.5 mg/m^3			
Formaldehyde; see 1910.1048				
Hydrogen fluoride (Z37.28-1969)	3 ppm			
Hydrogen sulfide (Z37.1966)		20 ppm	50 ppm	10 mins. once, only if no other meas. exp. occurs.
Mercury (Z37.8-1971)		1 mg/10m^3		
Methyl chloride (Z37.18-1969)	100 ppm	200 ppm	300 ppm	5 minutes in any 3 hrs.
Methylene chloride: see §1910.1052				
Organo (alkyl) mercury (Z37.30-1969)	0.01 mg/m^3	0.04 mg/m^3		
Styrene (Z37.15-1969)	100 ppm	200 ppm	600 ppm	5 minutes in any 3 hrs.
Tetrachloroethylene (Z37.22-1967)	100 ppm	200 ppm	300 ppm	5 minutes in any 3 hrs.
Toluene (Z37.12-1967)	200 ppm	300 ppm	500 ppm	10 minutes.
Trichloroethylene (Z37.19-1967)	100 ppm	200 ppm	300 ppm	5 minutes in any 2 hrs.

[a] This standard applies to the industry segments exempt from the 1 ppm 8 hour TWA and 5 ppm STEL of the benzene standard §1910.1028.
[b] This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.
[c] This standard applies to any operations or sectors for which the Hexavalent Chromium standard, 1910.1026, is stayed or otherwise is not in effect.

Table Z-3—Mineral dusts

Substance	Mppcf[a]	mg/m^3
Silica:		
Crystalline		
Quartz (Respirable)	$\frac{250^b}{\%SiO_2 + 5}$	$\frac{10\ mg/m^{3e}}{\%SiO_2 + 2}$
Quartz (Total Dust)	.....	$\frac{30\ mg/m^3}{\%SiO_2 + 2}$
Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz Tridymite: Use ½ the value calculated from the formulae for quartz		
Tridymite: Use ½ the value calculated from the formulae for quartz		
Amorphous, including natural diatomaceous earth	20	$\frac{80\ mg/m^3}{\%SiO_2}$
Silicates (less than 1% crystalline silica):		
Mica	20	
Soapstone	20	
Talc (non containing asbestos)	20[c]	
Talc (containing asbestos). Use asbestos limit.		
Tremolite (see 29 CFR 1910.1001)		
Portland cement	50	
Graphite (natural)	15	
Coal dust:		
Respirable fraction less than 5% SiO_2	.....	2.4 mg/m^{3e}
Respirable fraction greater than 5% SiO_2	.....	$\frac{10\ mg/m^{3e}}{\%SiO_2 + 2}$
Inert or Nuisance Dust:[d]		
Respirable fraction	15	5mg/m^3
Total dust	50	15mg/m^3

NOTE: Conversion factors—mppcf x 35.3 = million particles per cubic meter = particles per c.c.

[a] Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.

[b]The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.

[c]Containing less than 1% quartz; if 1% quartz or more, use quartz limit.

[d] All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by this limit, which is the same as the Particulates Not Otherwise Regulated (PNOR) limit in Table Z-1.

[e] Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percent passing selector
2	90
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC (now NRC) instrument. The respirable fraction of coal dust is determined with a MRE; the figure corresponding to that of 2.4 mg/m^3 in the table for coal dust is 4.5 mg/m^{3K}.

Toxic and hazardous substances compliance program

Purpose

The purpose of this program is to inform interested persons, including employees, that _____ is complying with the following chemical-specific regulation(s): _____.

These are complex regulations covering particularly hazardous chemicals. Due to the nature of the chemicals, OSHA has specified the following exposure limits for exposure for each chemical:

- Chemical name: _____.
- Action level (AL): _____.
- Permissible exposure limit (PEL): _____.
- Excursion limit/short-term exposure limit (STEL): _____.

_____ ensures that no employee is exposed to a chemical at concentrations greater than its permissible exposure limit over an eight-hour period. Our company also ensures that if an employee is exposed to a chemical for more than eight hours in any work day, the employee's allowable exposure, as a time-weighted-average (TWA) for that day, must be reduced according to the chemical-specific regulation.

Administrative duties

_____ is the program coordinator/manager who is responsible for developing and maintaining this written program. Copies of this program may be obtained at _____.

Chemical operations

The following company operations emit the corresponding chemicals listed:

- Chemical name: _____.
- Operation name and brief description: _____.
- How exposure to chemical occurs in operation: _____.
- Operating practices/job procedures for jobs with contact with chemical: _____.

Monitoring data

Our company understands that it is required to determine if any employee may be exposed to a chemical(s) at or above the action level as an eight-hour time-weighted average. We chose the following method(s) of monitoring and analysis for our initial exposure determination:

- Chemical name: _____.
- Initial employee exposure determination was based on: _____.
- Method of monitoring and analysis for initial exposure determination was: _____.
- Method chosen provides the following level of accuracy: _____.

Our initial determination for the following area(s)/operation(s) revealed that employee exposure is:

- Chemical name: _____.
- Above action level (AL): _____.
- Above STEL: _____.
- Above PEL: _____.

Subsequent monitoring is performed as follows:

- Chemical name: _____.
- Subsequent monitoring frequency: _____.
- When can subsequent monitoring discontinue? _____.
- Has subsequent monitoring been completed? (yes/no) _____.

We also understand that, after our initial determination, if changes in production, process, control, or personnel occur, we must determine if employees are exposed to higher concentrations of the chemical(s). Our procedure(s) for monitoring for change and initiating additional monitoring is:

- Chemical name: _____.
- Procedure for monitoring change: _____.

Our company notifies each employee in writing of the results that represent that employee's exposure. The notification procedure (including who is responsible for doing it and how many days after completing exposure determination that person notifies each employee) is completed using the following process: _____.

Additional monitoring information includes: _____.

Engineering and work practice controls

We use the following engineering, administrative, and work practice controls to reduce and maintain acceptable employee exposure limits to the chemical(s) at or below the permissible exposure limit to achieve compliance:

- Chemical name: _____.
- Control measure: _____.
- Schedule for implementing control measure: _____.

The engineering plans, studies, and technologies considered when determining methods select for controlling exposure to the chemical(s) are specified in the table below:

- Chemical name: _____.
- Engineering plans: _____.
- Studies: _____.
- Technologies: _____.

Maintenance plays an important role in meeting the PEL. Our maintenance schedules are as follows:

- Chemical name: _____.
- Maintenance activity: _____.
- Schedule (frequency): _____.

Personal protective equipment (PPE)

Our engineering and work practice controls are sufficient enough to reduce exposures to at or below the PEL without the use of respirators. Therefore, unless an employee specifically requests a respirator, respiratory protection is not used at this company.

We provide the following personal protective equipment to supplement our engineering and work practice controls:

- Chemical name: _____.
- PPE and clothing: _____.
- Procedures for cleaning, laundering, replacing, repairing, and disposing of PPE and clothing: _____.

We provide personal protective equipment as interim protection for exposed employees during exposure determination, treating employees as if they were exposed above the PEL (or to any quantity, if the chemical is one of the 13 carcinogens). This means we provide the following:

- Chemical name: _____.
- Specific types of protection provided during the initial exposure determination period: _____.

Inspections

Work areas, materials, and equipment are inspected by _____ as follows:

Emergency situations

Our company procedures for a chemical emergency situation involving the substantial release of a chemical are as follows:

- Chemical name: _____.
- Emergency procedures: _____.

Employees not essential to correcting the emergency situation are restricted from the area and normal operations are halted in that area until the emergency is abated. The following persons are trained and responsible for correcting the emergency situation: _____.

Copies of our *Emergency Action Plan* and *Fire Prevention Plan* are attached to this program for more information.

Medical surveillance

With its medical surveillance program, _____ monitors and maintains appropriate levels of employee occupational exposure to hazardous substances or physical agents. To determine which employees need medical surveillance because of occupational exposure to chemicals, we have identified the operations where employees may have contact.

This exposure determination is made without regard to the use of personal protective equipment (i.e., employees are considered to be exposed even if they wear personal protective equipment). It lists all job classifications/tasks in which all or some employees may be expected to incur such occupational exposure, regardless of frequency. At this facility, the following job classifications/tasks is in this category:

- Chemical name: _____.
- Job classifications where *all* employees have occupational exposure: _____.
- Job classifications where *some* employees have occupational exposure: _____.
- Tasks/procedures where occupational exposure occurs in the “some” job classification listings: _____.

Our examinations are performed under the supervision of a licensed physician, without cost to the employee, without loss of pay, and at a reasonable time and place. We provide the opportunity for medical attention and evaluation both when an employee experiences signs or symptoms of exposure and when they are routinely exposed to hazardous substances or physical agents above the action level or the PEL (whichever is the OSHA requirement). The processes we use to provide those opportunities is as follows:

- Chemical name: _____.
- Process for providing medical attention when employees experience signs and symptoms: _____.
- Process and frequency for providing medical attention when employees are routinely exposed above OSHA limits: _____.

When an emergency occurs during operations exposing an employee to a hazardous substance or physical agent used in the workplace, we provide the employee opportunity for medical attention and evaluation. We use the following process to provide this opportunity:

- Chemical name: _____.
- Process for providing medical attention and evaluation for emergencies: _____.

Our examining physician plays an important role in our medical monitoring program. _____ provides all necessary documentation to the physician.

At our facility, we keep detailed records of each chemical's medical monitoring and surveillance records. These include: _____. The medical records are kept in _____.

Program evaluation

This written program is revised and updated according to the following schedule:

- Chemical name: _____.
- Name/Position of reviewer: _____.
- Review frequency: _____.

Appendices

The following documents have been attached to this written program: _____.

Reserved

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OSHA COMPLIANCE MANUAL

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Asbestos

Introduction

"Asbestos" is a generic name given to a fibrous variety of six naturally occurring minerals that have been used for decades in the development of thousands of commercial products. The term "asbestos" is not a mineralogical definition but a commercial name given to a group of minerals that possess high tensile strength, flexibility, resistance to chemical and thermal degradation, and electrical resistance. These minerals have been used in many products, including insulation and fireproofing materials, automotive brakes and textile products, and cement and wallboard materials.

The asbestos minerals have a tendency to separate into microscopic-size particles that can remain in the air and are easily inhaled. These fibers can become embedded in the tissues of the lung and digestive system. Once the fibers become trapped in the lung's alveoli (air sacs), they cannot be removed. Persons occupationally exposed to asbestos have developed several types of life-threatening diseases, including lung cancer. Although the use of asbestos and asbestos products has dramatically decreased, they are still found in many residential and commercial settings and continue to pose a health risk to workers and others.

Asbestos workers have increased chances of getting two principal types of cancer:

- Cancer of the lung tissue itself, and
- Mesothelioma, a cancer of the thin membrane that surrounds the lung and other internal organs.

Other diseases related to asbestos exposure are asbestosis, an emphysema-like condition; and gastrointestinal cancer which is caused by ingesting asbestos-contaminated food. These diseases do not develop immediately following exposure to asbestos, but appear only after a number of years.

The beginning of this section provides a summary of OSHA's requirements for asbestos exposure among workers in general industry and describes the steps an employer must take to reduce the levels of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in the workplace.

This is followed by selected excerpts from the OSHA compliance directive for asbestos, CPL 2-2.63. It is a document developed to establish policies for OSHA enforcement of the asbestos standard, but it can be very helpful to know how the standard is being enforced.

Exposure

The asbestos standard, found at §1910.1001, requires employers to ensure that employee exposure to an airborne concentration of asbestos does not exceed 0.1 fiber per cubic centimeter of air as an eight (8)-hour time-weighted average (TWA). Covered employers must also ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over a sampling period of thirty (30) minutes. If these levels are exceeded, employers have to implement an asbestos exposure control program that contains air monitoring, employee training, and medical surveillance.

Asbestos monitoring

OSHA requires employers to perform initial monitoring for each job classification to determine the airborne concentrations of asbestos to which employees may be exposed. If exposures exceed the TWA permissible exposure limit and/or excursion limit, periodic monitoring must be conducted at intervals no greater than every six months.

If either initial or periodic monitoring indicates that employee exposures are below the TWA permissible exposure limit and/or excursion limit, monitoring can be stopped for those employees whose exposures are represented by such monitoring. The employer must initiate monitoring whenever there has been a change in the production, process, control equipment, personnel or work practices that may result in new or additional exposures to asbestos. Monitoring should also occur when the employer has any reason to suspect that a

change may result in new or additional exposures above the PEL. Employees must be notified of the results of asbestos monitoring, in writing, either individually or by a posted notice, within 15 working days after receiving the test results.

Regulated areas

Covered employers have to establish a regulated area(s) where airborne concentrations of asbestos exceed the permissible exposure limit (PEL). Only authorized personnel may be allowed enter regulated areas and they must use respirators. No smoking, eating, drinking, chewing tobacco or gum, or applying cosmetics is permitted in regulated areas. Warning signs have to be displayed at each regulated area and must be posted at all approaches to regulated areas.

Employers must ensure that employees working in and around regulated areas comprehend the warning signs. Methods to ensure employee comprehension may include the use of languages other than English, pictographs, and graphics. These signs must contain the following information:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use the alternate wording specified in 1910.1001(j)(4)(ii)(c) for warning signs.

In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

Warning labels have to be placed on all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers. The label must include the following information:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

Note: Prior to June 1, 2015, employers may use the alternate wording specified in 1910.1001(j)(5)(iii) for warning labels.

Engineering and work practice controls

To help reduce worker exposure to airborne fibers, asbestos must be handled, mixed, applied, removed, cut, scored or otherwise worked in a wet state. This “wet” method must also be used when products containing asbestos are removed from bags, cartons, or containers. If this is not possible, removal must be done in an enclosed or well ventilated area.

Asbestos containing materials must not be applied by spray methods. Compressed air can be used to remove asbestos or asbestos containing materials only if the compressed air is used in conjunction with an enclosed ventilated system designed to capture the dust cloud created by the compressed air.

To the extent feasible, engineering and work practice controls need to be used to reduce employee exposure to within the PEL. Respirators may be used where engineering controls have been instituted but are insufficient to reduce exposure to the required level. It is the employer’s responsibility to implement a written

program to reduce employee exposure to or below the PEL by means of engineering and work practice controls and by the use of respirators.

Written plans must be reviewed and updated as necessary to reflect significant changes in the asbestos program. Employee rotation cannot be used as a means of compliance with the permissible exposure limit.

Personal protective equipment

Respiratory protection

Exposed employees have to wear respirators:

(1) While feasible engineering and work practice controls are being installed or implemented;

(2) During maintenance and repair activities or other activities where engineering and work practice controls are not feasible;

(3) If feasible engineering and work practice controls are insufficient to reduce employee exposure; and

(4) In emergencies.

See the PERSONAL PROTECTIVE EQUIPMENT for guidance in developing a respirator program.

Employees who use an air purifying respirator must change filters whenever an increase in breathing resistance is detected. Employees who wear respirators must be allowed to wash their face and respirator facepiece whenever necessary to prevent skin irritation associated with respirator use. An employee must not be assigned to tasks requiring the use of respirators if a physician determines that the employee is unable to function normally wearing a respirator or that the employee's safety and health or that of others would be affected by the employee's use of a respirator.

In this case, the employer must assign the employee to another job or give the employee the opportunity to transfer to a different job which does not require the use of a respirator. The job must be with the same employer, in the same geographical area, and with the same seniority, status, and rate of pay, if such a position is available.

The employer must assure that a respirator issued to an employee fits properly and exhibits minimum facepiece leakage. Following a medical evaluation, each employee who will wear a respirator on the job must have a quantitative or qualitative fit test. This has to be done at the time of initial fitting and at least every six months for each employee wearing a negative pressure respirator.

Protective clothing

For any employee exposed to airborne concentrations of asbestos that exceed the PEL, protective clothing must be provided and required to be worn. The clothing may include coveralls or similar full-body clothing, head coverings, gloves, and foot coverings. Wherever the possibility of eye irritation exists, face shields, vented goggles, or other appropriate protective equipment must be provided and worn.

Asbestos-contaminated work clothing has to be removed in change rooms and placed and stored in closed containers which prevent dispersion of asbestos into the ambient environment. Protective clothing and equipment must be cleaned, laundered, repaired or replaced to maintain its effectiveness. The employer must inform any person who launders or cleans asbestos contaminated clothing or equipment of the potentially harmful effects of exposure to asbestos. Contaminated clothing and equipment needs to be transported in sealed impermeable bags or other closed impermeable containers and appropriately labeled.

Hygiene facilities and practices

Employees who work in regulated areas must be provided with clean change rooms, shower facilities, and lunchrooms.

- Change rooms have to contain at least two lockers — one for contaminated clothing, the other for street clothing.
- Employees have to shower at the end of the shift and cannot leave the workplace wearing any clothing or equipment used during the workshift.
- Lunchroom facilities must be readily accessible to employees and have a positive pressure filtered air supply.

Employees have to wash their hands prior to eating, drinking, or smoking. Set up a system to ensure that employees do not enter lunchroom facilities with protective work clothing or equipment unless surface asbestos fibers have been removed from the clothing or equipment by vacuuming or other method that removes dust without causing the asbestos to become airborne. Do not allow employees to smoke in work areas where they are occupationally exposed to asbestos because of activities in that work area.

Communicating hazards to employees

Employers and building owners are required to treat installed thermal system insulation (TSI) and sprayed on and troweled-on surfacing materials as asbestos containing material (ACM). Treat asphalt and vinyl flooring material installed no later than 1980 as asbestos-containing.

Employers and building and facility owners must exercise due diligence in complying with requirements to inform employers and employees about the presence and location of ACM and presumed asbestos containing material (PACM).

Building owner responsibilities

Building and facility owners have to maintain records of all information required concerning the presence, location and quantity of ACM and PACM in the building/facility. Such records need to be kept for the duration of ownership and must be transferred to successive owners.

Building and facility owners have to inform employers of employees with potential exposure risks. Those employers must inform their employees who will perform housekeeping activities in areas which contain ACM and/or PACM of the presence and location of ACM and PACM in these areas. Identification of ACM and PACM should be made by industrial hygienists, or by persons whose skill and experience in identifying asbestos hazards is the equivalent to that of industrial hygienists.

Information and training

All employees who are exposed to airborne concentrations of asbestos at or above the action level must be properly trained about asbestos hazards. Training has to be provided prior to or at the time of initial assignment, and at least yearly thereafter.

Training program elements

An effective training program must provide employees with information about the health hazards of asbestos exposures and include the following elements:

- Relationship between asbestos and smoking in producing lung cancer;
- Operations which could result in asbestos exposure;
- Engineering controls and appropriate work practices associated with the employee's job assignment;

- Purpose, proper use, and limitations of respirators and protective clothing;
- Medical surveillance program;
- Emergency and clean-up procedures;
- Names, addresses, and phone numbers of public health organizations which provide information, materials, and/or conduct programs concerning smoking cessation; and
- A review of the procedures contained in OSHA's asbestos standard at §1910.1001.

All training materials must be available to the employee without cost and, upon request, to OSHA and NIOSH representatives.

Housekeeping

It is essential that all exposures to asbestos fibers be kept to a minimum. Conscientious housekeeping is one way to ensure that the workplace is risk free by ensuring that:

- All surfaces are maintained as free as practicable of accumulations of dusts and waste containing asbestos;
- All spills and sudden releases of material containing asbestos are cleaned up as soon as possible;
- Surfaces contaminated with asbestos are not cleaned by the use of compressed air;
- HEPA-filtered vacuuming equipment is used for vacuuming.

The vacuum equipment must be used and emptied in a manner which minimizes the reentry of asbestos into the workplace.

Shoveling, dry sweeping, and dry clean-up of asbestos may be used only where vacuuming and/or wet cleaning are not feasible. Waste, scrap, debris, bags, containers, equipment, and clothing contaminated with asbestos consigned for disposal should be collected, recycled, and disposed of in sealed impermeable bags, or other closed, impermeable containers.

Medical surveillance

A medical surveillance program has to be developed for all employees who are exposed to airborne concentrations of asbestos at or above the action level. All examinations must be performed under the supervision of a licensed physician at no cost to the employee and at a reasonable time and place.

Pre-placement physical examination

Before an employee is assigned to a job with airborne concentration exposures of asbestos fibers at or above the TWA and/or excursion limit, a pre-placement medical examination must be provided or made available by the employer. Examinations will include a complete physical examination with emphasis on the:

- Respiratory system,
- Cardiovascular system,
- Digestive tract,
- Chest X-ray; and
- Pulmonary function test.

Each employee also has to complete a respiratory disease questionnaire.

These examinations must be made available annually following the employee's first exposure to asbestos. If the employee is terminated, he or she must be examined within 30 days before or after the date of termination. The employer must give the examining physician a copy of the standard and appendices; a description of the

employee's duties relating to the employee's asbestos exposure; the exposure level or anticipated exposure level; a description of any personal protective and respiratory equipment used or to be used; and information from previous medical examinations.

Physician's opinion

The employer is further responsible to get a written, signed opinion from the physician which contains:

- The results of the medical examination and the physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk from exposure to asbestos;
- Any recommended limitations on the employee or upon the use of personal protective equipment such as clothing or respirators;
- A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure; and
- A statement that the employee has been informed by the physician of the results of the medical examination.

The physician is not to reveal in the written opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to asbestos. The employer must provide a copy of the physician's written opinion to the affected employee within 30 days after its receipt.

Recordkeeping

Each employer having exposed employees is responsible for keeping accurate records of all measurements taken to monitor employee exposure to asbestos. These documents must be kept for 30 years and include the following information:

- Date of measurement, operation involving exposure, sampling and analytical methods used, and evidence of their accuracy;
- Number, duration, and results of samples taken;
- Type of respiratory protective devices worn;
- Name, social security number, and the results of all employee exposure measurements.

Medical surveillance records

It is essential to keep an accurate record for each employee subject to medical surveillance. OSHA requires that medical surveillance records include:

- Name and social security number of the employee;
- Physician's written opinions;
- Any employee medical complaints related to exposure to asbestos; and
- Additional information provided to the examining physician.

Medical surveillance records have to be retained for the duration of employment plus 30 years.

Other records

According to the requirements of the asbestos standard, the employer has to maintain all employee training records for one year beyond the last date of employment by that employee.

Records must be made available to the OSHA, NIOSH, affected employees, former employees, and designated representatives. In addition, the employer must comply with the requirements concerning transfer of records set forth in 29 CFR §1910.1020(h).

NOTE: The employer may utilize the services of competent organizations such as industry trade associations and employee associations to maintain the records required by this section.

Employee right to observe monitoring

The employer must provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to asbestos. When observation of the monitoring of exposure to asbestos necessitates entry into an area where the use of protective clothing or equipment is required, the observer has to be provided with, and be required to use, such clothing and equipment. The observer has to comply with all other applicable safety and health procedures.

Inspection procedures for occupational exposure to asbestos: Excerpts from OSHA compliance directive CPL 2-2.63

Compliance directives are among the best resources an employer can use to determine how OSHA inspectors enforce regulations. The following excerpts from Appendices A and B of compliance directive CPL 2-2.63 provide information on the training requirements of the asbestos standard and a description of the EPA asbestos training course. Additionally, in Appendix C, you will find questions and answers to asbestos compliance issues.

Appendix A: Summary of OSHA's asbestos training requirements

Employees exposed at or above the permissible exposure levels

Section 1910.1001(j)(7) requires that training be provided prior to the time of initial assignment and at least annually thereafter. The elements to be included in the training program are listed in §1910.1001(j)(7)(iii). There are no specifications in the standard for the length of the training session.

Employees who perform housekeeping operations:

Section 1910.1001(j)(7)(iv) requires the employer to provide an asbestos awareness training course to employees who perform housekeeping operations in an area which contains ACM and PACM. Elements to be included in the asbestos awareness course are listed in the section. Training is to be provided at least once per year. There are no specifications in the standard for the length of the training session.

Appendix B: Summary of the EPA asbestos training course

The EPA Model Accreditation Plan for asbestos worker training is based on the following specific occupations that have some level of asbestos involvement and exposures.

Asbestos abatement workers

A four day training course that includes:

(1) At least 14 hours of hands-on training that provides asbestos workers with actual experience performing tasks associated with asbestos abatement work.

(2) Topics for the course are to include the physical characteristics of asbestos, potential health effects related to asbestos exposure, employee personal protective equipment, work practices, personal hygiene, medical monitoring, air monitoring, relevant state, local, and federal standards, respiratory protection programs and medical monitoring programs, additional safety hazards on asbestos abatement projects.

(3) Course review, and an examination (50 multiple choice questions with 70 percent correct).

(4) Individual respirator fit-testing.

(5) The EPA training course requirements are found on pages 5252 and 5253 of the February 3, 1994 *Federal Register.*

An annual refresher training session is required which is to be one full day. The refresher courses are to be conducted as separate and distinct courses, not to be combined with any other training during the period of the refresher course. The refresher course shall review and discuss changes in regulations, developments in state-of-the-art procedures, and a review of key aspects of the initial training course. A recertification examination is at the option of the state.

Awareness training for maintenance and custodial workers

This training is detailed in 40 CFR 763.92(a)(1). EPA specifies that the training is to be two hours in length and must include, but not be limited to:

(1) Information regarding asbestos and its various uses and forms.

(2) Information on the health effects associated with asbestos exposure.

(3) Locations of asbestos-containing building material identified throughout each school building in which the employee works.

(4) Recognition of damage, deterioration, and delamination of asbestos containing building material.

(5) Name and telephone number of the person designated to carry out general local education agency responsibilities under 40 CFR 763.84 and the availability and location of the management plan.

EPA does not specify refresher training for this category.

Operations and maintenance training course

The training required by EPA for this course is detailed in sections 40 CFR 763.92(a)(1) and 763.92(a)(2). This course is to be a total of 16 hours, which is two hours for the awareness level portion and 14 hours for the additional training required for operations and maintenance personnel.

The training has to include the same requirements for awareness training, as well as the following additional requirements:

(1) Descriptions of the proper methods of handling asbestos containing building material.

(2) Information on the use of respiratory protection and other personal protective measures.

(3) The provisions of 40 CFR 763.92 and 40 CFR 763.91, Appendices A, B, C, D, EPA regulations contained in 40 CFR Part 763, subpart G, and in 40 CFR Part 61, subpart M, and OSHA regulations contained in 29 CFR 1926.58.

(4) Hands-on training in the use of respiratory protection, other personal protective measures, and good work practices.

Comprehensive course for supervisors

The five day training course for supervisors includes:

(1) Lectures and demonstrations on the physical characteristics of asbestos and asbestos-containing materials, potential health effects related to asbestos exposure, employee

personal protective equipment, work practices, personal hygiene, medical monitoring, air monitoring, relevant state, local, and federal standards, respiratory protection programs and medical monitoring programs, insurance and liability issues, recordkeeping for asbestos abatement projects, supervisory techniques for asbestos abatement activities, and contract specifications.

2. Fourteen hours of hands-on training must permit asbestos workers actual experience in performing tasks associated with asbestos abatement.
3. Individual respirator fit-testing.
4. Course review.
5. Written examination (100 multiple course questions with a passing score of 70 percent).

One full day of refresher training. The refresher courses are to be conducted as separate and distinct courses and not combined with any other training during the period of the refresher course. The refresher course reviews and discusses changes in regulations, developments in state-of-the-art procedures, and reviews key aspects of the initial training course. A recertification examination is at the option of the state.

Appendix C: Questions and answers on the asbestos standard

Scope

Q: Are marine terminals and longshoring covered by the General Industry standard?

A: Marine terminals and longshoring are covered by the General Industry standard if asbestos is being loaded, unloaded or stored.

Q: What work activity is most affected by the General Industry asbestos standard?

A: Brake and clutch repair in the General Industry standard is the activity engaged in by the largest group of asbestos exposed workers, although most of them are exposed sporadically and at low levels. The next largest group consists of custodial workers who do not perform their duties as part of construction activities, but clean surfaces, sweep, buff and vacuum floors and wash walls and windows in manufacturing plants and a wide variety of public and commercial buildings.

Q: Is housekeeping work covered under the General Industry standard or the Construction standard?

A: Housekeeping work which is not related to a construction activity, is regulated under the General Industry standard. Housekeeping work which is related to construction activities at a construction site is covered by the Construction standard.

Q: What other industries are covered by the General Industry standard?

A: Primary and secondary manufacture of asbestos-containing products.

Q: What activities does the Construction standard (29 CFR 1926.1101) cover?

A: The construction standard explicitly states that it covers, but is not limited to, the following activities involving asbestos: demolition, removal, alteration, repair, maintenance, installation, clean-up, transportation, disposal, and storage. It has been redesignated 29 CFR 1926.1101.

Q: If construction activities are performed in a facility normally covered by the General Industry standard, which standard applies?

A: Asbestos work which involves removal, repair, maintenance or demolition is explicitly regulated by the Construction standard even if such work is performed within a facility otherwise regulated under the General Industry standard.

Q: Does the standard apply during earthmoving projects, drilling, blasting or sawing where natural deposits of asbestos occur?

A: The record indicates that certain construction sites in mostly well-defined areas contain deposits of naturally occurring asbestos. In such cases, wetting of the excavation site, often required by local

authorities, should be sufficient to suppress measurable airborne asbestos concentrations. No other actions are required by the standard.

Q: In the above case is the employer required to take any action if there is no information readily available indicating asbestos contamination of the soil?

A: In the absence of actual knowledge or information showing asbestos contamination of soil in the immediate vicinity of a construction site, the employer is not required to take any action under this standard.

Definitions

Q: How has the definition of "asbestos" changed in the asbestos standards?

A: The non-asbestiform varieties of the minerals actinolite, tremolite and anthophyllite are no longer included in the definition of asbestos.

Q: Briefly, what are the four classes of activities covered in the Construction standard?

A: "Class I" work is defined as activities involving the removal of thermal system insulation (TSI) and sprayed-on or troweled-on or otherwise applied surfacing asbestos-containing material or presumed asbestos-containing material.

"Class II" asbestos work is defined as removal of ACM or PACM which is not TSI or surfacing ACM or PACM. Certain "incidental" roofing materials such as mastic, flashing and cements when they are still intact are excluded.

"Class III" asbestos work is defined as repair and maintenance operations which are likely to disturb ACM or PACM. "Disturbance" means activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling through tunnels, or attics and spaces above the ceiling where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.

"Class IV" asbestos work means maintenance and custodial activities during which employees contact, but do not disturb ACM or PACM, and activities to clean up dust, waste, and debris resulting from Class I, II, and III activities. This may include dusting surfaces where ACM waste and debris and accompanying dust exists, and cleaning up loose ACM or PACM debris from thermal system insulation or surfacing ACM/PACM, following construction activity.

Q: Do the new standards set a minimum level of asbestos content for asbestos-containing materials?

A: Asbestos-containing material means any material containing more than 1% asbestos.

Q: What is "presumed asbestos containing material" (PACM)?

A: The definition of PACM is limited to thermal system insulation and sprayed on and/or troweled or otherwise applied surfacing material in buildings constructed no later than 1980. The material is "presumed" to contain asbestos unless it is demonstrated in accordance with the standard that PACM does not contain asbestos.

Q: Does OSHA still use the term "small-scale, short-term"?

A: No. OSHA has dropped the term "small-scale, short-term" work from the regulatory text. The term "small-scale, short-term" was too limiting, has been shown to be confusing, and could not be defined with sufficient precision to serve the purpose of distinguishing high risk asbestos-disturbing activity from activity of reduced risk.

Q: Are "wrap and cut" operations included in the definition of "removal"?

A: Yes, a wrap and cut operation is a type of asbestos removal. It consists of two distinct operations. The wrap portion requires the removal of small amounts of asbestos from either side of the pipe to be cut.

This will be a Class I or III operation depending on the amount of asbestos removed. Once the asbestos is removed and wrapped, the pipe is then cut. The cutting portion of the job is unclassified, as it does not involve asbestos removal.

Multi-employer worksites

Q: Who is responsible for employee protection on multi-employer worksites?

A: The standard explicitly requires asbestos hazards to be abated "by the contractor who created or controls the source of asbestos contamination." Additionally, employers of employees exposed to the hazard must protect their employees.

Q: How are potentially exposed employees protected when their employer is not creating the hazard?

A: Paragraphs (d)(3) and (d)(4) of 1926.1101 set forth the duties of the employer of employees who are exposed to asbestos hazards, but who did not create the source of asbestos. An employer shall request the contractor with control of the hazard to take corrective action. For example, if there is a breach of an enclosure within which asbestos work is being performed, the employer of employees working outside that enclosure shall request the asbestos contractor who erected the enclosure to repair the breach immediately, as required by paragraph (d)(2).

If the repair is not made, and if employees working outside the enclosure could be exposed to asbestos in excess of the PEL, the employer of those employees shall either remove them from the worksite pending repairs, or consider his employees to be working within a regulated area and comply with the provisions of paragraph (e) governing exposure assessments and monitoring of employees who work within such areas. If there is an enclosure, then the employer must inspect it to ensure the integrity of the enclosure. The general contractor who is deemed to have supervisory control over the entire worksite, including the regulated area, is also responsible for violations which could be abated or prevented by the exercise of such supervisory capacity.

Q: Does the standard provide "by-stander" protection, for employees working outside an enclosure?

A: Yes, the negative pressure enclosure system provisions are in 1926.1101(g), "Methods of Compliance." These systems reduce exposures of the employees who are disturbing the asbestos who are inside the enclosure, as well as employees outside the enclosure. In other cases, "critical barriers" are required where, for instance, Class II materials are removed using aggressive methods.

Exposure assessment

Q: What is included in the new "exposure assessment" requirements in the Construction and Shipyard standards?

A: The "exposure assessment" predicts exposure and evaluates potential controls. In most cases, the exposure assessment will include both past and current monitoring. Monitoring results must be considered, but do not necessarily constitute an adequate "assessment" if they would not represent all representative employee exposures during the entire job. The assessment must review relevant controls, conditions and factors that influence the degree of exposure. These include, but are not limited to, quality of supervision and of employee training, techniques used for wetting the ACM, placing and repositioning the ventilation equipment and impacts due to weather conditions. The assessment must be based on a review of all aspects of the employer's performance doing similar jobs.

Q: Do all employers need to conduct an "initial exposure assessment" under the Construction standard?

A: In general, all employers who have a workplace covered by this standard are to conduct an "initial exposure assessment" at the beginning of each asbestos job [paragraph (f)(2)]. Exceptions to this requirement exist only for most Class IV work. Even employers who are planning to install full negative

pressure enclosures with air flushing technology must conduct initial exposure assessments. Employers may base assessments of similar jobs on prior assessments of repetitive, routine jobs.

Q: Is it more difficult than before to base an initial exposure on "historic data"?

A: Yes, the standard establishes specific evaluation criteria for data. This criteria included the experience and training of the crews and the historic data must be updated annually. It is important to note that historic data is usually that data generated by an individual employer, whereas objective data is related to a product, material, or activity and may be derived from other employers' (such as the manufacturer of the product) data.

Q: Explain "objective data."

A: The use of objective data grants a monitoring exemption and may be used as a basis for a "negative exposure assessment." The employer using "objective data" must demonstrate that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations in excess of the PEL under those work conditions having the greatest potential for releasing asbestos. The employer may use data derived from other employers' jobs. The data should reflect worst case conditions in a variety of occupational settings.

Q: When can "objective data" be relied on for a negative exposure assessment?

A: For any specific asbestos job (combination of activity and product) performed by employees who have been trained in compliance with the standard the employer must demonstrate that, under worst case conditions, statistically there is a high degree of confidence that an exposure above the permissible exposure limit will not occur.

Q: How would an employer who performs repetitive work complete exposure assessment?

A: An employer may evaluate repetitive operations with highly similar characteristics, as one job, such as cable pulling in the same building, so long as the data used also reflect repetitive operations of the same duration and frequency.

Q: Did OSHA adopt a clearance level?

A: OSHA has not included a provision for a specific "clearance level" in the revised standards.

Methods of compliance

Q: What are the three basic controls required initially in ALL operations covered in the Construction standard?

A: Regardless of the exposure levels the controls required are: use of HEPA filtered vacuums when the source of the dust/debris is damaged ACM or disturbance of ACM or PACM; use of wet methods to control asbestos fiber dispersion; and prompt disposal of asbestos contaminated waste materials. These provisions apply to, for example, employers who install asbestos-containing material (no Class designation), clean up asbestos-containing debris at a construction site (Class IV), repair a boiler covered with asbestos-containing TSI (Class I or III), and remove asbestos-containing surfacing material (Class I). Certain roofing operations, however, are not subject to these requirements.

Q: When does OSHA consider the use of wet methods infeasible?

A: An employer can demonstrate infeasibility if he/she can show that wet methods cannot be used due to conditions such as electrical hazards, hot surfaces, and the presence of technical equipment which cannot tolerate moisture.

Q: What is required for the disposal of asbestos-contaminated waste?

A: All asbestos-contaminated waste must be promptly disposed of in leak-tight containers.

Q: What is meant by the term "air sweeping"?

A: Where the exposure is expected to be above the PELs, OSHA requires ventilation that moves contaminated air away from employees toward a HEPA filtered exhaust device. It does NOT mean that a general building ventilation system to vent asbestos contaminated air, would be acceptable under the standard.

Q: Is the negative pressure enclosure the only effective system for larger removal operations?

A: Negative pressure enclosure systems are effective in many circumstances in protecting workers both within and outside the enclosure. Other systems such as glove bags and mini-enclosures can be equally effective.

Q: What is the major difference between the negative pressure enclosure and negative air ventilation?

A: The negative pressure enclosure system is primarily designed to keep asbestos from contaminating the building. The air pressure inside the enclosure is less than outside the enclosure. Negative air ventilation draws clean air from outside the enclosure at sufficient quantities and at strategic locations, so as to provide clean air in the worker's breathing zone and is part of the negative enclosure system.

Q: If an employer has a variety of work activities, how does one decide which class to follow?

A: The classes are exclusive. For example, the stripping of 50 linear feet of thermal system insulation, whether or not it has been positively identified as asbestos containing material, is Class I, for it is the removal of PACM. Repair of a valve covered by ACM is Class III, since "removal" is not taking place, if less than one glove bag of ACM has been disturbed. Removal of flooring material containing ACM is Class II. If more than one "class" of work occurs simultaneously, the work must be performed according to the highest hazard classification.

Q: Is all asbestos activity designated by "class"?

A: All asbestos work under the Construction and Shipyard standards is not in the "class system." The installation of new asbestos-containing products does not carry a class designation, and thus the class-specific requirements do not apply to that activity. For work that does not readily fall into one of the four classes, the employer must comply with the PEL. Work covered by the General Industry standard is not included in the "class system."

Q: Is misting considered a "wet method"?

A: Wet methods encompass a range of work practices. For example, when removing material which is bound in a matrix, misting may be appropriate. Removing ACM or PACM which is not so bound, or where deterioration of the ACM has occurred, would require more aggressive wetting.

Brake and clutch

Q: Are the appendices on brake and clutch repair (Appendix F for General Industry and Appendix L for Shipyard employment) mandatory?

A: Yes.

Q: What are the two "preferred" methods for brake and clutch repair?

A: The two "preferred" methods are the low pressure/wet-cleaning method and the negative pressure enclosure/HEPA vacuum system.

Q: Is the solvent spray method prohibited?

A: No. The solvent spray method is an "equivalent" method that may be used when proper work practices are followed.

Q: What are the work practices that must be used when an employer chooses the spray/solvent can method?

A: An employer who uses an "equivalent" method must follow detailed written procedures. At a minimum, the solvent spray method should include the following procedures: (1) the solvent shall be used to first wet the brake and clutch parts; (2) the brake and clutch parts shall be wiped clean with a cloth; (3) the contaminated cloth shall be placed in an impermeable container, and then either disposed of properly or laundered in a way that prevents the release of asbestos fibers in excess of 0.1 fiber per cubic centimeter

of air; (4) any spilled solvent or dispersed asbestos shall be cleaned up immediately and not allowed to dry, either with a cloth or a HEPA vacuum. Dry brushing during solvent spray operations is prohibited.

Q: What other precautions are required when solvents are used?

A: The solvents typically used in brake and clutch work are hazardous chemicals, and the employer must therefore comply with the Hazard Communication standard. If the solvents used are flammable, appropriate precautions against fire and explosion must be taken.

Q: If the employer chooses to use one of the two "preferred" methods or an "equivalent" method, does the employer have to conduct exposure monitoring?

A: No.

Q: Does Appendix F that covers brake and clutch work practices also cover brake and clutch work done on large stationary equipment like printing presses?

A: No, the Appendix is only intended for automotive work. For other asbestos jobs as described above, the employer must use work methods that reduce the exposures to below the PELs.

Q: What type of "aqueous" solution is allowed when the low pressure/wet cleaning method is used?

A: The intent of the standard was to ensure that the asbestos is sufficiently wet so that exposures are kept well below the PELs. The solution can consist only of water, or water mixed with an organic solvent, or a detergent. It is important to note the potential danger of solvent use in these operations. The use of solvents, which are often flammable and may also present a health hazard, must be undertaken with great care. The employer must also be in compliance with the Hazard Communication standard.

Q: Are other methods allowed for employers who do brake and clutch work infrequently?

A: Yes, for those shops in which brake work is infrequent, OSHA has determined to allow the use of a wet control method as a "preferred" method. Therefore, in facilities in which five (5) or fewer brake "jobs" (five brake "jobs" is equivalent to five vehicles) or 5 clutches, or some combination totaling 5, are repaired each week, the mechanic/technician may control potential asbestos exposure through the use of a pump sprayer (bottle) containing water or amended water to wet down the drum or clutch housing before it is removed and to control fiber release during subsequent activities. The mechanic may use other implements to deliver the water such as a garden hose; however, the resulting waste water generated must be captured and properly disposed of without allowing it to dry on any surfaces. The spray should be controlled through the use of low pressure to the extent feasible. OSHA anticipates that the use of a spray bottle will be adequate to control the dust without generating a large volume of wastewater. However, any waste water generated must be disposed of properly.

Q: What provisions are required to perform a brake inspection?

A: The extent to which an "inspection" is different from the other brake servicing depends on whether and how the drum is removed. Most inspections of brake shoes involve removing the drum which may contain a substantial number of asbestos fibers. Precautions must be taken against the release of those fibers into the workplace. If the drum is carefully pulled back just far enough to observe the brake shoe and brake components, it is sufficient to thoroughly wet the exterior and around the seam between the brake drum and backing plate. Any dislodged material must be immediately cleaned up in accordance with 1910.1001(k).

Blows to the drum with a hammer or similar implement to dislodge a rusted-in-place or frozen drum may cause asbestos fibers to be released. For such cases, in shops performing 6 or more brake jobs per week, an enclosure must be installed around the drum to capture the dust or the drum interior and contents must be thoroughly wetted prior to striking or forcibly removing the brake drum. As with other brake servicing, this must be done using a preferred or equivalent method. When using the equivalent spray can method, first wet the interior and contents of the drum before striking it. Then, carefully pull the drum back just enough to allow another application of solvent and thoroughly wet the interior before removal of the drum. There should be no visible dust created during drum loosening and removal.

Flooring operations

Q: When must an employer presume that flooring material contains asbestos?

A: A 1988 EPA survey reported that 42 percent of public and commercial buildings within the U.S. contain asbestos-containing flooring material. The standard requires that employers presume that floor tile and resilient flooring found in buildings constructed no later than 1980 contains asbestos and take the specific precautions required unless the employer demonstrates that the flooring materials do not contain asbestos, by using recognized analytical techniques.

Q: What work practices are prohibited or restricted in floor maintenance?

A: (1) Sanding of asbestos-containing flooring material is prohibited; (2) stripping of finishes must be conducted using low abrasion pads at speeds lower than 300 rpm and wet methods; and (3) burnishing or dry buffing may be performed only on asbestos-containing flooring which has sufficient finish so that the pad cannot contact the asbestos-containing material.

Q: What work practices must be used when removing floor tile?

A: The floor must first be HEPA-vacuumed. The floor tiles then must be carefully pried up individually after being wetted. Misting is sufficient if the tiles are removed intact. After removal, each tile must be placed in an impermeable trash bag or other impermeable waste container.

Q: If the wetting agent contains a hazardous substance, what other precautions must the employer take?

A: The employer may be responsible for compliance with other standards such as the Hazard Communication standard. The employer shall obtain a material safety data sheet for the substance and follow the recommendations for the use of personal protective equipment and provide training.

Q: If floor tiles are broken during removal, are they no longer "intact?"

A: Not necessarily. Some incidental breakage of floor tiles is to be expected. Under the standard, material is not intact only if it has crumbled, been pulverized, or has otherwise deteriorated so that the asbestos fibers are no longer likely to be bound with their matrix. Therefore, the incidental breakage of tiles does not by itself mean that the material is not intact.

Q: How are tiles to be removed when they cannot be removed by careful prying?

A: The tiles may be heated to soften the adhesive holding them to the substrate. When tiles are removed intact using heat, wetting may be omitted.

Q: How are tiles to be removed when they cannot be removed by either careful prying or heating?

A: Aggressive techniques such as mechanical chipping can be used if a competent person evaluates the worksite and determines that additional precautions required by the standard are properly installed and operated. This may include negative pressure enclosures.

Q: How must residual adhesive be removed?

A: The standard does not require removal of residual adhesive, but it is often necessary to remove or smooth residual adhesive to prepare the surface for installation of a new floor. Wet methods must be used when removing residual adhesive. The adhesive must either be wet-scraped manually or removed using a low speed floor machine and wetted sand or a removal solution. The adhesive residues must be placed in an impermeable trash bag or other impermeable container while still wet. Remaining water or dirt in the area must then be HEPA vacuumed.

Q: What work practices must be used when removing resilient sheet flooring?

A: The material must not be ripped up. The floor shall first be HEPA vacuumed. The sheet flooring shall then be removed in strips four to eight inches wide. As a strip is removed, the point of separation must be constantly misted to minimize fiber release. A strip must be rolled up as it is removed and the roll placed

in an impermeable trash bag or other impermeable container. Residual felt and adhesive is then removed by wet scraping, and the floor is HEPA vacuumed.

Q: When must flooring removal jobs be monitored for asbestos levels?

A: Most jobs will not require monitoring. Monitoring is only required if compliant work practices are not followed, if the material is not removed intact, or if the employees are not properly trained in accordance with the standard.

Q: What level of training is required for competent persons for flooring removal operations?

A: When flooring removal jobs are conducted using compliant work practices and the material is removed intact, the competent person must have completed at least 12 hours of training. If the material is not removed intact, the competent person must have completed a training course that meets the requirement for a Class II competent person.

Q: Must respirators be worn when floor tiles are removed using heat?

A: The standard generally requires that respirators be worn when Class II work, including floor tile removal, is not performed using wet methods. However, the standard allows wetting to be omitted when floor tiles are removed intact using heat. Since the use of heat to remove floor tiles provides the same level of protection against fiber release as the use of wetting, the omission of wetting does not require respirators to be worn when heat is used and the tiles are removed intact. Respirators would only be needed if their use is required under another provision of the standard.

Building owner responsibilities

Q: Does a building owner have any responsibility under the standard even though the employees at risk may not be the owner's direct employees?

A: Yes. The building and/or facility owner must notify contractors and tenants of the presence of ACM/PACM, even though the employees at risk are not the owner's direct employees. OSHA has the authority to require building owners who are "statutory employers" to take necessary action such as notifying other employers, and to protect employees other than their own. They also have the responsibility to identify and label ACM/PACM when required. Homeowners are not considered "building owners" when they have work done in their private homes.

Q: When shipyard vessels undergoing repair are foreign-owned, who is considered the "building owner?"

A: When a foreign-owned vessel is repaired in an American shipyard, the employer is either the shipyard or an outside primary contractor. They must either treat materials defined as PACM as asbestos-containing or sample the suspect material and analyze it to determine whether or not it contains asbestos.

Q: Does a long term lessee of a building have the same responsibilities as a "building owner"?

A: "Building owner" has been defined to include lessees who control the management and recordkeeping functions of a building/facility/vessel. It is not OSHA's intention to exempt the owner from notification requirements by allowing a lessee to comply. Rather, when the owner has transferred the management of the building to a long-term lessee, that lessee is the more appropriate party to receive, transmit, and retain information about in-place asbestos. When the lease is terminated, the records are to be transferred to the building owner.

Q: Can building owners use building records to rebut the presumption of asbestos containing materials (PACM)?

A: Generally, building records must be relied upon to rebut the presumption of asbestos containing material (PACM). If an employer had an AHERA asbestos survey, such a survey would be accepted. However, for non-PACM materials, building owners and employers may use all sources of information including building records to show that the materials do not contain asbestos.

Q: What materials must be presumed to contain asbestos?

A: Thermal System Insulation (TSI) and sprayed on and troweled on surfacing materials installed no later than 1980. (Note: In addition, resilient flooring material installed no later than 1980 shall be identified as asbestos-containing). Other building/facility areas and material would not be exempt from the standard's control requirements; however, they would not be presumptively considered to contain asbestos.

Q: Do the standards require any particular qualifications of the person who designates materials as PACM?

A: The person who designates materials as PACM is not required to have any technical training. The evaluation is not to determine if the material is or is not asbestos, rather it is to identify thermal system insulation and surfacing materials. The process does not require technical training. Thermal system insulation, and sprayed on or troweled on surfacing material are easily recognized and identified.

Q: Are the sign and label requirements the same in the General Industry standard as they are in the Construction and Shipyard standards?

A: Yes, the three standards contain the same provisions.

Q: If construction of a building began before 1981 but was not completed until several years later, is the owner responsible for presuming asbestos exists in the entire building?

A: The CSHO will need to evaluate this on a case-by-case basis. Generally speaking, the focus would be on areas that contain suspect materials in those areas built before 1981.

Q: How has the definition of repair and maintenance changed?

A: Repair and maintenance is now considered Class III work if it involves less than one glovebag of material, regardless of the time it takes to do the job. If the job involves more than one glovebag of TSI or surfacing material then it is a Class I job. If the job involves more than one bag of other ACM then it is a Class II job.

Q: What are some examples of activities that may be classified as Class III?

A: These activities may include: maintenance/repair of boilers, air handling units, heat exchangers, and tanks; repair/replacement of pipe insulation including cutting away of small amounts of ACM (that which fits into a standard glovebag or disposal bag); valve or gasket replacement, or activities above suspended ceilings such as connections and/or extensions for telecommunication/computer networks; adjustment/repair of HVAC systems and; testing/cleaning/replacing smoke or heat detectors when connected to ceilings containing ACM. Class III work involves a "disturbance."

Respirators

Q: What are the respiratory protection requirements for Class I work when the exposure is in excess of 0.1 f/cc or when a negative exposure assessment (NEA) has not been produced?

A: Respirators must be worn for all Class I work. In the above circumstances an employer must provide a supplied air respirator operated in the pressure demand mode. In addition, the employer must provide appropriate escape devices that could be either the auxiliary positive pressure SCBA or egress HEPA filters.

Q: When can a PAPR be used in Class I operations?

A: The standard allows a tight-fitting PAPR in Class I operations when the exposure levels do not exceed 1.0 f/cc as an 8-hour TWA.

Q: If an NEA has been produced in a Class I job, what respirator is required?

A: In situations where the competent person makes a determination that exposures in Class I jobs will be less than the PELs, the respirator could be selected from among available NIOSH-approved negative pressure devices that are non-disposable and equipped with high efficiency filters, unless the employee requests a PAPR.

Q: Is an industrial hygiene consultant who is doing an asbestos survey by taking bulk samples required to use a respirator?

A: This would be a Class III operation and, as in all Class III operations, a negative exposure assessment must be made to determine if a respirator is required.

Labels

Q: Is color coding an acceptable alternative to labels where asbestos containing products are installed?

A: Yes. There may be instances where asbestos-covered materials (pipes, tanks, etc.) would make labeling infeasible. The employer must ensure that all employees and contractors have been trained to understand the coding system.

Q: Are there guidelines concerning the feasibility of posting signs and labels on installed asbestos products in a building?

A: Signs and labels for installed asbestos products in all three standards is a performance oriented requirement. The degree to which signs and labels are required depends on the exposure potential, access to the asbestos product, and the hazard of the material. Signs and labels are required to be posted on or near the product. It is generally not feasible to put labels on walls or floors. If it is not feasible, alternatives may be used. For example, if asbestos-containing floors are being serviced by employees using a common equipment room day after day, then a sign or label for the asbestos flooring can be posted in the equipment room.

The object is to forewarn employees who may be potentially exposed during the floor cleaning operation and have access to the material. The label could be posted on the buffing machine which the employer chooses. In another example, signs and labels can be used in a more limited way when the mechanical staff performing asbestos related operations are internal. It is the employers responsibility to train employees performing Class III operations, which means signs and labels do not play as important a role as they would if the employer uses outside contractors. When outside contractors come in, the employer must post signs and labels.

Training

Q: What training is required for housekeepers under the General Industry standard?

A: The standard requires awareness training annually. The standard has a list of specific topics which must be covered. There is no length of time specified for this training.

Q: What training is needed when a custodian does maintenance work?

A: The training requirements are not tied to the job title of the worker performing the work. Rather, if a worker is disturbing asbestos and the disturbance will result in the generation of less than one standard 60" × 60" waste or glovebag, then Class III work is being performed and Class III training is required. For example, if a building custodian is told to scrape off a few inches of sprayed-on material on a decking to access an electrical box, he/she will be performing Class III work and must have the requisite training.

Medical surveillance

Q: What are the fundamental elements of the medical surveillance requirements?

A: OSHA has clarified the medical surveillance provisions to explain that two groups will receive more limited surveillance. These include the following:

- where workers are required to wear negative pressure respirators while performing Class I, II or III work for fewer than 30 days per year, a physician must ensure that the worker is able to use a respirator, thus limiting the requirements for surveillance of occasional respirator wearers;

- where workers perform Class II and III work for more than 30 days per year, the employer is not required to count jobs that take less than a total of one hour per day against the 30 day tally for medical surveillance.

Otherwise, all who perform Class I, II or III work for 30+ days per year or may be exposed above the PELs for more than 30 days per year must receive full medical surveillance.

Q: When workers who have been exposed to asbestos and covered by the medical surveillance program are no longer exposed, can medical surveillance be discontinued?

A: In the General Industry standard, workers who are no longer exposed at or above the PELs are not subject to medical surveillance requirements. If the employment is terminated, the employer must provide a termination medical exam.

Q: Once medical surveillance is discontinued, what further obligations does the employer have?

A: In all three standards, the employer has to maintain the medical records for the employee's duration of employment plus thirty years.

Asbestos checklist

YES	NO	
		General
❑	❑	Have you identified the presence, location, and quantity of all asbestos-containing materials in the work place?
❑	❑	Have employees been informed of all asbestos-containing materials in their respective work areas?
❑	❑	Have identifying signs and labels been attached or posted so all employees know to avoid these materials?
❑	❑	Are all materials suspected of containing asbestos in facilities constructed before 1981 handled as if they do contain asbestos until proven otherwise?
❑	❑	Have employees and contract employers and their employees (including housekeeping personnel) received initial awareness or worker training as well as annual refresher training appropriate to their work assignments and is the training material available for employees and regulators to inspect?
❑	❑	Are regulated areas established and demarcated, and is access restricted appropriately?
❑	❑	Is drinking, smoking, chewing gum or tobacco, and application of cosmetics prohibited in the regulated area?
❑	❑	Is smoking prohibited in all work areas?
❑	❑	Is a written respiratory protection program and a medical surveillance program in effect?
❑	❑	Are workers provided with protective work clothing and equipment appropriate to the work assignment, and are workers provided with clean clothing and equipment at least weekly?
❑	❑	Are workers provided with a clean room and shower facilities appropriate to the work being performed, and is the change room separated from the storage area where potentially contaminated clothing and equipment are kept?

YES	NO	
❑	❑	Is all potentially asbestos-contaminated clothing that needs to be laundered containerized, labeled, handled, and transported appropriately and is anyone handling or laundering it fully informed of the potential hazards?
❑	❑	Is a positive-pressure, air-filtered lunchroom provided, and are employees required to wash their hands and face before eating and smoking?
		Asbestos time-weighted averages (TWA)
❑	❑	Is employee exposure to asbestos over 0.1 fibers per cubic centimeter (f/cc) of air on an 8-hour, time-weighted average (TWA) prevented?
❑	❑	Is employee exposure to asbestos over 1.0 f/cc for a 30 minute excursion limit (EL) prevented?
❑	❑	Is employee exposure over 0.5 f/cc TWA and 2.5 f/cc EL prevented in the following job descriptions? • Coupling cutoff in primary asbestos-cement pipe manufacturing, • Sanding in primary and secondary asbestos-cement sheet manufacturing, • Grinding in primary and secondary friction product manufacturing, • Carding and spinning in dry textile processes, and • Grinding and sanding in primary plastics manufacturing.
❑	❑	Are representative employees monitored for TWA and EL at least every six months?
❑	❑	Is a written program to reduce employee exposure below the TWA and EL in place, and is the program reviewed and updated as necessary?
❑	❑	Is asbestos handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to reduce employee exposure below the TWA and EL?
		Controls
❑	❑	Are engineering controls used to reduce employee asbestos exposure to the lowest achievable levels and is local exhaust ventilation designed, constructed, installed, and maintained in accordance with ANSI Z9.2-1979?
❑	❑	Are all hand-operated and machine-operated tools that could produce or release asbestos fibers equipped with local exhaust ventilation?
❑	❑	Are respirators used during installation or implementation of: • Engineering and work practice controls, • Work such as maintenance and repair activities where engineering and work practice controls are infeasible, • All operations where engineering and work practice controls are not yet sufficient to reduce exposures below the TWA and EL, and • During emergencies?
❑	❑	Are appropriate respirators used in regulated areas?
❑	❑	Are asbestos-containing cements, mortars, coatings, grouts, plaster, and similar materials removed from containers while either wet, ventilated, or enclosed?
❑	❑	Is using compressed air to remove asbestos prohibited unless it is done in a containment that will capture all dust?
❑	❑	Is sanding of asbestos-containing flooring prohibited?

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JOB HAZARD ANALYSIS

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Job hazard analysis

Introduction

Job-related injuries occur every day in the workplace. Often these injuries occur because employees have not been trained, or over time, have gotten lax in following safe job procedures. One way to prevent workplace injuries is to establish proper job procedures and train all employees in safer and more efficient work methods.

Establishing proper job procedures is one of the benefits of conducting a job hazard analysis.

- Carefully studying and recording each step of a job.
- Identifying existing or potential job hazards (both safety and health).
- Determining the best way to perform the job to reduce or eliminate these hazards.

Improved job methods can reduce costs resulting from employee absenteeism and workers' compensation, and can lead to increased productivity.

> *NOTE: The job procedures in this chapter are for illustration only and do not necessarily include all steps, hazards or protections for similar jobs in industry. In addition, standards issued by OSHA should be referred to as part of your overall job hazard analysis. There are OSHA standards that apply to most job operations, and compliance with these standards is mandatory.*

Although this section is designed for use by managers and supervisors, employees also are encouraged to use the information contained here to analyze their own jobs, be aware of workplace hazards, and report any hazardous conditions to their supervisors.

What is a job hazard analysis?

The hazard of a job creates the potential for harm. In practical terms, a hazard often is associated with a condition or activity that, if left uncontrolled, can result in an injury or illness. Identifying job hazards and eliminating or controlling them as early as possible will help prevent injuries and illnesses.

A job hazard analysis is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. Ideally, after you identify uncontrolled hazards, you will take steps to eliminate or reduce them to an acceptable risk level.

Job hazard analysis is a valuable safety tool

Every day, workers are injured or killed in U.S. workplaces. You can help prevent workplace injuries and illnesses by looking at your workplace operations, establishing proper job procedures, and ensuring that all employees are trained properly. One of the best ways to determine and establish proper work procedures is to conduct a job hazard analysis. A job hazard analysis is one component of the larger commitment of a safety and health management system.

Value seen through results

Employers can use the findings of a job hazard analysis to eliminate and prevent hazards in their workplaces. This is likely to result in:

- Fewer worker injuries and illnesses;
- Safer, more effective work methods;

- Reduced workers' compensation costs; and
- Increased worker productivity.

The analysis also can be a valuable tool for training new employees in the steps required to perform their jobs safely. For a job hazard analysis to be effective, management must demonstrate its commitment to safety and health and follow through to correct any uncontrolled hazards identified. Otherwise, management will lose credibility and employees may hesitate to report dangerous conditions that threaten their safety.

Selecting jobs for analysis

A job hazard analysis can be performed for all jobs in the workplace, whether the job is "special" (non-routine) or routine. Even one-step jobs, such as those in which only a button is pressed, can and perhaps should be analyzed by evaluating surrounding work conditions.

To determine which jobs should be analyzed first, review your job injury and illness reports. Obviously, a job hazard analysis should be conducted first for jobs with the highest rates of accidents and disabling injuries. Priority should go to the following types of jobs:

1. Jobs with the highest injury or illness rates;
2. Jobs with the potential to cause severe or disabling injuries or illness, even if there is no history of previous accidents;
3. Jobs in which one simple human error could lead to a severe accident or injury;
4. Jobs that are new to your operation or have undergone changes in processes and procedures; and
5. Jobs complex enough to require written instructions.

Also, jobs where "close calls" have occurred should be given priority. Analyses of new jobs and jobs where changes have been made in processes and procedures should follow. Eventually, a job hazard analysis should be conducted and made available to employees for all jobs in the workplace.

Conducting the job hazard analysis

Before you actually begin, take a look at the general conditions under which the job is performed and develop a checklist. Below are some sample questions you might ask.

- Are there materials on the floor that could trip a worker?
- Is lighting adequate?
- Are there any live electrical hazards at the jobsite?
- Are there any explosive hazards associated with the job or likely to develop?
- Are tools, including hand tools, machines and equipment in need of repair?
- Is there excessive noise in the work area, hindering worker communication?
- Is fire protection equipment readily accessible and have employees been trained to use it?
- Are emergency exits clearly marked?
- Are trucks or motorized vehicles properly equipped with brakes, overhead guards, backup signals, horns, steering gear and identification, as necessary?
- Are all employees operating vehicles and equipment properly trained and authorized?

- Are employees wearing proper personal protective equipment for the jobs they are performing?
- Have any employees complained of headaches, breathing problems, dizziness, or strong odors?
- Is ventilation adequate, especially in confined spaces?
- Have tests been made for oxygen deficiency and toxic fumes?

Naturally, this list is by no means complete because each worksite has its own requirements and environmental conditions. You should add your own questions to the list. You might also take photographs of the workplace, if appropriate, for use in making a more detailed analysis of the work environment.

Involve your employees

It is very important to involve your employees in the hazard analysis process. They have a unique understanding of the job, and this knowledge is invaluable for finding hazards. Involving employees will help minimize oversights, ensure a quality analysis, and get workers to "buy in" to the solutions because they will share ownership in their safety and health program.

Review your accident history

Review your worksite's history of accidents and occupational illnesses that needed treatment, losses that required repair or replacement, and any "near misses," that is, events in which an accident or loss did not occur, but could have. These events are indicators that the existing hazard controls (if any) may not be adequate and deserve more scrutiny.

Conduct a preliminary job review

Discuss with your employees the hazards they know exist in their current work and surroundings. Brainstorm with them for ideas to eliminate or control those hazards. If any hazards exist that pose an immediate danger to an employee's life or health, take immediate action to protect the worker.

Any problems that can be corrected easily should be corrected as soon as possible. Do not wait to complete your job hazard analysis. This will demonstrate your commitment to safety and health and enable you to focus on the hazards and jobs that need more study because of their complexity. For those hazards determined to present unacceptable risks, evaluate types of hazard controls.

List, rank, and set priorities for hazardous jobs

List jobs with hazards that present unacceptable risks, based on those most likely to occur and with the most severe consequences. These jobs should be your first priority for analysis.

Break down the job

Nearly every job can be broken down into job tasks or steps. When beginning a job hazard analysis, watch the employee perform the job and list each step as it is taken. Be sure to record enough information to describe each job action without getting overly detailed.

Avoid making the breakdown of steps so detailed that it becomes unnecessarily long or so broad that it does not include basic steps. You may find it valuable to get input from others who have performed the same job.

Later, review the job steps with the employee to make sure you have not omitted something. Point out that you are evaluating the job itself, not the employee's job performance. Include the employee in all phases of the analysis — from reviewing the job steps and procedures to discussing uncontrolled hazards and recommended solutions.

Sometimes, in conducting a job hazard analysis, it may be helpful to photograph or videotape the worker performing the job. These visual records can be handy references when doing a more detailed analysis of the work.

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Identifying workplace hazards

A job hazard analysis is an exercise in detective work. Your goal is to discover the following:

- What can go wrong?
- What are the consequences?
- How could it arise?
- What are other contributing factors?
- How likely is it that the hazard will occur?

To make your job hazard analysis useful, document the answers to these questions in a consistent manner. Describing a hazard in this way helps to ensure that your efforts to eliminate it and implement controls help target the most important contributors to the hazard.

Good hazard scenarios describe:

- Where it is happening (environment),
- Who or what it is happening to (exposure),
- What precipitates the hazard (trigger),
- The outcome that would occur should it happen (consequence), and
- Any other contributing factors.

Rarely is a hazard a simple case of one singular cause resulting in one singular effect. More frequently, many contributing factors tend to line up in a certain way to create the hazard. Here is an example of a hazard scenario:

> In the metal shop (environment), while clearing a snag (trigger), a worker's hand (exposure) comes into contact with a rotating pulley. It pulls his hand into the machine and severs his fingers (consequences) quickly.

To perform a job hazard analysis, you should ask the following questions.

What can go wrong?

The worker's hand could come into contact with a rotating object that "catches" it and pulls it into the machine.

What are the consequences?

The worker could receive a severe injury and lose fingers and hands.

How could it happen?

The accident could happen as a result of the worker trying to clear a snag during operations or as part of a maintenance activity while the pulley is operating. Obviously, this hazard scenario could not occur if the pulley is not rotating.

What are other contributing factors?

This hazard occurs very quickly. It does not give the worker much opportunity to recover or prevent it once his hand comes into contact with the pulley. This is an important factor, because it helps you determine the severity and likelihood of an accident when selecting appropriate hazard controls. Unfortunately, experience has shown that training is not very effective in hazard control when triggering events happen quickly because humans can react only so quickly.

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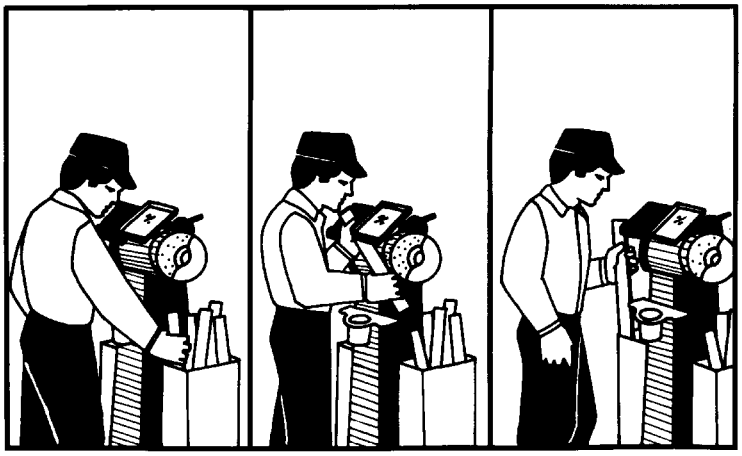
How likely is it that the hazard will occur?

This determination requires some judgment. If there have been "near-misses" or actual cases, then the likelihood of a recurrence would be considered high. If the pulley is exposed and easily accessible, that also is a consideration.

In the example, the likelihood that the hazard will occur is high because there is no guard preventing contact, and the operation is performed while the machine is running. By following the steps in the following example, you can organize your hazard analysis activities.



1. Reach into metal box to right of machine, grasp casting and carry to wheel.
2. Push casting against wheel to grind off burr.
3. Place finished casting in box to left of machine.

Sample job hazard analysis form

***Job Location*:** Metal Shop	***Analyst*:** Joe Safety	***Date:***
***Task Description*:** Worker reaches into metal box to the right of the machine, grasps a 15-pound casting and carries it to grinding wheel. Worker grinds 20 to 30 castings per hour.		
Hazard Description: Picking up a casting, the employee could drop it onto his foot. The casting's weight and height could seriously injure the worker's foot or toes.		
Hazard Controls: 1. Remove castings from the box and place them on a table next to the grinder. 2. Wear steel-toe shoes with arch protection. 3. Change protective gloves that allow a better grip. 4. Use a device to pick up castings.		

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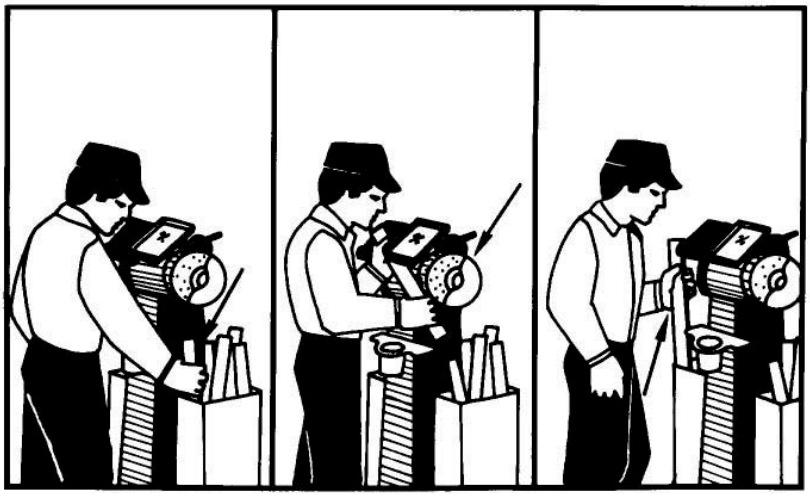
Additional questions you should ask

Be sure to examine each step to determine the hazards that exist or that might occur. Some additional questions to ask about the job include:

- Is the worker wearing protective clothing and equipment, including safety belts or harnesses that are appropriate for the job?
- Are work positions, machinery, pits or holes, and hazardous operations adequately guarded?
- Are lockout procedures used for machinery deactivation during maintenance procedures?
- Is the worker wearing clothing or jewelry that could get caught in the machinery?
- Are there fixed objects that may cause injury, such as sharp machine edges?
- Is the flow of work improperly organized (e.g., is the worker required to make movements that are too rapid)?
- Can the worker get caught in or between machine parts?
- Can the worker be injured by reaching over moving machinery parts or materials?
- Is the worker at any time in an off-balance position?
- Is the worker positioned to the machine in a way that is potentially dangerous?
- Is the worker required to make movements that could cause hand or foot injuries, or strain from lifting?
- Can the worker be struck by an object or lean against or strike a machine part or object?
- Can the worker fall from one level to another?
- Can the worker be injured from lifting or pulling objects, or from carrying heavy objects?
- Do environmental hazards — dust, chemicals, radiation, welding rays, heat or excessive noise — result from the performance of the job?

Repeat the job observation as often as necessary until all hazards have been identified. Below is the same illustration of the basic job steps for grinding iron castings, with existing or potential hazards indicated.



1. Strike hand on edge of metal box or casting; cut hand on burr. Drop casting on toes.
2. Strike hand against wheel. Flying sparks, dust or chips; wheel breakage. Not enough of wheel guarded. No dust removal system. Sleeves could get caught in machinery.
3. Strike hand against metal box or castings.

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Job Location: Metal Shop	***Analyst:*** Joe Safety	***Date:***
Task Description: Worker reaches into metal box to the right of the machine, grasps a 15-pound casting and carries it to grinding wheel. Worker grinds 20 to 30 castings per hour.		
Hazard Description: Castings have sharp burrs and edges that can cause severe lacerations.		
Hazard Controls: 1. Use a device such as a clamp to pick up castings. 2. Wear cut-resistant gloves that allow a good grip and fit tightly to minimize the chance that they will get caught in grinding wheel.		

Controlling job hazards

Information obtained from a job hazard analysis is useless, unless hazard control measures recommended in the analysis are incorporated into the tasks. You should recognize that not all hazard controls are equal. Some are more effective than others at reducing the risk.

After reviewing your list of hazards with the employee, consider what control methods will eliminate or reduce them, such as combining steps or changing the sequence, or whether safety equipment and precautions are needed to reduce the hazards.

The most effective controls are engineering controls that physically change a machine or work environment to prevent employee exposure to the hazard. Consider redesigning the process or equipment, changing tools, adding machine guards, personal protective equipment or ventilation to eliminate or reduce hazardous conditions. The more reliable or less likely a hazard control can be circumvented, the better.

If this is not feasible, administrative controls may be appropriate. This may involve changing how employees do their jobs. Discuss your recommendations with all employees who perform the job and consider their responses carefully. If you plan to introduce new or modified job procedures, be sure they understand what they are required to do and the reasons for the changes. The following information provides the recommended order of precedence and effectiveness for job hazard control.

Engineering controls

Engineering controls include:

- Hazard elimination/minimization by designing the facility, equipment, or process to remove the hazard, or substituting processes, equipment, materials, or other factors to lessen the hazard;
- Enclosing the hazard using enclosed cabs, enclosures for noisy equipment, or other means;
- Isolating the hazard with interlocks, machine guards, blast shields, welding curtains, or other means; and
- Removing or redirecting the hazard such as with local and exhaust ventilation.

Administrative controls

Administrative controls include:

- Written operating procedures, work permits, and safe work practices;
- Exposure time limitations (used most commonly to control temperature extremes and ergonomic hazards);
- Monitoring the use of highly hazardous materials;
- Alarms, signs, and warnings;
- Job rotation;
- Buddy system; and
- Training.

Personal protective equipment

Personal protective equipment, such as respirators, hearing protection, protective clothing, safety glasses, and hardhats, is acceptable as a control method in the following circumstances:

- When engineering controls are not feasible or do not totally eliminate the hazard;
- While engineering controls are being developed;
- When safe work practices do not provide sufficient additional protection; and
- During emergencies when engineering controls may not be feasible.

Use of one hazard control method over another higher in the control precedence scale may be appropriate for providing interim protection until the hazard is abated permanently. In reality, if the hazard cannot be eliminated entirely, the adopted control measures will likely be a combination of all three items instituted simultaneously.

Careful documentation is essential

If safer and better job steps can be used, list each new step, such as describing a new method for disposing of material. List exactly what the worker needs to know in order to perform the job using a new method. Do not make general statements about the procedure, such as “Be careful.” Be as specific as you can in your recommendations.

Go over the recommendations with all employees performing the job. Their ideas about the hazards and proposed recommendations may be valuable. Be sure that they understand what they are required to do and the reasons for the changes in the job procedure.

Below is the same illustration of the basic job steps for grinding iron castings with recommendations for new steps and protective measures.

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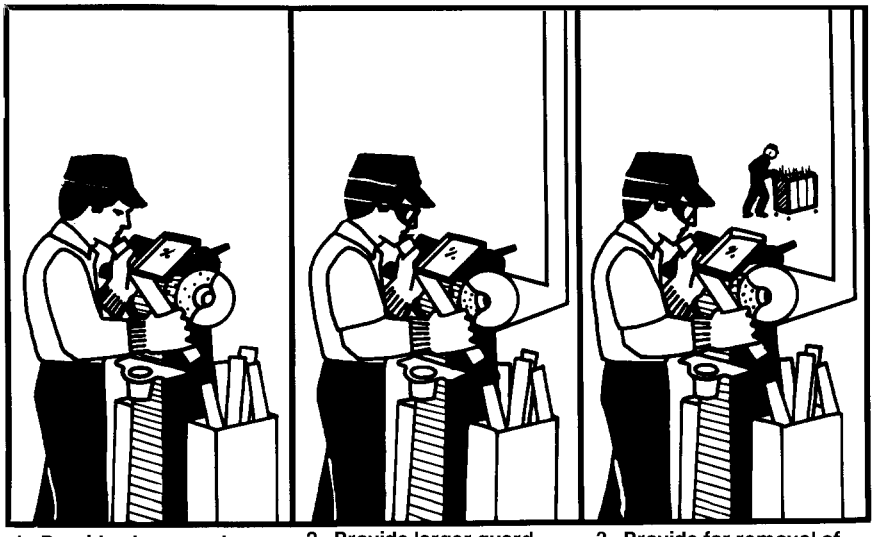

1. Provide gloves and safety shoes.
2. Provide larger guard over wheel. Install local exhaust system. Provide safety goggles. Instruct worker to wear short or tight-fitting sleeves.
3. Provide for removal of completed stock.

Job Location: Metal Shop	***Analyst:*** Joe Safety	***Date:***
Task Description: Worker reaches into metal box to the right of the machine, grasps a 15-pound casting and carries it to grinding wheel. Worker grinds 20 to 30 castings per hour.		
Hazard Description: Reaching, twisting, and lifting 15-pound castings from the floor could result in a muscle strain to the lower back.		
Hazard Controls: 1. Move castings from the ground and place them closer to the work zone to minimize lifting. Ideally, place them at waist height or on an adjustable platform or pallet. 2. Train workers not to twist while lifting and reconfigure work stations to minimize twisting during lifts.		

Repeat similar forms for each job step.

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Reviewing the job hazard analysis

A job hazard analysis can do much toward reducing accidents and injuries in the workplace, but it is only effective if it is reviewed and updated periodically. Periodically reviewing your job hazard analysis ensures that it remains current and continues to help reduce workplace accidents and injuries. Even if the job has not changed, it is possible that during the review process you will identify hazards that were not identified in the initial analysis.

It is particularly important to review your job hazard analysis if an illness or injury occurs on a specific job. In addition, if an accident has resulted from an employee's failure to follow job procedures, this should be discussed with all employees performing the job. Based on the circumstances, you may determine that you need to change the job procedure to prevent similar incidents in the future.

If an employee's failure to follow proper job procedures results in a "close call," discuss the situation with all employees who perform the job and remind them of proper procedures. Any time you revise a job hazard analysis, it is important to train all employees affected by the changes in the new job methods, procedures, or protective measures adopted.

Using the job hazard analysis for training employees

Any time a job hazard analysis is revised, training in the new job methods or protective measures should be provided to all employees affected by the changes. The analysis also can be used to effectively train new employees on job steps and job hazards, especially if they are working with highly toxic substances or in dangerous situations.

Getting outside help

If your employees are involved in many different or complex processes, you may need professional help conducting your job hazard analyses. Sources of help include your insurance carrier, the local fire department, and private consultants with safety and health expertise. In addition, OSHA offers assistance through its regional and area offices and consultation services.

Even when you receive outside help, it is important that you and your employees remain involved in the process of identifying and correcting hazards because you are on the worksite every day and most likely to encounter these hazards. New circumstances and a recombination of existing circumstances may cause old hazards to reappear and new hazards to appear. In addition, you and your employees must be ready and able to implement whatever hazard elimination or control measures a professional consultant recommends.

Common job hazards and descriptions

Hazards	Hazard descriptions
Chemical (Toxic)	A chemical that exposes a person by absorption through the skin, inhalation, or through the blood stream that causes illness, disease, or death. The amount of chemical exposure is critical in determining hazardous effects. Check Material Safety Data Sheets (MSDS), and/or §1910.1000 for chemical hazard information.
Chemical (Flammable)	A chemical that, when exposed to a heat ignition source, results in combustion. Typically, the lower a chemical's flash point and boiling point, the more flammable the chemical. Check MSDS for flammability information.
Chemical (Corrosive)	A chemical that, when it comes into contact with skin, metal, or other materials, damages the materials. Acids and bases are examples of corrosives.
Explosion (Chemical reaction)	Self explanatory.
Explosion (Over pressurization)	Sudden and violent release of a large amount of gas/energy due to a significant pressure difference such as rupture in a boiler or compressed gas cylinder.

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Hazards	Hazard descriptions
Electrical (Shock/Short circuit)	Contact with exposed conductors or a device that is incorrectly or inadvertently grounded, such as when a metal ladder comes into contact with power lines. 60Hz alternating current (common house current) is very dangerous because it can stop the heart.
Electrical (Fire)	Use of electrical power that results in electrical overheating or arcing to the point of combustion or ignition of flammables, or electrical component damage.
Electrical (Static/ESD)	The moving or rubbing of wool, nylon, other synthetic fibers, and even flowing liquids can generate static electricity. This creates an excess or deficiency of electrons on the surface of material that discharges (spark) to the ground resulting in the ignition of flammables or damage to electronics or the body's nervous system.
Electrical (Loss of power)	Safety-critical equipment failure as a result of loss of power.
Ergonomics (Strain)	Damage of tissue due to overexertion (strains and sprains) or repetitive motion.
Ergonomics (Human error)	A system design, procedure, or equipment that is error-provocative. (A switch goes up to turn something off).
Excavation (Collapse)	Soil collapse in a trench or excavation as a result of improper or inadequate shoring. Soil type is critical in determining the hazard likelihood.
Fall (Slip, trip)	Conditions that result in falls (impacts) from height or traditional walking surfaces (such as slippery floors, poor housekeeping, uneven walking surfaces, exposed ledges, etc.)
Fire/Heat	Temperatures that can cause burns to the skin or damage to other organs. Fires require a heat source, fuel, and oxygen.
Mechanical/Vibration (Chaffing/Fatigue)	Vibration that can cause damage to nerve endings, or material fatigue that results in a safety-critical failure. (Examples are abraded slings and ropes, weakened hoses and belts.)
Mechanical failure	Self explanatory; typically occurs when devices exceed designed capacity or are inadequately maintained.
Mechanical	Skin, muscle, or body part exposed to crushing, caught-between, cutting, tearing, shearing items or equipment.
Noise	Noise levels (>85 dBA 8 hr TWA) that result in hearing damage or inability to communicate safety-critical information.
Radiation (Ionizing)	Alpha, Beta, Gamma, neutral particles, and X-rays that cause injury (tissue damage) by ionization of cellular components.
Radiation (Non-ionizing)	Ultraviolet, visible light, infrared, and microwaves that cause injury to tissue by thermal or photochemical means.
Struck by (Mass acceleration)	Accelerated mass that strikes the body causing injury or death. (Examples are falling objects and projectiles.)
Struck against	Injury to a body part as a result of coming into contact of a surface in which action was initiated by the person. (An example is when a screwdriver slips.)
Temperature extreme (Heat/Cold)	Temperatures that result in heat stress, exhaustion, or metabolic slow down such as hypothermia.
Visibility	Lack of lighting or obstructed vision that results in an error or other hazard.
Weather phenomena (Snow/Rain/Wind/Ice)	Self explanatory.

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Job hazard analysis forms

Using a standard form when doing a job hazard analysis will help ensure that no important step is overlooked. Standardizing the form also creates a familiar document that is easy to use and identify. Following are two samples of job hazard analysis forms. One is based on the completed forms shown on previous pages, and the other presents a variation of the same information.

<table>
<tr><th>Job title:</th><th>Job location:</th><th>Analyst</th><th>Date</th></tr>
<tr><td>Task #</td><td colspan="3" rowspan="2">Task description:</td></tr>
<tr><td></td></tr>
<tr><td>Hazard type:</td><td colspan="3">Hazard description:</td></tr>
<tr><td>Consequence:</td><td colspan="3">Hazard controls:</td></tr>
<tr><td colspan="4">Rational or comment:</td></tr>
</table>

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Sample job hazard analysis form

Job title: _____ Date of analysis: _____

Job location: _____

Step	Hazard	New procedure or protection

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Sample job hazard analysis

Cleaning inside surface of chemical tank—Top manhole entry

Step	Hazard	New procedure or protection
1. Select and train operators.	Operator with respiratory or heart problem; other physical limitation.	• Examination by industrial physician for suitability to work.
	Untrained operator — failure to perform task.	• Train operators. • Dry run. [Reference: National Institute for Occupational Safety and Health (NIOSH) Doc. #80-406]
2. Determine what is in the tank, what process is going on in the tank, and what hazards this can pose.	Explosive gas.	• Obtain work permit signed by safety, maintenance and supervisors.
	Improper oxygen level.	• Test air by qualified person.
	Chemical exposure — Gas, dust, vapor: irritant toxic	• Ventilate to 19.5%-23.5% oxygen and less than 10% LEL of any flammable gas. Steaming inside of tank, flushing and draining, then ventilating, as previously described, may be required.
	Liquid: irritant toxic corrosive	• Provide appropriate respiratory equipment — SCBA or air line respirator. • Provide protective clothing for head, eyes, body and feet.
	Solid: irritant corrosive	• Provide parachute harness and lifeline. [Reference: OSHA standards 1910.106, 1926.100, 1926.21(b)(6); NIOSH Doc. #80-406] • Tanks should be cleaned from outside, if possible.
3. Set up equipment.	Hoses, cord, equipment — tripping hazards.	• Arrange hoses, cords, lines and equipment in orderly fashion, with room to maneuver safely.
	Electrical — voltage too high, exposed conductors.	• Use ground fault circuit interrupter.
	Motors not locked out and tagged.	• Lockout and tag mixing motor, if present.
4. Install ladder in tank.	Ladder slipping	• Secure to manhole top or rigid structure.
5. Prepare to enter tank.	Gas or liquid in tank.	• Empty tank through existing piping. • Review emergency procedures. • Open tank. • Check of job site by industrial hygienist or safety professional. • Install blanks in flanges in piping to tank (isolate tank). • Test atmosphere in tank by qualified person (long probe).
6. Place equipment at tank-entry position.	Trip or fall.	• Use mechanical-handling equipment. • Provide guardrails around work positions at tank top.
7. Enter tank.	Ladder — tripping hazard.	• Provide personal protective equipment for conditions found. [Reference: NIOSH Doc. #80-406; OSHA CFR 1910.134]
	Exposure to hazardous atmosphere.	• Provide outside helper to watch, instruct and guide operator entering tank, with capability to lift operator from tank in emergency.
8. Cleaning tank.	Reaction of chemicals, causing mist or expulsion of air contaminant.	• Provide protective clothing and equipment for all operators and helpers. • Provide lighting for tank (Class I, Div. 1). • Provide exhaust ventilation. • Provide air supply to interior of tank. • Frequent monitoring of air in tank. • Replace operator or provide rest periods. • Provide means of communication to get help if needed. • Provide two-man standby for any emergency.
9. Cleaning up.	Handling of equipment, causing injury.	• Dry run. • Use material-handling equipment.

OSHA COMPLIANCE MANUAL

OCCUPATIONAL NOISE EXPOSURE

OSHA COMPLIANCE MANUAL

Reserved

Occupational noise exposure

Noise, or unwanted sound, is one of the most common health problems in American workplaces. However, it is often ignored because there are no visible effects and it usually develops over a long period of time.

Human hearing is amazingly sensitive. Our ears can distinguish 400,000 different sounds and can detect sounds so quiet that they cause the eardrum to vibrate less than 1/80,000,000th of an inch. But there's no guarantee that this remarkable sensitivity will last a lifetime — to maintain it, it must be protected.

The National Institute for Occupational Safety and Health (NIOSH) estimates that 30 million workers in the U.S. are exposed to hazardous noise. Exposure to high levels of noise can cause hearing loss, create physical and psychological stress through a progressive loss of communication, reduce productivity, interfere with communication and socialization, and contribute to accidents and injuries by making it difficult to hear warning signals.

In the work environment, OSHA requires employers to determine if their employees are exposed to excessive noise. If so, the employers must implement feasible engineering or administrative controls to eliminate or reduce hazardous levels of noise. Where controls are not sufficient to reduce noise to an acceptable level, an effective hearing conservation program must be established.

Sound and noise

Sound is usually defined as what you hear; while *noise* is any sound you don't want to hear. The point at which sound becomes a problem is when it's so loud that it destroys the ability to hear the sounds we want to, or need to, hear.

Sound is the physical phenomenon that stimulates our sense of hearing. It is an acoustic wave that results when a vibrating source, such as machinery, disturbs an elastic medium, such as air. In air, sound is usually described as variations of pressure above and below atmospheric pressure. These fluctuations, commonly called sound pressure, develop when a vibrating surface forms areas of high and low pressure, which transmit from the source as sound.

Sound is measured in two ways: *decibels* and *frequency*. Decibels indicate the pressure of sound. Sound waves transfer that pressure from place to place and are expressed in units on a logarithmic scale. Frequency is related to a sound's pitch and is measured in units called hertz (Hz), or cycles per second.

The pitch of a sound — how high or low it seems — is how you perceive its frequency. The higher the pitch of a sound, the higher its frequency. High-frequency sounds are generally more annoying than low-frequency sounds and can be more harmful to hearing. Human hearing is most sensitive to frequencies between 3,000 to 4,000 Hz. That's why people with damaged hearing have difficulty understanding higher-pitched voices and other sounds in the 3,000 – 4,000 Hz range.

Anatomy of the ear

The ear is the organ that makes hearing possible. It has three main parts:

1. External outer ear,
2. Air-filled middle ear, and
3. Fluid-filled inner ear.

The function of the ear is to gather, transmit, and perceive sounds from the environment. This involves three stages:

1. Modification of the acoustic wave by the outer ear, which receives the wave and directs it to the eardrum.

2. Conversion and amplification of the modified acoustic wave to a vibration of the eardrum (transmitted through the middle ear to the inner ear).
3. Transformation of the mechanical movement (vibrations) of the wave into nerve impulses. The vibrations pass the small bones of the middle ear, which transmit them to sensory cells, called hair cells, located in the cochlea. The vibrations become nerve impulses and go directly to the brain, which interprets the impulses as sound.

Effects of excessive exposure

People differ in their sensitivity to sound, and there's no way to determine who is most at risk for hearing damage. Factors such as sound pressure, frequency, and length of exposure all play roles in determining whether what a person hears is harmful or just annoying.

When noise is too loud, it can damage the sensitive hair cells of the inner ear. As the number of damaged hair cells increases, the brain receives fewer impulses to interpret as sound. While a single exposure to loud noise can damage hair cells, it probably won't destroy them. The person may experience ringing in the ears and some sounds may be muffled, but the hair cells will recover and so will hearing. This is called a temporary threshold shift. But, without proper hearing protection, repeated exposures to loud noise can damage hair cells to the point that they won't recover. Because the damage is severe, it results in a permanent threshold shift, and no treatment will restore it.

In its early stages, when hearing loss is above 2,000 Hz, it affects the ability to understand or discriminate speech. As it progresses to the lower frequencies, it begins to affect the ability to hear sounds in general. The three main types of hearing loss are conductive, sensorineural, or a combination of the two.

The effects of noise can be simplified into three general categories:

- *Primary effects*: Noise-induced temporary threshold shift, noise-induced permanent threshold shift, acoustic trauma, and tinnitus.
- *Effects on communication and performance*: Isolation, annoyance, difficulty concentrating, absenteeism, and accidents.
- *Other effects*: Stress, muscle tension, ulcers, increased blood pressure, and hypertension.

Ultrasonics

Ultrasound is high-frequency sound that is inaudible, or cannot be heard, by the human ear. However, it may still affect hearing and produce other health effects. Factors to consider regarding ultrasonics include:

- The upper frequency of audibility of the human ear is approximately 15-20 kilo-Hertz (kHz).
  - This is not a set limit and some individuals may have higher or lower (usually lower) limits.
  - The frequency limit normally declines with age.
- Most of the audible noise associated with ultrasonic sources, such as ultrasonic welders or ultrasonic cleaners, consists of subharmonics of the machine's major ultrasonic frequencies.
  - *Example*: Many ultrasonic welders have a fundamental operating frequency of 20 kHz, a sound that is at the upper frequency of audibility of the human ear. However, a good deal of noise may be present at 10 kHz, the first subharmonic frequency of the 20 kHz operating frequency, and is therefore audible to most persons.

Evaluating noise exposure

The first step toward solving any noise problem is to define it. To understand what requirements must be implemented according to OSHA's noise standard, it is necessary to determine exposure levels.

Indications of a problem

There are various factors that indicate when noise is a problem in the workplace. While people react differently to noise, subjective responses should not be ignored because they may provide warnings that noise may be at unacceptable levels.

- Noisy conditions can make normal conversation difficult. When noise levels are:
  - Above 80 decibels (dB), people have to speak very loudly.
  - Between 85 and 90 dB, people have to shout.
  - Greater than 95 dB, people have to move close together to hear each other at all.
- High noise levels can cause adverse reactions or behaviors.

Lower levels of noise exposure may actually be riskier than higher levels. Exposures below 95 dBA may be annoying, but don't seem loud enough for hearing protection — though cumulative exposure can lead to hearing loss. Noise levels above 100 dBA, however, are uncomfortable and the discomfort serves as a reminder to wear hearing protection.

Sometimes, overexposure to loud noise can trigger ringing or other sounds in the ears. This is called tinnitus. While tinnitus may be a symptom of damaged hearing, it can also be caused by infections, medications, and impacted ear wax. The only way to know for sure if noise has damaged a person's hearing is to have a hearing examination by a certified audiometric technician, audiologist, otolaryngologist, or physician.

Don't forget that exposure to loud noise doesn't occur in just the workplace. Off the job, employees can be exposed to noise from firearms, motorcycles, snowmobiles, power tools, lawn mowers and snow blowers, and loud music, often from headsets and ipods.

Walk-around sound survey

There's only one way to know if noise has reached a dangerous level — have someone trained to conduct a sound survey. Anyone trained to use a sound-level meter and a dosimeter and evaluate the data should be able to perform the survey.

The walk-around survey will screen for noise exposures and determine if additional monitoring is necessary. When screening for noise exposures, sound level meter measurements and estimates of the duration of exposure are sufficient. The resulting spot readings can be used to determine the need for a more complete evaluation. Survey steps to follow include:

1. Tour the facility and develop a detailed understanding of facility operations and potential noise sources. Take the tour with someone who is familiar with plant operations. Speak with knowledgeable personnel about operations and maintenance requirements. Make notes on a diagram of the floor plan if possible. Look for indications that noise may be a problem.
2. Use a sound level meter to take spot readings of operations that are questionable. It may be useful to mark the sound levels on a diagram of the floor plan. Make notes regarding what equipment is on or off.
3. Estimate exposures by identifying employees and their locations and estimate the length of time they spend in different areas or how long they operate particular equipment or tools.

If the results of the walk-around survey indicate time-weighted average (TWA) exposures of 80 dBA or more, additional noise monitoring should be performed. Remember to take into account the accuracy of the sound level meter when making this estimation. For example, a Type 2 sound level meter has an accuracy of ±2 dBA.

Work shift sampling

When the results of the walk-around survey indicate that noise levels may exceed those outlined in OSHA's Occupational Noise Exposure standard at §1910.95, additional monitoring is necessary. Sample the noise exposures of representative employees from each job classification that may be potentially overexposed.

Use a dosimeter with a threshold of 80 dBA (A-weighted sound pressure level) and 90 dBA to measure noise exposures. Most modern dosimeters use simultaneous 80 and 90 dBA thresholds.

- A dosimeter with a threshold of 80 dBA is used to measure the noise dose of those employees identified during the walk-around survey as having noise exposures that are in compliance with Table G-16 of OSHA's noise standard 1910.95, but whose exposure may exceed the levels specified in Table G-16a [1910.95 Appendix A: Noise Exposure Computation]. In other words, the 80-dBA threshold is used to determine compliance with the 85 dBA time-weighted average (TWA) action level under OSHA's noise standard.
- The dosimeter with a threshold of 90 dBA is used to measure the noise dose of those employees identified during the walk-around survey as having potential noise exposures that exceed the sound levels in Table G-16. In other words, the 90 dBA threshold is used to determine compliance with the permissible exposure limit (PEL).

As a minimum, sampling should be conducted for a length of time necessary to establish whether exposures are above the limits permitted by Table G-16 or Table G-16a. Instrument accuracy must be taken into account. Consider the following with respect to the monitoring results:

- TWA exposures at or above the action level of 85 dBA require a hearing conservation program (results obtained from the 80 dBA threshold).
- TWA exposures exceeding the PEL (Table G-16) require feasible engineering or administrative controls to be implemented (results obtained from the 90 dBA threshold).

Establish a sampling protocol

1. Inform the employee being monitored that the dosimeter should not interfere with his/her normal duties, and emphasize that the employee should continue to work as usual.
2. Explain the purpose of the dosimeter to each employee being sampled and emphasize that the dosimeter is not a speech recording device.
3. Instruct the employee being sampled not to remove the dosimeter unless absolutely necessary and not to cover the microphone with a coat or outer garment or move it from its installed position. Inform the employee when and where the dosimeter will be removed.
4. The microphone should be located in the employee's hearing zone. OSHA defines the hearing zone as a sphere with a two-foot diameter surrounding the head. Clip the microphone to the employee's clothing according to the manufacturer's instructions. Most manufacturers recommend that the microphone be placed on the shoulder area midway between the head and the point of the shoulder. Practicality and safety will dictate the actual microphone placement at each survey location.
5. Use the microphone windscreen to protect the microphone when the wearer will be outdoors or in dusty or dirty areas. (The windscreen will not protect the microphone from rain or extreme humidity).
6. When noise levels at an employee's two ears are different, the higher level must be sampled for compliance determinations.

7. Position and secure any excess microphone cable to avoid snagging or inconvenience to the employee. If practical, the cord should be run under the employee's shirt or coat.
8. Check the dosimeter periodically to ensure that the microphone is properly oriented.
9. Obtain and note sound level meter readings during different phases of work the employee performs during the shift. There is no minimum regarding the number of readings to obtain, but it is important to take enough readings to identify work cycles. For statistical reasons, more readings should be taken when noise levels fluctuate widely.
10. Document sampling results.

Source: OSHA Technical Manual, Noise and Hearing Conservation

Appendix III:B. General Sampling Protocol

Measuring sound

Instruments generally used to measure sound include:

- Sound level meter
- Dosimeter
- Octave-band analyzer

Important factors to consider when dealing with these instruments are instrument settings, calibration, and effects of the environment on instrumentation.

Sound level meter

There are various factors that may indicate noise is a problem in the workplace. While people react differently to noise, subjective responses should not be ignored because they may provide warnings that noise may be at unacceptable levels. A sound level meter (SLM) is the basic instrument for investigating noise levels.

Sound level meters can be used to:

- Spot-check noise dosimeter performance.
- Determine an employee's noise dose whenever use of a noise dosimeter is unavailable or inappropriate.
- Identify and evaluate individual noise sources for abatement purposes.
- Aid in determining the feasibility of engineering controls for individual noise sources.
- Evaluate hearing protectors.

Considerations for use

Factors to consider with the use of a SLM include:

- When evaluating employee exposures, place the microphone in the hearing zone of the employee being monitored.
- Sound level readings in a non-reverberant environment should be taken in accordance with the manufacturer's instructions.
- Special considerations may be involved with the use and care of a sound level meter.

Measuring impulse/impact sounds

Some meters have a ″peak″ and ″impulse″ response for measuring transient sounds (sounds that decay or pass with time).

- The true peak value is the maximum value of the noise waveform. The impulse measurement is an integrated measurement. The true peak reading should only be used when determining compliance with OSHA's 140 dB peak sound pressure level.
- The user should *not* use ″impulse″ response when measuring true peak sound pressure levels.

ANSI standards

Sound level meters used by OSHA meet the American National Standards Institute (ANSI) Standard S1.4 "Specifications for Sound Level Meters." The ANSI standard sets performance and accuracy tolerances according to three levels of precision: Types 0, 1, and 2. Type 0 is used in laboratories, Type 1 is used for precision measurements in the field, and Type 2 is used for general-purpose measurements.

- For compliance purposes, readings with an ANSI Type 2 sound level meter and dosimeter are considered to have an accuracy of ±2 dBA, while a Type 1 instrument has an accuracy of ±1 dBA.
- A Type 2 meter is the minimum requirement by OSHA for noise measurements, and is usually sufficient for general purpose noise surveys.
    - The Type 1 meter is preferred for the design of cost-effective noise controls.
    - For unusual measurement situations, refer to the manufacturer's instructions and appropriate ANSI standards for guidance in interpreting instrument accuracy.

Dosimeter

Like a sound level meter, a noise dosimeter can also measure sound levels. However, the dosimeter is actually worn by the employee in order to determine the personal noise dose during the workshift or sampling period. Dosimeters can be used to:

- Take compliance measurements according to OSHA's noise standard.
- Measure the employee's exposure to noise and automatically compute the necessary noise dose calculations.

Factors to consider with the use of a dosimeter include:

- The microphone must be placed in the employee's hearing zone. OSHA defines the hearing zone as a sphere with a two-foot diameter surrounding the head.
- Select specific instrument settings for the dosimeter.
- Special considerations may be involved with the use and care of a dosimeter.

ANSI standards

The ANSI standard for personal dosimeters is S1.25-1991, "Specifications for Personal Noise Dosimeters." Some older dosimeters only meet the 1978 version of this standard. The 1978 version was not intended for measuring noise that is predominantly impulsive. For noise that is impulsive in nature, a dosimeter meeting the 1991 version of the standard is recommended.

Octave-band analyzers

Octave-band analyzers are sound level meters that can be used to:

- Help determine the adequacy of various types of frequency-dependant noise controls.

- Select hearing protectors because they can measure the amount of attenuation (how much a sound is weakened) offered by the protectors in the octave bands responsible for most of the sound energy in a given situation.
- Divide noise into its frequency components.
    - Some sound level meters may have an octave or one-third octave band filter attached or integrated into the instrument. Usually a Type 1 (precision) sound level meter is used for octave and one-third octave analysis.
    - The filters are used to analyze the frequency content of noise. They are also valuable for the calibration of audiometers and to determine the adequacy of various types of noise control.

Frequency components may include:

- Most octave-band filter sets provide filters with the following center frequencies: 31.5, 63, 125, 250, 500, 1,000, 2,000, 4,000, 8,000, and 16,000 Hertz (Hz).
- For a more detailed analysis, the spectrum is sometimes measured in one-third octave bands.
- The special signature of any given noise can be obtained by taking sound level meter readings at each of the center frequency bands. The results may indicate octave-bands that contain the majority of the total sound power being radiated.

Controlling workplace noise

Engineering controls

Workplace safety and health specialists agree that engineering controls are the best way to control noise. That's true if the engineering control is effective, practical, and affordable. When you replace a noisy machine with a quiet one, modify it to make it quieter, or change the sound path so that the noise never reaches the listener, you're using an engineering control.

Replacement

If you have an old, noisy electric hand drill, you can replace it with a newer, quieter one. But, if you have a large noisy chipper/shredder, replacing it may not be practical. Instead, you might enclose the shredder to isolate the noise.

Enclose the offending equipment

Creative solutions may also be effective ones. Construction workers were using a concrete mixer to de-grease metal parts by tumbling them in sawdust — effective but noisy. To reduce the noise level to below 85 decibels, the employer built an enclosure around the mixer with two-by-fours and acoustic sound board, sealing the access door with polyurethane foam. The cost was minimal and the design was effective; it lowered noise levels to 78 decibels.

Increase the distance

When you double the distance between the worker and the sound source, you decrease the sound pressure level by six decibels. For example, a hazardous 96-decibel noise source at five feet is a safe 84 decibels at 20 feet.

Reduce the impact

When you reduce the height that materials collected in bins and boxes will drop, you can quiet noisy processes. Consider lining containers with damping materials such as plastic or rubber to keep them quiet.

Applying practical engineering controls to a noise problem can be challenging because there may not be ready-to-order solutions. You're more likely to find a solution when you:

- Understand what's causing the noise.
- Determine how the noise is reaching the worker.
- Identify the most appropriate point, or points, at which to control the noise, either at the source, along the sound path, or at the worker.

Administrative and work practice controls

Unlike engineering controls that prevent hazardous noise from reaching a worker, administrative controls manage workers' activities to reduce their exposure. Closely related to administrative controls are work practice controls, which emphasize safe practices.

Administrative and work-practice controls are usually less expensive than engineering controls because there are no significant capital costs involved in changing or modifying equipment. In some cases, administrative controls can reduce employee exposure to noise and increase productivity by rotating employees through a demanding, noisy task. Work practice controls can also improve performance by emphasizing safe work practices.

Administrative and work practice controls usually may not be as effective as engineering controls because they don't control the noise exposure. Noisy machines are still noisy and the exposure is still present. Some controls that can be used to reduce exposure include:

- Reduce the time employees spend working in noisy areas;
- Rotate two or more employees so that each is exposed to noise less than 85 decibels, averaged over an eight-hour day.
- Shut down noisy equipment when it's not needed for production.
- Ensure that employees maintain equipment so that it runs smoothly and quietly.
- Ensure that employees know how to perform their tasks and operate equipment at safe noise levels.
- Use warning signs to identify work areas where noise exceeds safe levels.
- Encourage employees to report noise hazards to supervisors.

If you can't eliminate or control noise with an engineering control, you may be able to control it with an administrative control. However, if an administrative control won't reduce employee exposures to safe levels, you'll need to consider a third noise-control tool — hearing protectors.

Personal protective equipment: Hearing protectors

When workplace noise equals or exceeds 85 dBA, averaged over an eight-hour period, can't be reduced through engineering, administrative, or work practice controls, employees must be provided with hearing protection. Those who receive hearing protectors must have the opportunity to select them from a variety of types that are compatible with their work tasks. Employees must also be properly fitted and trained to use and care for their hearing protectors.

There are two types of hearing protectors: ear plugs and earmuffs. Both types reduce the pressure of sound that reaches the eardrum and are the next line of defense when noise levels can't be reduced to safe levels with engineering or administrative controls.

Expandable foam plugs

Expandable foam plugs are made of a formable material designed to expand and conform to the shape of each person's ear canal. Roll the expandable plugs into a thin, crease-free cylinder. Whether you roll plugs with thumb and fingers or across your palm doesn't matter. What's critical is the final result — a smooth tube thin enough so that about half the length will fit easily into your ear canal. Some individuals, especially women with small ear canals, have difficulty rolling typical plugs small enough to make them fit. A few manufacturers now offer a small size expandable plug.

Pre-molded, reusable plugs

Pre-molded plugs are made from silicone, plastic or rubber and are manufactured as either ″one-size-fits-most″ or are available in several sizes. Many pre-molded plugs are available in sizes for small, medium or large ear canals.

A critical tip about pre-molded plugs is that a person may need a different size plug for each ear. The plugs should seal the ear canal without being uncomfortable. This takes trial and error of the various sizes. Directions for fitting each model of pre-molded plug may differ slightly depending on how many flanges they have and how the tip is shaped. Insert this type of plug by reaching over your head with one hand to pull up on your ear. Then use your other hand to insert the plug with a gentle rocking motion until you have sealed the ear canal.

Advantages of pre-molded plugs are that they are relatively inexpensive, reusable, washable, convenient to carry, and come in a variety of sizes. Nearly everyone can find a plug that will be comfortable and effective. In dirty or dusty environments, you don't need to handle or roll the tips.

Canal caps

Canal caps often resemble earplugs on a flexible plastic or metal band. The earplug tips of a canal cap may be a formable or pre-molded material. Some have headbands that can be worn over the head, behind the neck or under the chin. Newer models have jointed bands increasing the ability to properly seal the earplug.

The main advantage canal caps offer is convenience. When it's quiet, employees can leave the band hanging around their necks. They can quickly insert the plug tips when hazardous noise starts again. Some people find the pressure from the bands uncomfortable. Not all canal caps have tips that adequately block all types of noise. Generally, the canal caps tips that resemble stand-alone earplugs seem to block the most noise.

Earmuffs

Earmuffs come in many models designed to fit most people. They work to block out noise by completely covering the outer ear. Muffs can be ″low profile″ with small ear cups or large to hold extra materials for use in extreme noise. Some muffs also include electronic components to help users communicate or to block impulsive noises.

Workers who have heavy beards or sideburns or who wear glasses may find it difficult to get good protection from earmuffs. The hair and the temples of the glasses break the seal that the earmuff cushions make around the ear. For these workers, earplugs are best. Other potential drawbacks of earmuffs are that some people feel they can be hot and heavy in some environments.

Miscellaneous devices

Manufacturers are receptive to comments from hearing protection users. This has led to the development of new devices that are hybrids of the traditional types of hearing protectors. Because many people like the comfort of foam plugs, but don't want to roll them in dirty environments, a plug is now available that is essentially a foam tip on a stem. You insert this plug much like a pre-molded plug without rolling the foam.

Scientists are developing earmuffs using high-tech materials to reduce weight and bulk, but still effectively block noise. On the horizon may be earplugs with built in two-way communication capability.

Select the right protection

The best hearing protector is the one that is comfortable and convenient and that will be worn every time a person is in an environment with hazardous noise. Select hearing protectors based on comfort, convenience, and compatibility. Employees won't wear hearing protectors that are uncomfortable or difficult to use or that interfere with their work. To ensure they will wear the protectors, allow employees to choose, with the help of a person trained in fitting hearing protectors, from among a variety of appropriate types and sizes.

Most hearing protectors are labeled with a noise reduction rating (NRR) indicating a protection level in decibels. However, these ratings are not reliable outside of a testing laboratory, which is where they received the rating. The NRR rating tends to overestimate the protection a hearing protector will provide under real-world conditions.

One way to estimate the real-world effectiveness of a hearing protector is to subtract 7 dB from the manufacturer's NRR as shown below:

Noise level to which the worker is exposed, averaged over an eight-hour period. . . 95 dBA

NRR shown on the hearing protector label . . . . . 25 decibels

Subtract 7 dB from the NRR . . . . . 25 - 7 = 18

Subtract 18 dB from 95 dBA . . . . . 95 dBA - 18 dB = 77 dBA

This hearing protector may be able to reduce the worker's exposure from 95 dBA to 77 dBA.

Develop a hearing conservation program

An effective hearing conservation program can prevent hearing loss, improve employee morale and a general feeling of well-being, increase quality of production, and reduce the incidence of stress-related disease. Employers must administer a continuing, effective hearing conservation program whenever employee noise exposures are at or above an eight hour time-weighted average (TWA) of 85 dBA or, equivalently, a dose of 50 percent. This is referred to as the action level.

Minimum requirements of a hearing conservation program include:

- Monitoring program,
- Audiometric testing program,
- Hearing protection devices,
- Employee training, and
- Recordkeeping.

Monitoring program

Employers have to develop and implement a monitoring program whenever information indicates that any employee's exposure may equal or exceed the action level. The sampling strategy must be designed to identify all employees for inclusion in the hearing conservation program and enable the proper selection of hearing protectors.

The monitoring requirement is performance-based, as it allows employers to choose a monitoring method that best suits each individual work situation. Either personal or area monitoring may be used. If there are

circumstances that may make area monitoring generally inappropriate, such as high worker mobility, significant variations in sound level or a significant component of impulse noise, then the employer must use representative personal sampling unless it can be shown that area sampling produces equivalent results.

Noise measurements must integrate all continuous, intermittent, and impulsive noise levels from 80 to 130 dBA. Monitoring must be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that additional employees may be exposed at or above the action level, or the attenuation provided by hearing protectors used by employees is inadequate.

The employer must notify each employee who is exposed at or above the action level of the results of the monitoring and provide them with an opportunity to observe noise monitoring procedures.

Hearing protection devices (HPDs)

Hearing protection devices (HPDs) are considered the last option to control exposures to noise. HPDs are generally used during the necessary time it takes to implement engineering or administrative controls, or when such controls are not feasible.

Employers must make HPDs available at no cost to all employees exposed at or above the action level and provide replacements as necessary. Further, they must ensure that HPDs are worn by employees where feasible administrative and engineering controls fail to reduce sound levels within those listed in Table G-16, or who are exposed at or above the action level and who have not yet had a baseline audiogram established or have experienced a standard threshold shift (STS).

HPD selection and use

Employees must be given the opportunity to select their HPDs from a suitable variety. Generally, this should include a minimum of two devices, representative of at least two different types. The employer must provide training in the use and care of all protectors provided to employees and ensure proper initial fitting and supervise their correct use.

HPD attenuation

Attenuation refers to the damping or decrease of noise levels as a result of wearing HPDs. The employer has to evaluate HPD attenuation for the specific noise environments in which the HPD will be used. HPDs must attenuate employee exposure to at least an eight hour time-weighted average of 90 dBA.

For employees who have experienced a standard threshold shift (STS), HPDs must attenuate exposure at or below the action level of 85 dBA-TWA (time-weighted average). The adequacy of the HPDs must be re-evaluated whenever employee noise exposures increase to the extent that they may no longer provide adequate attenuation. The employer must provide more effective hearing protectors as necessary.

Employee training

OSHA requires employers to establish a training program for all employees with noise exposures at or above the action level and ensure employee participation. Training must be repeated annually for each employee in the hearing conservation program and the information must be updated to be consistent with changes in protective equipment and work processes.

The employer must ensure that each employee is informed of the following:

- The effects of noise on hearing.
- The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care.
- The purpose of audiometric testing and an explanation of test procedures.

Access to information and training materials

Employers have to make copies of the noise standard available to affected employees and post a copy in the workplace. They also are required to provide affected employees with any informational materials pertaining to the standard that are supplied to the employer by OSHA and give OSHA copies of all material relating to the employer's training and education program (on request).

Recordkeeping

OSHA has specific recordkeeping requirements for noise monitoring and employee testing results.

Exposure measurements

Employers must maintain an accurate record of all employee exposure measurements. These records must be retained for two years.

Audiometric test records

The employer must retain all employee audiometric test records. These records must include:

- Name and job classification of the employee.
- Date of the audiogram.
- The examiner's name.
- Date of the last acoustic or exhaustive calibration of the audiometer.
- Employee's most recent noise exposure assessment.

Additionally, the employer has to maintain accurate records of the background sound pressure level measurements in audiometric test rooms. These records must be maintained for the duration of the affected worker's employment.

Access to records

All records required by the noise standard must be provided upon request to employees, former employees, representatives designated by the individual employee, and OSHA.

Employers who cease to do business must transfer to the successor employer all records required by the noise standard. The successor employer has to retain these records for the remainder of the periods described previously.

Recording hearing loss on the 300 Log

Noise-induced hearing loss is a serious and irreversible condition. However, it is not the type of occupational injury that typically requires days away from work for recuperation. All work-related hearing losses of 10 decibel shifts that result in a total 25 decibel shift above audiometric zero have to be recorded on the 300 Log.

Audiometric zero and STS

A standard threshold shift (STS) is a change in hearing threshold, relative to an employee's baseline audiogram (hearing test), averaging 10 decibels (dB) or more at 2,000, 3,000, and 4,000 hertz (Hz) in one or both ears. If an employee's audiogram reveals that a work-related STS has occurred in one or both ears, and the total hearing level is 25 decibels or more above audiometric zero in the same ear(s) as the STS, the case is recordable.

If you have an employee with a recordable STS, document the case by checking the ″hearing loss″ column (M)(5) on the OSHA 300 Log.

Retesting

Retesting allows you to exclude false positive results and temporary threshold shifts from the data. If you retest the employee's hearing within 30 days of the first test, and the retest does not confirm the STS, you are not required to record the hearing loss case on the OSHA 300 Log. However, if the retest confirms the STS, record the hearing loss illness within seven calendar days of the retest.

Hearing loss that occurs with aging

You may take into account the hearing loss that occurs as a result of the aging process and retest an employee who has an STS on an audiogram to ensure that the STS is permanent before recording it. When comparing audiogram results, adjust the results for the employee's age when the audiogram was taken using Tables F-1 or F-2, as appropriate, in Appendix F of the Occupational Noise Exposure standard.

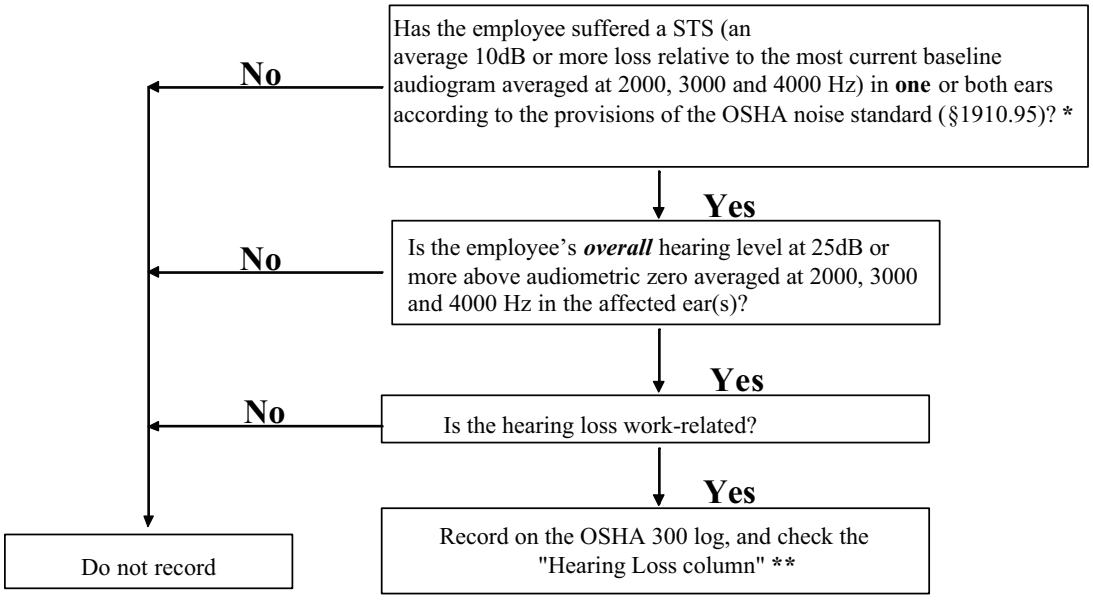
Noise dose

Hearing loss is presumed to be work-related if the employee is exposed to noise in the workplace at an 8-hour time-weighted average of 85 dBA or greater, or to a total noise dose of 50 percent, as defined in OSHA's noise exposure standard.

Noise dose is defined as the amount of actual exposure to noise relative to its permissible exposure limit. A dose greater than 100 percent represents exposure above the limit. For hearing loss cases where the employee is not exposed to this level of noise, refer to the rules in §1904.5 to determine if the hearing loss is work-related.

If a physician determines that the hearing loss is not work-related or has not been significantly aggravated by occupational noise exposure, you are not required to consider the case work-related or to record it on the 300 Log. For example if the hearing loss occurred before the employee was hired; or hearing loss that is unrelated to workplace noise, such as off the job traumatic injury to the ear or infections.

Use this **'decision tree'** to determine whether the results of a audiometric exam given on or after January 1, 2003 reveal a recordable STS.



Note: In all cases, use the most current baseline to determine recordability as you would to calculate a STS under the hearing conservation provisions of the noise standard (§1910.95). If an STS occurs in only one ear, you may only revise the baseline audiogram for that ear.
* The audiogram may be adjusted for presbycusis (aging) as set out in 1910.95.
** A separate hearing loss column on the OSHA 300 Log beginning in Calendar year 2004.

Employee hearing conservation training program

When feasible engineering and administrative controls don't adequately reduce noise exposures, you (the employer) must provide and pay for hearing protection devices (HPDs).

Overview

OSHA's Occupational Noise Exposure standard is in the General Industry regulations at §1910.95. When employees are exposed to 85 or more decibels (dB) averaged over an eight-hour period, the employer must implement a hearing conservation program that includes noise monitoring, hearing tests, hearing protection devices (HPDs), recordkeeping, and an annual training program. All of these provisions can be overwhelming to an employee, but a thorough training program can help employees understand how the program works.

Specific training elements

1. **Introduce the hazards of noise**.

   The most obvious hazard from being exposed to excessive noise is that it can cause noise-induced hearing loss.

   In addition to causing temporary or permanent hearing loss, excessive noise can:

   - Cause you to miss hearing important warnings or instructions;
   - Cause fatigue from the strain of talking and listening over the noise; and

- Cause increased blood pressure, headaches, sleeping disorders, and other ailments.

Trainer's note: *Tell employees not to believe that they will "get used to" the noise in the workplace.*

2. Describe how engineering controls can reduce or eliminate noise hazards.

The most effective way to control noise is to eliminate it by using engineering controls. Generally, the term "engineering controls" means using materials and equipment.

Common examples of engineering controls are:

- Installing a muffler on a machine,
- Erecting acoustical enclosures and barriers around noisy equipment,
- Installing sound absorbing material on walls,
- Installing vibration mounts under equipment,
- Making sure moving parts on machinery are properly lubricated, and
- Buying quieter equipment.

Trainer's note: *Provide examples of how engineering controls have been used to reduce the noise in your workplace.*

3. Explain how administrative controls can reduce noise.

The next way to control noise hazards is through administrative controls. This involves managing how work is assigned.

Examples include operating a noisy machine only during a shift when fewer people are exposed, or moving an employee to a less noisy job once he has been exposed to a certain daily dose of noise.

Even providing quiet areas where employees can get relief from workplace noise is an example of an administrative control. Lunchrooms and break areas should be located away from noise.

Trainer's note: *Give examples of any administrative controls in place at your facility*.

4. Outline the requirements of a hearing conservation program.

When it is not feasible to otherwise reduce noise to a safe level, the employer has to implement a hearing conservation program. A hearing conservation program is required for all employees whose noise exposure levels equal or exceed an 8-hour time-weighted average of 85 dB.

The hearing conservation program includes provisions for:

- Monitoring noise levels,
- Providing employees with audiometric testing,
- Using appropriate HPDs,
- Training, and
- Recordkeeping.

5. Describe how noise levels are monitored.

Noise monitoring is done for many reasons, including:

- To determine whether noise levels could contribute to hearing loss,
- To determine whether noise interferes with communication or warning signals,

- To identify employees for the hearing conservation program,
- To set priorities for noise control efforts,
- To identify areas where hearing protection practices are needed,
- To evaluate specific sources of noise, and
- To evaluate the success of noise control efforts.

Monitoring is conducted using sound level meters, dosimeters worn by employees, or other more sophisticated acoustical equipment. Employees must be able to observe the monitoring. Employees who are exposed at or above an 8-hour time-weighted average of 85 dB must be given the results of the monitoring.

Trainer's note: *Display your noise monitoring equipment.*

6. Explain how you provide hearing tests.

Employers have to provide affected employees with hearing tests in order to know if the hearing conservation program is effective.

A technician uses an instrument (an audiometer) to send sounds (tones) through headphones. The person being tested responds to the test sounds. The chart that records responses to the test sounds is called an audiogram. Employees can request test results.

You first have a baseline audiogram. This is followed up with annual audiograms. If tests show that you have experienced a certain change in the hearing threshold relative to the baseline audiogram, additional testing or examinations may be necessary, and you need to be refitted and retrained in the use of HPDs.

Trainer's note: *You may want to have a separate session to explain the audiometric testing program so that employees know what to expect during the tests.*

7. Demonstrate how to use HPDs.

By wearing HPDs, you reduce the level of sound entering the ear. Three typical types of HPDs are:

- Earmuffs,
- Ear canal caps, and
- Earplugs.

HPDs must be available (at no cost) to any employee who is exposed at or above an 8-hour time-weighted average of 85 dB. Under certain conditions, employees can be *required* to wear the HPDs. You must be able to select HPDs from a variety of suitable choices. The HPDs must fit properly, and you must be trained to use and wear them correctly.

For example, to correctly insert foam earplugs, follow the manufacturer's instructions. In general:

1. Roll the earplug between your fingers so it is tightly compressed into a smooth, long, slender cylinder.
2. Reach over your head with the opposite hand and gently lift and pull your ear to straighten the ear canal.
3. While holding your ear, insert the compressed earplug with your other hand, and hold it in place with a finger while it expands into your ear.

Trainer's note: *Have volunteers help you demonstrate how to wear and adjust HPDs*.

Quiz: Have you heard about hearing conservation?

For each question, show if you think the statement is ″True″ or ″False.″

1. Noise can cause temporary hearing problems. True/False
2. Putting a noisy machine on a rubber mat can help reduce noise. True/False
3. Employees have to buy the earplugs they use. True/False
4. You don't need a hearing test to know if you're losing your hearing. True/False
5. Employees have to stay away while noise monitoring is done. True/False

Name: _____ Date: _____

Answers to Quiz

1. True
2. True
3. False
4. False
5. False

Answers to questions your employees may ask (NIOSH)

Q: Don't we lose our hearing as we age?

A: It's true that most people's hearing test gets worse as they get older. But for the average person, aging does not cause impaired hearing before at least the age of 60. People who are not exposed to noise and are otherwise healthy, keep their hearing for many years.

People who are exposed to noise and do not protect their hearing begin to lose their hearing at an early age. For example, by age 25 the average carpenter has ″50-year old″ ears! That is, by age 25, the average carpenter has the same hearing as someone who is 50 years old and has worked in a quiet job.

Q: Can you poke out your eardrums with earplugs?

A: That is unlikely for two reasons. First, the average ear canal is about 1¼ inches long. The typical ear plug is between ½ to ¾ inch long. So even if you inserted the entire earplug, it would still not touch the eardrum. Second, the path from the opening of the ear canal to the eardrum is not straight. In fact, it is quite irregular. This prevents you from poking objects into the eardrum.

Q: We work in a dusty, dirty place. Should I worry that our ears will get infected by using earplugs?

A: Using earplugs will not cause an infection. But use common sense. Have clean hands when using earplugs that need to be rolled or formed with your fingers in order for you to insert them. If this is inconvenient, there are plenty of earplugs that are pre-molded or that have stems so that you can insert them without having to touch the part that goes into the ear canal.

Q: Can you hear warning sounds, such as backup beeps, when wearing hearing protectors?

A: The fact is that there are fatal injuries because people do not hear warning sounds. However, this is usually because the background noise was too high or because the person had severe hearing loss, not because someone was wearing hearing protectors. Using hearing protectors will bring both the noise and the warning sound down equally.

So if the warning sound is audible without the hearing protector, it will usually be audible when wearing the hearing protector. For the unusual situations where this is not the case, the solution may be as simple as using a different hearing protector. Also, many warning systems can be adjusted or changed so warning signals are easier to detect.

Q: Won't hearing protectors interfere with our ability to hear important sounds our machinery and equipment make?

A: Hearing protectors will lower the noise level of your equipment; it won't eliminate it. However, some hearing protectors will reduce certain frequencies more than others; so wearing them can make noises sound different. In cases where it's important that the sound just be quieter without any other changes, there are hearing protectors that can provide flat attenuation.

There are also noise-activated hearing protectors that allow normal sounds to pass through the ear and only ″turn-on″ when the noise reaches hazardous levels. There are even protectors that professional concert musicians use that can lower the sound level while retaining sound fidelity.

Q: Will we be able to hear each other talk when wearing hearing protectors?

A: Some people find they can wear hearing protectors and still understand speech. Others will have trouble hearing speech while wearing hearing protectors. Being able to hear what other people say depends on many things: distance from the speaker, ability to see the speaker's face, general familiarity with the topic, level of background noise, and whether or not one has an existing hearing impairment. In some cases, wearing hearing protectors can make it easier to understand speech.

In other instances, people may be using hearing protectors to keep out too much sound. You may need a protector that reduces the sound enough to be safe without reducing the sound too much to hear speech at a comfortably loud level. For those people who work in noise and must communicate, it may also be necessary to use communication headsets. Allow your employees to try different protectors. Some will work better than others at helping them to hear speech, and different protectors may work better for different people.

Q: How long does it take to get used to hearing protectors?

A: Think about getting a new pair of shoes. Some shoes take no time to get used to. Others, even though they are the right size, can take a while to get used to. Hearing protectors are no different from other safety equipment in terms of getting used to them. But if hearing protectors are the wrong size, or are worn out, they will not be comfortable.

Also, workers may need more than one kind of protector at their job. For example, no one would wear golf shoes to go bowling. If hearing protectors are not suitable for the work being done, they probably won't feel comfortable.

Q: How long can someone be in a loud noise before it's hazardous?

A: The degree of hearing hazard is related to both the level of the noise as well as to the duration of the exposure. But this question is like asking how long can people look at the sun without damaging their eyes. The safest thing to do is to ensure workers always protect their ears by wearing hearing protectors anytime they are around loud noise.

Q: How can I tell if a noise situation is too loud?

A: There are two rules: First, if you have to raise your voice to talk to someone who is an arm's length away, then the noise is likely to be hazardous. Second, if your ears are ringing or sounds seem dull or flat after leaving a noisy place, then you probably were exposed to hazardous noise.

Q: How often should your hearing be tested?

A: Anyone regularly exposed to hazardous noise should have an annual hearing test. Also, anyone who notices a change in his/her hearing (or who develops tinnitus) should have his or her ears checked. People who have healthy ears and who are not exposed to hazardous noise should get a hearing test every three years.

Q: Since I already have hearing loss and wear a hearing aid, hearing prevention programs don't apply to me, right?

A: If you have hearing loss, it's important to protect the hearing that you have left. Loud noises can continue to damage your hearing making it even more difficult to communicate at work and with your family and friends.

Program evaluation checklist

Use the following NIOSH checklist to evaluate your hearing conservation program.

Training and education

Failures or deficiencies in hearing conservation programs (hearing loss prevention programs) can often be traced to inadequacies in the training and education of noise-exposed employees and those who conduct elements of the program.

1. Has training been conducted at least once a year?
2. Was the training provided by a qualified instructor?
3. Was the success of each training program evaluated?
4. Is the content revised periodically?
5. Are managers and supervisors directly involved?
6. Are posters, regulations, handouts, and employee newsletters used as supplements?
7. Are personal counseling sessions conducted for employees having problems with hearing protection devices or showing hearing threshold shifts?

Supervisor involvement

Data indicate that employees who refuse to wear hearing protectors or who fail to show up for hearing tests frequently work for supervisors who are not totally committed to the hearing loss prevention programs.

1. Have supervisors been provided with the knowledge required to supervise the use and care of hearing protectors by subordinates?
2. Do supervisors wear hearing protectors in appropriate areas?
3. Have supervisors been counseled when employees resist wearing protectors or fail to show up for hearing tests?
4. Are disciplinary actions enforced when employees repeatedly refuse to wear hearing protectors?

Noise measurement

For noise measurements to be useful, they need to be related to noise exposure risks or the prioritization of noise control efforts, rather than merely filed away. In addition, the results need to be communicated to the appropriate personnel, especially when follow-up actions are required.

1. Were the essential/critical noise studies performed?
2. Was the purpose of each noise study clearly stated? Have noise-exposed employees been notified of their exposures and appraised of auditory risks?

3. Are the results routinely transmitted to supervisors and other key individuals?
4. Are results entered into health/medical records of noise exposed employees?
5. Are results entered into shop folders?
6. If noise maps exist, are they used by the proper staff?
7. Are noise measurement results considered when contemplating procurement of new equipment? Modifying the facility? Relocating employees?
8. Have there been changes in areas, equipment, or processes that have altered noise exposure? Have follow-up noise measurements been conducted?
9. Are appropriate steps taken to include (or exclude) employees in the hearing loss prevention programs whose exposures have changed significantly?

Engineering and administrative controls

Controlling noise by engineering and administrative methods is often the most effective means of reducing or eliminating the hazard. In some cases engineering controls will remove requirements for other components of the program, such as audiometric testing and the use of hearing protectors.

1. Have noise control needs been prioritized?
2. Has the cost-effectiveness of various options been addressed?
3. Are employees and supervisors appraised of plans for noise control measures? Are they consulted on various approaches?
4. Will in-house resources or outside consultants perform the work?
5. Have employees and supervisors been counseled on the operation and maintenance of noise control devices?
6. Are noise control projects monitored to ensure timely completion?
7. Has the full potential for administrative controls been evaluated? Are noisy processes conducted during shifts with fewer employees? Do employees have sound-treated lunch or break areas?

Monitoring audiometry and recordkeeping

The skills of audiometric technicians, the status of the audiometer, and the quality of audiometric test records are crucial to hearing loss prevention program success. Useful information may be ascertained from the audiometric records as well as from those who actually administer the tests.

1. Has the audiometric technician been adequately trained, certified, and recertified as necessary?
2. Do on-the-job observations of the technicians indicate that they perform a thorough and valid audiometric test, instruct and consult the employee effectively, and keep appropriate records?
3. Are records complete?
4. Are follow-up actions documented?
5. Are hearing threshold levels reasonably consistent from test to test? If not, are the reasons for inconsistencies investigated promptly?
6. Are the annual test results compared to baseline to identify the presence of an OSHA standard threshold shift?
7. Is the annual incidence of standard threshold shift greater than a few percent? If so, are problem areas pinpointed and remedial steps taken?

8. Are audiometric trends (deteriorations) being identified, both in individuals and in groups of employees? (NIOSH recommends no more than 5% of workers showing 15 dB Significant Threshold Shift, same ear, same frequency.)
9. Do records show that appropriate audiometer calibration procedures have been followed?
10. Is there documentation showing that the background sound levels in the audiometer room were low enough to permit valid testing?
11. Are the results of audiometric tests being communicated to supervisors and managers as well as to employees?
12. Has corrective action been taken if the rate of no-shows for audiometric test appointments is more than about 5%?
13. Are employees incurring STS notified in writing within at least 21 days? (NIOSH recommends immediate notification if retest shows 15 dB Significant Threshold Shift, same ear, same frequency.)

Referrals

Referrals to outside sources for consultation or treatment are sometimes in order, but they can be an expensive element of the hearing loss prevention program, and should not be undertaken unnecessarily.

1. Are referral procedures clearly specified?
2. Have letters of agreement between the company and consulting physicians or audiologists been executed?
3. Have mechanisms been established to ensure that employees needing evaluation or treatment actually receive the service (i.e., transportation, scheduling, reminders)?
4. Are records properly transmitted to the physician or audiologist, and back to the company?
5. If medical treatment is recommended, does the employee understand the condition requiring treatment, the recommendation, and methods of obtaining such treatment?
6. Are employees being referred unnecessarily?

Hearing protection devices

When noise control measures are infeasible, or until such time as they are installed, hearing protection devices are the only way to prevent hazardous levels of noise from damaging the inner ear. Making sure that these devices are worn effectively requires continuous attention on the part of supervisors and program implementers as well as noise-exposed employees.

1. Have hearing protectors been made available to all employees whose daily average noise exposures are 85 dBA or above? (NIOSH recommends requiring HPD use if noises equal or exceed 85 dBA regardless of exposure time.)
2. Are employees given the opportunity to select from a variety of appropriate protectors?
3. Are employees fitted carefully with special attention to comfort?
4. Are employees thoroughly trained, not only initially but at least once a year?
5. Are the protectors checked regularly for wear or defects, and replaced immediately if necessary?
6. If employees use disposable hearing protectors, are replacements readily available?
7. Do employees understand the appropriate hygiene requirements?

8. Have any employees developed ear infections or irritations associated with the use of hearing protectors? Are there any employees who are unable to wear these devices because of medical conditions? Have these conditions been treated promptly and successfully?
9. Have alternative types of hearing protectors been considered when problems with current devices are experienced?
10. Do employees who incur noise-induced hearing loss receive intensive counseling?
11. Are those who fit and supervise the wearing of hearing protectors competent to deal with the many problems that can occur?
12. Do workers complain that protectors interfere with their ability to do their jobs? Do they interfere with spoken instructions or warning signals? Are these complaints followed promptly with counseling, noise control, or other measures?
13. Are employees encouraged to take their hearing protectors home if they engage in noisy non-occupational activities?
14. Are new types of or potentially more effective protectors considered as they become available?
15. Is the effectiveness of the hearing protector program evaluated regularly?
16. Have at-the-ear protection levels been evaluated to ensure that either over or under protection has been adequately balanced according to the anticipated ambient noise levels?
17. Is each hearing protector user required to demonstrate that he or she understands how to use and care for the protector? The results documented?

Administrative

Keeping organized and current on administrative matters will help the program run smoothly.

1. Have there been any changes in federal or state regulations? Have hearing loss prevention program's policies been modified to reflect these changes?
2. Are copies of company policies and guidelines regarding the hearing loss prevention program available in the offices that support the various program elements? Are those who implement the program elements aware of these policies? Do they comply?
3. Are necessary materials and supplies being ordered with a minimum of delay?
4. Are procurement officers overriding the hearing loss prevention program implementer's requests for specific hearing protectors or other hearing loss prevention equipment? If so, have corrective steps been taken?
5. Is the performance of key personnel evaluated periodically? If such performance is found to be less than acceptable, are steps taken to correct the situation?
6. Safety: Has the failure to hear warning shouts or alarms been tied to any accidents or injuries? If so, have remedial steps been taken?

Hearing Conservation Program

Administration

This written hearing conservation plan serves as a record of the details of the hearing conservation program in place at this company. We have this program in place to protect the hearing of all employees in the company. Elements of our hearing conservation program include:

- Monitoring,

- Audiometric testing program,
- Hearing protection,
- Training and information, and
- Recordkeeping.

_____ has overall responsibility for coordinating safety and health programs in this company. _____ is the person having overall responsibility for the Hearing Conservation Program. _____ will review and update the program, as necessary.

Copies of the written program may be obtained from _____ .

Monitoring

The monitoring program is in place to provide an ongoing means of determining employee exposure to noise and protect employees based on excessive exposure. When monitoring information indicates that any employee's exposure equals or exceeds an 8-hour time-weighted average of 85 decibels, the employee is included in the hearing conservation program.

To determine employee exposure to noise, we use the following type of calibrated equipment: _____ . The company notifies all employees exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring by the following method. _____ .

The company provides an opportunity in the following way for affected employees or their representatives to observe any noise measurements conducted: _____ .

Appropriate hearing devices are selected for employees in the Hearing Conservation Program by the following method: _____ .

Monitoring is repeated whenever a change in production, process, equipment, or controls increases noise exposures to the extent that either additional employees may be exposed at or above the action level or the attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements of noise reduction.

The audiometric testing program is in place and available at no cost to all affected employees to ensure that noise exposures are kept at proper levels.

Audiometric testing

The program ensures that a valid baseline audiogram is established for exposed employees within six months of their first exposure (or within one year if mobile vans are used, with employees wearing hearing protection for any period exceeding six months) by the following method: _____ .

Audiometric testing is repeated _____ .

The company determines if a standard threshold shift (STS) has occurred by _____ .

If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the company informs the employee of the new audiometric interpretation by _____ and discontinues the required use of hearing protectors for that employee.

Hearing protection

The company makes hearing protectors available to all employees exposed to an 8-hour TWA of 85 decibels or greater at no cost to the employees, according to the following procedures: _____ .

The company ensures the use of available hearing protection by all affected employees by: _____ .

The company ensures that employees have a variety of suitable protectors that attenuate (lower) employee exposure at least to an 8-hour time-weighted average of 90 decibels, or 85 decibels or lower for employees who have experienced a standard threshold shift in their hearing, according to the following method: ____ .

Appropriate hearing protectors available for employees to choose from include: _____ .

The company ensures evaluation for adequacy of the hearing protection attenuation for the specific noise environments in which the protector will be used, according to specifications given in an appendix to the standard, by: _____ .

The company reevaluates attenuation whenever employee noise exposures increase to the extent that current hearing protectors no longer provide adequate attenuation, and then provides more effective hearing protection, according to the following method: _____ .

Training and information

_____ has a hearing protection training program for all employees exposed to noise at or above an 8-hour time-weighted average of 85 decibels.

We ensure employee participation in the hearing protection training program by: _____ .

Copies of the Occupational Noise Exposure standard are available to affected employees or their representatives.We also post copies of the standard in the following location(s): _____

_____ .

Refresher training is provided _____ . We ensure that the training material is updated to be consistent with changes in the protective equipment and work processes by: _____ .

According to the following method: _____ , we ensure that each affected employee is informed of at least the following information:

- The effects of noise on hearing;
- The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and
- The purpose of audiometric testing, and an explanation of test procedures.

We also make informational materials pertaining to the Occupational Noise Exposure standard that are supplied by OSHA available to affected employees or their representatives by: _____ .

Recordkeeping

Recordkeeping is an essential element of our Hearing Conservation Program. It is the means by which hearing levels are tracked and assessed over a period of years. _____ has in place measures to maintain comprehensive and up-to-date records.

_____ maintains accurate records of:

- Employee exposure measurements by: _____ .
- Employee audiometric test records by: _____ .

The company retains noise exposure measurement records and audiometric test records as required by OSHA. These records are made available to employees, former employees, representatives designated by the individual employee, and OSHA upon request, according to the following method: _____ .

OSHA COMPLIANCE MANUAL

COMBUSTIBLE DUST

OSHA COMPLIANCE MANUAL

Reserved

Combustible dust

Any combustible material (and some materials normally considered noncombustible) can burn rapidly when in a finely divided form. If such a dust is suspended in air in the right concentration, it can become explosive. The force from such an explosion can cause employee deaths, injuries, and destruction of entire buildings. Such incidents have killed scores of employees and injured hundreds over the past few decades.

In many accidents, employers and employees were unaware that a hazard even existed.

What dusts are combustible?

Normally, employers can rely on safety data sheets (SDSs) to find out information about the hazards of their materials. However, the Chemical Safety Board, who completed an extensive study in 2006 on combustible dust hazards, found that past MSDSs often were not sufficient in communicating combustible dust hazards—many fail to reference the appropriate NFPA standard for managing dust hazards and few list physical properties of combustible dusts or explain why dusty conditions should be avoided (to minimize secondary explosion potential). (OSHA has subsequently included combustible dust as meeting the definition of a hazardous chemical in the Hazard Communication standard; combustible dust hazards must be addressed on labels and SDSs by 2015. Label elements include the signal word “warning” and the hazard statement “May form combustible dust concentrations in the air”. For chemicals in a solid form that do not present a combustible dust hazard, but may form combustible dusts while being processed in normal downstream uses, OSHA allows the chemical manufacturer some flexibility in labeling requirements. The manufacturer or importer to may transmit the label to the customer at the time of the initial shipment, but the label does not need to be included with subsequent shipments unless it changes.)

The CSB says that there are a few factors that determine how explosive a dust can be, as well as some key measurements for determining dust explosibility. These include particle size, moisture content, ambient humidity, oxygen available for combustion, the shape of the dust particle, and the concentration of dust in the air (i.e., minimum explosive concentration or MEC).

The ease of ignition and severity of combustible dust explosion are typically influenced by particle size, the CSB notes. Finer particles are more explosive because they have large surface areas relative to their weight, allowing them to rapidly react with oxygen when dispersed in air and ignite. Combustible dusts with an average particle size smaller than 420 microns are considered by most reference sources to be explosive unless testing proves otherwise. (To put the size of a micron in rough perspective, the particle size of table salt is around 100 microns — the phenolic resin powders that caused a catastrophic explosion at an acoustics insulation manufacturer had a particle size of 10 to 50 microns in diameter, similar to talcum (baby) powder.)

A 2008 OSHA Poster on combustible dust lists the following as having the potential for a combustible dust explosion:

- **Agricultural products** - Egg white; powdered milk; nonfat dry milk; soy flour; corn starch; rice starch; wheat starch; sugar; milk sugar; beet sugar; tapioca; whey; and wood flour.
- **Agricultural dusts** - Alfalfa; apple; beet root; carrageen; carrot; cocoa bean dust; cocoa powder; coconut shell dust; coffee dust; corn meal; cornstarch; cotton; cottonseed; garlic powder; gluten; grass dust; green coffee; hops (malted); lemon peel dust; lemon pulp; linseed; locust bean gum; malt; oat flour; oat grain dust; olive pellets; onion powder; parsley (dehydrated); peach; peanut meal and skins; peat; potato; potato flour; potato starch; raw yucca seed dust; rice dust; rice flour; rice starch; rye flour; semolina; soybean dust; spice dust; spice powder; sugar (10x); sunflower; sunflower seed dust; tea; tobacco blend; tomato; walnut dust; wheet flour; wheet grain dust; wheat starch; xanthan gum.
- **Carbonaceous dusts** - Charcoal (activated and wood); bituminous coal; petroleum coke; lampblack; lignite; peat (22%H_20); pine soot; cellulose; cellulose pulp; cork; corn.
- **Chemical dusts** - Adipic acid; anthraquinone; ascorbic acid; calcium acetate; calcium stearate;

carboxy-methylcellulose; dextrin; lactose; lead stearate; methyl-cellulose; paraformaldehyde; sodium ascorbate; sodium stearate; sulfur.

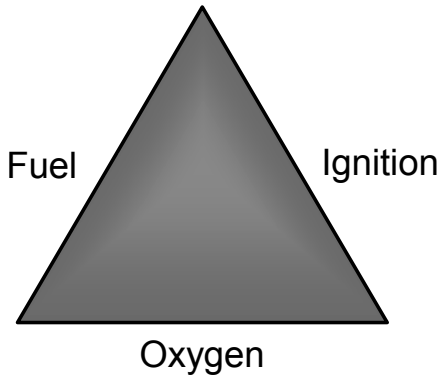
- **Metal dusts** - Aluminum; bronze; iron carbonyl; magnesium; zinc.
- **Plastic dusts** - (poly) Acrylamide; (poly) acrylonitrile; (poly) ethylene (low-pressure process); epoxy resin; melamine resin; melamine, molded (phenol-cellulose); melamine, molded (wood flour and mineral filled phenol-formaldehyde); (poly) methyl acrylate; (poly) methyl acrylate, emulsion polymer; phenolic resin; (poly) propylene; terpene-phenol resin; urea-formaldehyde/cellulose, molded; (poly) vinyl acetate/ethylene copolymer; (poly) vinyl alcohol; (poly) vinyl butyral; (poly) vinyl chloride/ethylene/vinyl acetylene suspension copolymer; (poly) vinyl chloride/vinyl acetylene emulsion copolymer.

How much dust does it take?

Even seemingly small amounts of accumulated dust can cause catastrophic damage. The CSB estimated, for example, that the explosion that devastated a pharmaceutical plant in 2003 and killed six employees was caused by dust accumulations mainly under 0.25 inches deep. The CSB study references National Fire Protection Administration (NFPA) warnings that a catastrophic explosion can occur from as little as 1/32 of an inch of accumulated dust (around the thickness of a dime) covering just 5 percent of a room's surface.

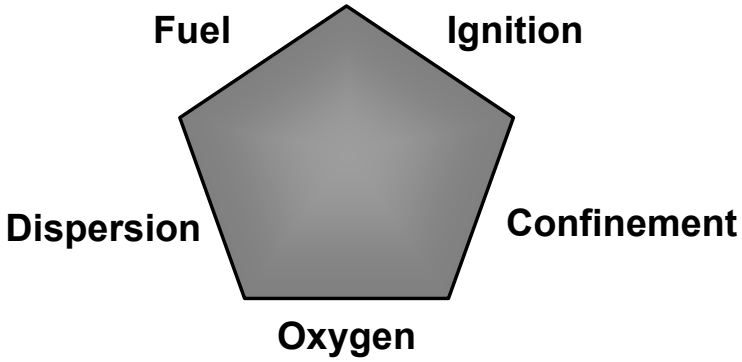
How do dust fires/explosions occur?

Like all fires, a dust **fire** occurs when fuel (the combustible dust) is exposed to heat (an ignition source) in the presence of oxygen (air). Removing any one of these elements of the classic fire triangle eliminates the possibility of a fire.



Classic fire triangle

The CSB says that a dust **explosion** requires the simultaneous presence of two additional elements — dust suspension and confinement. Suspended dust burns more rapidly, and confinement allows for pressure buildup. Removal of either the suspension or the confinement elements prevents an explosion, although a fire may still occur. Further, the concentration of suspended dust must be within an explosible range for an explosion to occur. This is analogous to the flammability range commonly used for vapors (such as natural gas and propane).



Dust explosion pentagon

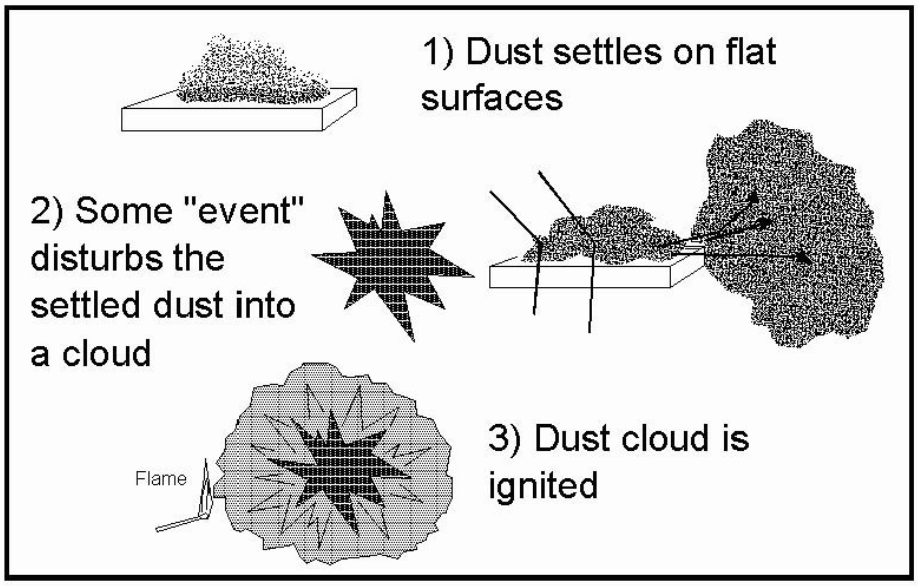
Types of dust explosions

Generally speaking, there are two types of dust explosions, primary and secondary. Secondary explosions are often the most damaging.

A **primary** dust explosion occurs when a dust suspension within a container, room, or piece of equipment is ignited and explodes.

The pressure wave from the first (or primary) explosion often shakes loose dust from flat building surfaces, forming a cloud that can be ignited by the flame following it. This phenomenon is called a **secondary** explosion.

The CSB says that the best way to prevent secondary dust explosions is to minimize dust accumulations. Ensuring good housekeeping, designing and maintaining equipment to prevent dust leaks, using dust collectors, eliminating flat surfaces and other areas where dust can accumulate, and sealing hard-to-clean areas (such as the area above a suspended ceiling) can effectively prevent secondary dust explosions. However, the CSB and NFPA note that proper equipment and techniques to clean combustible dust accumulations must be used, for example minimizing dust clouds and making sure that vacuum cleaners are approved for combustible dust locations.



Secondary dust explosion

Dust explosions through ducting

The CSB notes that some incidents involved dust explosions that spread through pipes or vent ducts, from one piece of equipment to other equipment or other areas of the facility. In many cases, the pressure can increase as the explosion moves from one location to the next, increasing the damage. The NFPA standards for dust collectors consider the risk of propagation, with recommendations to provide isolation valves or distance to minimize chances of a dust explosion spreading to areas where workers may be present.

Applicable OSHA requirements

Currently, OSHA does not have a standard that comprehensively addresses combustible dust. However, there are several applicable OSHA requirements related to combustible dust hazards, including:

- General Duty Clause, Section 5(a)(1) of the Occupational Safety and Health Act (Employers must keep workplaces free from recognized hazards likely to cause death or serious physical harm)
- §1910.22 General requirements (See Housekeeping)
- §1910.38 Emergency action plans
- §1910.39 Fire prevention plans
- §1910.94 Ventilation
- §1910.157 Portable fire extinguishers
- §1910.178 Powered industrial trucks
- §1910.269 Electric power generation, transmission and distribution (See Coal and ash handling)
- §1910.272 Grain handling facilities
- §1910.307 Electrical - Hazardous (classified) locations
- §1910.1200 Hazard Communication

Industry consensus standards

In addition to OSHA standards, there are several industry consensus standards that address combustible dust issues. The primary National Fire Protection Association consensus standards and documents related to this hazard (see www.nfpa.org to view NFPA standards) are:

- NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids*
- NFPA 61, *Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities*
- NFPA 68, *Standard on Explosion Protection by Deflagration Venting*
- NFPA 69, *Standard on Explosion Prevention Systems*
- NFPA 484, *Standard for Combustible Metals*
- NFPA 499, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*
- NFPA 655, *Standard for the Prevention of Sulfur Fires and Explosions*
- NFPA 664, *Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities*
- NFPA Fire Protection Handbook

In addition to NFPA standards, OSHA has also referenced FM 7-76, *Prevention and Mitigation of Combustible Dust Explosions and Fires*, Loss Prevention Data Sheet 7-76. FM Global, 2001.

State and local fire codes also apply. The two predominant model fire codes which have been adopted by many jurisdictions in this country are the International Code Council's International Fire Code® and NFPA's Uniform Fire Code®. Both of these model codes reference many of the NFPA consensus standards related to dust explosion prevention and mitigation.

Dust hazard assessments

OSHA says that a qualified team of managers should be responsible for conducting a facility analysis (or for having one done by qualified outside persons) prior to the introduction of a hazard and for developing a prevention and protection scheme tailored to their operation. OSHA recommends that facilities carefully identify the following in order to assess their potential for dust explosions:

- Materials that can be combustible when finely divided;
- Processes which use, consume, or produce combustible dusts;
- Open areas where combustible dusts may build up;
- Areas requiring special electrical equipment classification (Class II locations) due to the presence (or potential presence) of combustible dust;
- Hidden areas where combustible dusts may accumulate;
- Means by which dust may be dispersed in the air; and
- Potential ignition sources (for example, welding, cigarettes, hot surfaces, and electrical switch/outlet activation).

Controlling dust

In a 2008 Fact Sheet, OSHA recommends that employers consider the following to control dust:

- Implement a hazardous dust inspection, testing, housekeeping, and control program;
- Use proper dust collection systems and filters;
- Minimize the escape of dust from process equipment or ventilation systems;
- Use surfaces that minimize dust accumulation and facilitate cleaning;
- Provide access to all hidden areas to permit inspection;
- Inspect for dust residues in open and hidden areas at regular intervals;
- If ignition sources are present, use cleaning methods that do not generate dust clouds;
- Use only vacuum cleaners approved for dust collection; and
- Locate relief valves away from dust deposits.

Ignition control

With regards to ignition control, OSHA recommends:

- Use appropriate electrical equipment and wiring methods;
- Control static electricity, including bonding of equipment to ground;
- Control smoking, open flames, and sparks;
- Control mechanical sparks and friction;
- Use separator devices to remove foreign materials capable of igniting combustibles from process materials;
- Separate heated surfaces from dusts;
- Separate heating systems from dusts;
- Select and use industrial trucks properly;
- Use cartridge activated tools properly; and
- Use an equipment preventive maintenance program.

Injury and damage control

To control injuries and damage, OSHA recommends:

- Separation of the hazard (isolate with distance);
- Segregation of the hazard (isolate with a barrier);
- Deflagration isolation/venting;
- Pressure relief venting for equipment;
- Directing vents away from work areas;
- Specialized fire suppression systems;
- Explosion protection systems;
- Spark/ember detection for suppression activation;
- Emergency action plan development; and

- Maintenance of emergency exit routes.

Training

Workers are the first line of defense in preventing and mitigating fires and explosions. If the people closest to the source of the hazard are trained to recognize and prevent hazards associated with combustible dust in the plant, they can be instrumental in recognizing unsafe conditions, taking preventative action, and/or alerting management. While OSHA standards require training for certain employees, all employees should be trained in safe work practices applicable to their job tasks, as well as on the overall plant programs for dust control and ignition source control. They should be trained before they start work, periodically to refresh their knowledge, when reassigned, and when hazards or processes change. Employers with hazardous chemicals (including combustible dusts) in their workplaces are required to comply with 29 CFR 1910.1200, the Hazard Communication standard. This includes having labels on containers of hazardous chemicals, using safety data sheets, and providing employee training.

Supervisors and managers should be aware of and support the plant dust and ignition control programs. Their training should include identifying how they can encourage the reporting of unsafe practices and facilitate abatement actions.

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Emergency action plans (EAPs)

Introduction

Nobody expects an emergency or disaster — especially one that affects them, their employees, and their business personally. Yet the simple truth is that emergencies and disasters can strike anyone, anytime, and anywhere. You and your employees could be forced to evacuate your company when you least expect it. The best way to protect yourself, your workers, and your business is to expect the unexpected and develop a well-thoughtout emergency action plan to guide you when immediate action is necessary.

Workplace emergency

A workplace emergency is an unforeseen situation that threatens your employees, customers, or the public; disrupts or shuts down your operations; or causes physical or environmental damage. Emergencies may be natural or manmade and include the following:

- Floods,
- Hurricanes,
- Tornadoes,
- Fires,
- Toxic gas releases,
- Chemical spills,
- Radiological accidents,
- Explosions,
- Civil disturbances, and
- Workplace violence resulting in bodily harm and trauma.

The best way is to prepare to respond to an emergency before it happens. Few people can think clearly and logically in a crisis, so it is important to do so in advance, when you have time to be thorough.

Brainstorm the worst-case scenarios. Ask yourself what you would do if the worst happened. What if a fire broke out in your boiler room? Or a hurricane hit your building head-on? Or a train carrying hazardous waste derailed while passing your loading dock? Once you have identified potential emergencies, consider how they would affect you and your workers and how you would respond.

Emergency action plan

An emergency action plan covers designated actions employers and employees must take to ensure employee safety from fire and other emergencies. Even if you are not specifically required to do so, compiling an emergency action plan is a good way to protect yourself, your employees, and your business during an emergency.

Putting together a comprehensive emergency action plan that deals with all types of issues specific to your worksite is not difficult.

You may find it beneficial to include the management team and employees in the process. Explain your goal of protecting lives and property in the event of an emergency, and ask for their help in establishing and implementing the emergency action plan. Their commitment and support are critical to the plan's success.

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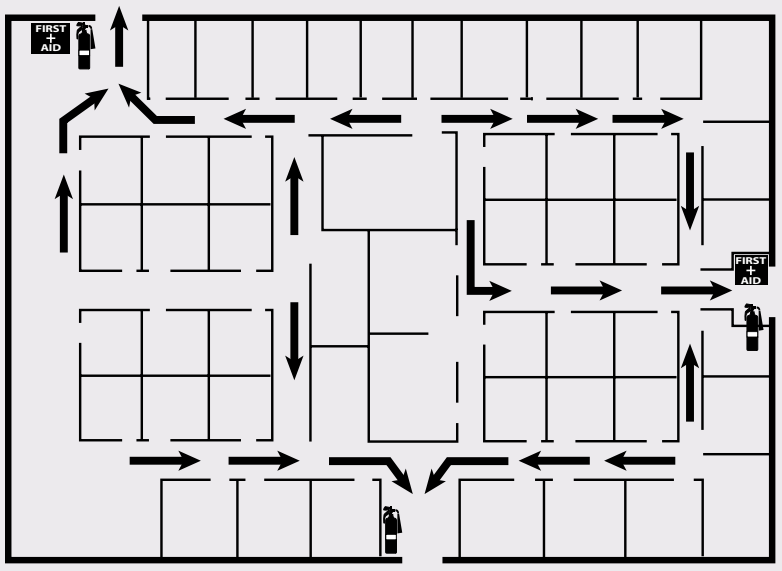
What to include in an emergency action plan

When developing an emergency action plan, it's a good idea to look at a wide variety of potential emergencies that could occur in the workplace. It should be tailored to your worksite and include information about all potential sources of emergencies. Developing an emergency action plan means you should do a hazard assessment to determine what, if any, physical or chemical hazards in your workplaces could cause an emergency. If you have more than one worksite, each site should have an emergency action plan.

At a minimum, the emergency action plan must include the following:

- A preferred method for reporting fires and other emergencies;
- An evacuation policy and procedure;
- Emergency escape procedures and route assignments, such as floor plans, workplace maps, and safe or refuge areas;



- Names, titles, departments, and telephone numbers of individuals both within and outside your company to contact for additional information or explanation of duties and responsibilities under the emergency plan;
- Procedures for employees who remain to perform or shut down critical plant operations, operate fire extinguishers, or perform other essential services that cannot be shut down for every emergency alarm before evacuating; and
- Rescue and medical duties for any workers designated to perform them.

You also may want to consider designating an assembly location and procedures to account for all employees after an evacuation.

In addition, although they are not specifically required by OSHA, you may find it helpful to include in your plan the following:

- The site of an alternative communications center to be used in the event of a fire or explosion; and
- A secure on- or offsite location to store originals or duplicate copies of accounting records, legal documents, your employees' emergency contact lists, and other essential records.

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Alerting employees to an emergency

The plan must include a way to alert employees, including disabled workers, to evacuate or take other action, and how to report emergencies. Some steps to take include the following:

- Make sure alarms are distinctive and recognized by all employees as a signal to evacuate the work area or perform actions identified in your plan;
- Make available an emergency communications system such as a public address system, portable radio unit, or other means to notify employees of the emergency and to contact local law enforcement, the fire department, and others; and
- Stipulate that alarms must be able to be heard, seen, or otherwise perceived by everyone in the workplace. You might want to consider providing an auxiliary power supply in the event that electricity is shut off.

Although it is not specifically required by OSHA, consider the following:

- Using tactile devices to alert employees who would not otherwise be able to recognize an audible or visual alarm; and
- Providing an updated list of key personnel such as the plant manager or physician, in order of priority, to notify in the event of an emergency during off-duty hours.

Developing an evacuation policy and procedures

A disorganized evacuation can result in confusion, injury, and property damage. That is why when developing your emergency action plan it is important to determine the following:

- Conditions under which an evacuation would be necessary;
- A clear chain of command and designation of the person in your business authorized to order an evacuation or shutdown. You may want to designate an "evacuation warden" to assist others in an evacuation and to account for personnel;
- Specific evacuation procedures, including routes and exits. Post these procedures where they are easily accessible to all employees;
- Procedures for assisting people with disabilities or who do not speak English;
- Designation of what, if any, employees will continue or shut down critical operations during an evacuation. These people must be capable of recognizing when to abandon the operation and evacuate themselves; and
- A system for accounting for personnel following an evacuation. Consider employees' transportation needs for community-wide evacuations.

When to call for an evacuation

In the event of an emergency, local emergency officials may order evacuation of the premises. In some cases, they may instruct you to shut off the water, gas, and electricity. If you have access to radio or television, listen to newscasts to keep informed and follow whatever official orders you receive.

In other cases, a designated person within your business should be responsible for making the decision to evacuate or shut down operations. Protecting the health and safety of everyone in the facility should be the first priority. In the event of a fire, an immediate evacuation to a predetermined area away from the facility is the best way to protect employees. On the other hand, evacuating employees may not be the best response to an emergency such as a toxic gas release at a facility across town from your business.

The type of building you work in may be a factor in your decision. Most buildings are vulnerable to the effects of disasters such as tornadoes, earthquakes, floods, or explosions. The extent of the damage depends on the type of emergency and the building's construction. Modern factories and office buildings, for example, are framed in steel and are structurally more sound than neighborhood business premises may be. In a disaster such as a major earthquake or explosion, however, nearly every type of structure will be affected. Some buildings will collapse and others will be left with weakened floors and walls.

The role of coordinators and evacuation wardens during an emergency

When drafting an emergency action plan, select a responsible individual to lead and coordinate your emergency plan and evacuation. It is critical that employees know who the coordinator is and understand that person has the authority to make decisions during emergencies.

The coordinator should be responsible for the following:

- Assessing the situation to determine whether an emergency exists requiring activation of your emergency procedures;
- Supervising all efforts in the area, including evacuating personnel;
- Coordinating outside emergency services, such as medical aid and local fire departments, and ensuring that they are available and notified when necessary; and
- Directing the shutdown of plant operations when required.

You also may find it beneficial to coordinate the action plan with other employers when several employers share the worksite, although OSHA standards do not specifically require this.

In addition to a coordinator, designate evacuation wardens to help move employees from danger to safe areas during an emergency. Generally, one warden for every 20 employees should be adequate, and the appropriate number of wardens should be available at all times during working hours.

Employees designated to assist in emergency evacuation procedures should be trained in the complete workplace layout and various alternative escape routes. All employees and those designated to assist in emergencies should be made aware of employees with special needs who may require extra assistance, how to use the buddy system, and hazardous areas to avoid during an emergency evacuation.

Establishing evacuation routes and exits

When preparing your emergency action plan, designate primary and secondary evacuation routes and exits. To the extent possible under the conditions, ensure that evacuation routes and emergency exits meet the following conditions:

- Clearly marked and well lit;
- Wide enough to accommodate the number of evacuating personnel;
- Unobstructed and clear of debris at all times; and
- Unlikely to expose evacuating personnel to additional hazards.

If you prepare drawings that show evacuation routes and exits, post them prominently for all employees to see.

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Accounting for employees after an evacuation

Accounting for all employees following an evacuation is critical. Confusion in the assembly areas can lead to delays in rescuing anyone trapped in the building, or unnecessary and dangerous search-and-rescue operations. To ensure the fastest, most accurate accountability of your employees, you may want to consider including these steps in your emergency action plan:

- Designate assembly areas where employees should gather after evacuating;
- Take a head count after the evacuation. Identify the names and last known locations of anyone not accounted for and pass them to the official in charge;
- Establish a method for accounting for non-employees such as suppliers and customers; and
- Establish procedures for further evacuation in case the incident expands. This may consist of sending employees home by normal means or providing them with transportation to an offsite location.

Planning for rescue operations

It takes more than just willing hands to save lives. Untrained individuals may endanger themselves and those they are trying to rescue. For this reason, it is generally wise to leave rescue work to those who are trained, equipped, and certified to conduct rescues.

If you have operations that take place in permit-required confined spaces, you may want your emergency action plan to include rescue procedures that specifically address entry into each confined space.

Medical assistance to provide during an emergency

If your company does not have a formal medical program, you may want to investigate ways to provide medical and first aid services. If medical facilities are available near your worksite, you can make arrangements for them to handle emergency cases. Provide your employees with a written emergency medical procedure to minimize confusion during an emergency.

If an infirmary, clinic, or hospital is not close to your workplace, ensure that onsite person(s) have adequate training in first aid. The American Red Cross, some insurance providers, local safety councils, fire departments, or other resources may be able to provide this training. Treatment of a serious injury should begin within 3 to 4 minutes of the accident.

Consult with a physician to order appropriate first aid supplies for emergencies. Medical personnel must be accessible to provide advice and consultation in resolving health problems that occur in the workplace. Establish a relationship with a local ambulance service so transportation is readily available for emergencies.

Employees' role in the emergency action plan

The best emergency action plans include employees in the planning process, specify what employees should do during an emergency, and ensure that employees receive proper training for emergencies. When you include your employees in your planning, encourage them to offer suggestions about potential hazards, worst-case scenarios, and proper emergency responses. After developing the plan, review it with employees to make sure everyone knows what to do before, during and after an emergency.

Keep a copy of the emergency action plan in a convenient location where employees can get to it, or provide all employees a copy. If you have 10 or fewer employees, you may communicate your plan orally.

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Employee information

In the event of an emergency, it could be important to have ready access to important personal information about employees. This includes their home telephone numbers, the names and telephone numbers of their next of kin, and medical information.

Employee training

OSHA requires that employers train designated employees to assist in the safe and orderly evacuation of other employees. Educate all employees about the types of emergencies that may occur and train them in the proper course of action. The size of the workplace and workforce, processes used, materials handled, and the availability of onsite or outside resources will determine training requirements. Be sure all employees understand the function and elements of the emergency action plan, including types of potential emergencies, reporting procedures, alarm systems, evacuation plans, and shutdown procedures. Discuss any special onsite hazards such as flammable materials, toxic chemicals, radioactive sources, or water-reactive substances. Clearly communicate who will be in charge during an emergency to minimize confusion.

General employee training should address:

- Individual roles and responsibilities;
- Threats, hazards, and protective actions;
- Notification, warning, and communications procedures;
- Means for locating family members in an emergency;
- Emergency response procedures;
- Evacuation, shelter, and accountability procedures;
- Location and use of common emergency equipment; and
- Emergency shutdown procedures.

You also may wish to train your employees in first aid procedures, including protection against bloodborne pathogens; respiratory protection, including use of an escape-only respirator; and methods for preventing unauthorized access to the site.

Once you have reviewed the emergency action plan with employees and everyone has had the proper training, it is a good idea to hold practice drills as often as necessary to keep employees prepared. Include outside resources such as fire and police departments when possible. After each drill, gather management and employees to evaluate the effectiveness of the drill. Identify the strengths and weaknesses of the plan and work to improve it.

Employee refresher training

Review the plan with all employees and consider implementing annual training in the plan (annual refresher training, however, is not required by OSHA). Also offer training when you:

- Develop the initial plan;
- Hire new employees;
- Introduce new equipment, materials, or processes into the workplace that affect evacuation routes;
- Change the layout or design of the facility; and
- Revise or update your emergency procedures.

Including hazardous substances in the plan

No matter what kind of business you run, you could potentially face an emergency involving hazardous materials such as flammable, explosive, toxic, noxious, corrosive, biological, oxidizable, or radioactive substances.

The source of the hazardous substances could be external, such as a local chemical plant that catches on fire or an oil truck that overturns on a nearby freeway. The source may be within your physical plant. Regardless of the source, these events could have a direct impact on your employees and your business and should be addressed by the emergency action plan.

If you use or store hazardous substances at your worksite, there is an increased risk of an emergency involving hazardous materials and this possibility should be addressed in your emergency action plan. OSHA's Hazard Communication Standard (1910.1200) requires employers who use hazardous chemicals to inventory them, keep the manufacturer-supplied Material Safety Data Sheets (MSDSs) for them in a place accessible to workers, label containers of these chemicals with their hazards, and train employees in ways to protect themselves against those hazards. A good way to start is to determine from your hazardous chemical inventory what hazardous chemicals you use and to gather the MSDSs for the chemicals. MSDSs describe the hazards that a chemical may present, list the precautions to take when handling, storing, or using the substance, and outline emergency and first-aid procedures.

For specific information on how to respond to emergencies involving hazardous materials and hazardous waste operations, refer to 1910.120(q).

Providing special equipment for emergencies

Employees may need personal protective equipment to evacuate during an emergency. Personal protective equipment must be based on the potential hazards in the workplace. Assess your workplace to determine potential hazards and the appropriate controls and protective equipment for those hazards. Personal protective equipment may include items such as the following:

- Safety glasses, goggles, or face shields for eye protection;
- Hard hats and safety shoes for head and foot protection;
- Proper respirators;
- Chemical suits, gloves, hoods, and boots for body protection from chemicals;
- Special body protection for abnormal environmental conditions such as extreme temperatures; and
- Any other special equipment or warning devices necessary for hazards unique to your worksite.

Choosing appropriate respirators and other equipment

Consult with health and safety professionals before making any purchases. Respirators selected should be appropriate to the hazards in the workplace, meet OSHA standards criteria, and be certified by the National Institute for Occupational Safety and Health.

Respiratory protection may be necessary if the employees must pass through toxic atmospheres of dust, mists, gases, or vapors, or through oxygen-deficient areas while evacuating. There are four basic categories of respirators for use in different conditions. All respirators must be NIOSH-certified.

Emergency action plan coordination

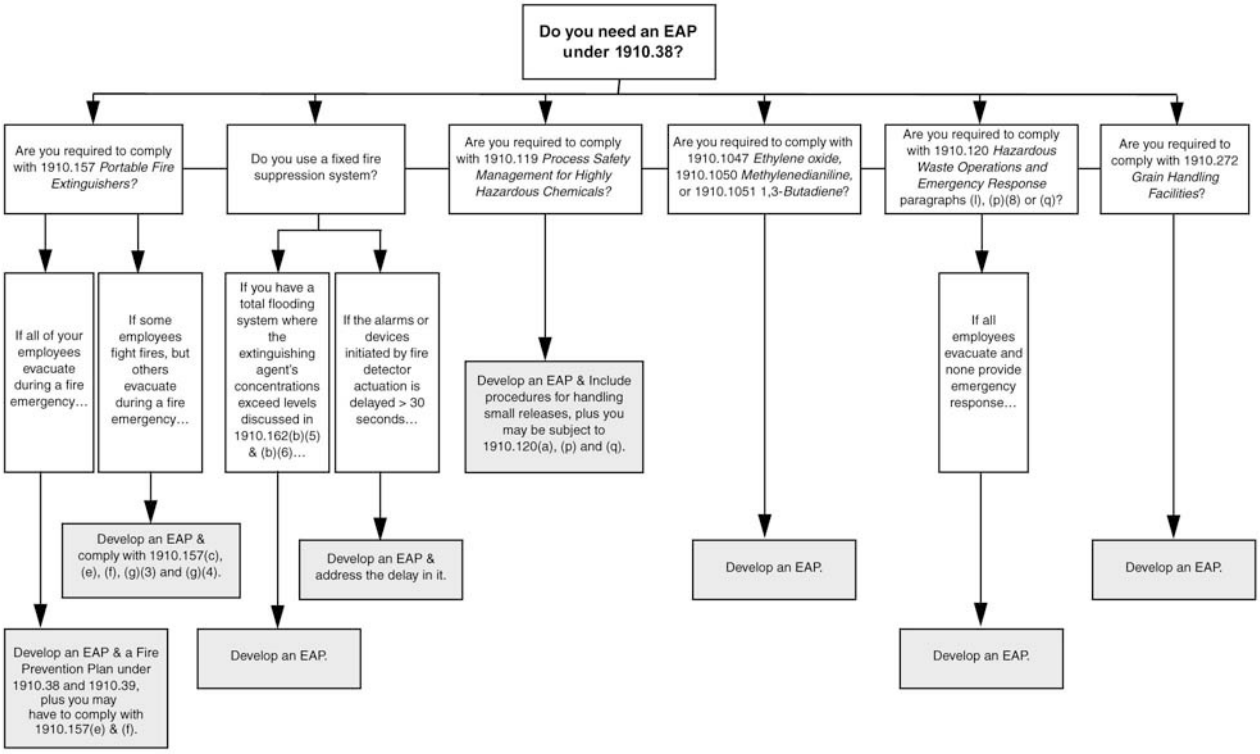
Although there is no specific OSHA requirement to do so, you may find it useful to coordinate your efforts with any other companies or employee groups in your building to ensure the effectiveness of your plan. In addition, if you rely on assistance from local emergency responders such as the fire department, local HAZMAT teams,

or other outside responders, you may find it useful to coordinate the emergency plans with these organizations. This ensures that you are aware of the capabilities of these outside responders and that they know what is expected of them.

Other OSHA standards address emergency planning requirements

In addition to 1910.38, several other OSHA standards address emergency planning requirements. These include the 1910.120(q), Hazardous Waste Operations and Emergency Response; 1910.156, Fire Brigades; and 1910.146(k), Permit-Required Confined Spaces. The OSHA Publication 3122, *Principal Emergency Response and Preparedness Requirements in OSHA Standards and Guidance for Safety and Health Problems*, provides a broad view of emergency planning requirements across OSHA standards.

Standards that refer to 1910.38 Emergency Action Plans (EAPs)



Emergency action plan

Purpose

_____ is dedicated to the protection of its employees from emergencies such as tornadoes and fires. When emergencies do occur, our Emergency Action Plan (EAP) is initiated. This EAP is in place to ensure employee safety from emergencies during regular hours and after hours. It provides a written document detailing and organizing the actions and procedures to be followed by employees in case of a workplace emergency.

OSHA's Emergency Action Plan requirements, found at 1910.38, requires our company to have a written Emergency Action Plan (EAP). This plan applies to all operations in our company where employees may encounter an emergency situation.

The EAP communicates to employees, policies and procedures to follow in emergencies. This written plan is available, upon request, to employees, their designated representatives, and any OSHA officials who ask to see it.

Administrative duties

_____ is the EAP administrator, who has overall responsibility for the plan. This responsibility includes the following:

1. Developing and maintaining a written Emergency Action Plan for regular and after hours work conditions;
2. Notifying the proper rescue and law enforcement authorities, and the building owner/superintendent in the event of an emergency affecting the facility;
3. Taking security measures to protect employees;
4. Integrating the Emergency Action Plan with any existing general emergency plan covering the building or work area occupied;
5. Distributing procedures for reporting emergencies, the location of safe exits, and evacuation routes to each employee;
6. Conducting drills to acquaint employees with emergency procedures and to judge the effectiveness of the plan;
7. Training designated employees in emergency response such as the use of fire extinguishers and the application of first aid;
8. Deciding which emergency response to initiate (evacuate or not);
9. Ensuring that equipment is placed and locked in storage rooms or desks for protection;
10. Maintaining records and property as necessary; and
11. Ensuring that our facility meets all local fire codes, building codes, and regulations.

_____ is responsible for reviewing and updating the plan as necessary. Copies of this plan may be obtained from _____.

_____ has full authority to decide to implement the EAP if an emergency threatens human health. The following potential emergencies might reasonably be expected at this facility and thus call for the implementation of this EAP: _____.

The following personnel can be contacted regarding further information about the written Emergency Action Plan or an explanation of duties under this plan: _____.

Key management personnel home telephone numbers are kept in _____ for immediate use in the event of an emergency. These telephone numbers include:

- Key management member: _____.
- Telephone number: _____.
- Cell/wireless number: _____.

These contact numbers have been distributed to the following persons to be retained in their homes for use in communicating an emergency occurring during non-work hours:

- Name: _____.
- Title: _____.

Our facility houses several places of employment, so we have set up a building-wide EAP including all employers in the building. _____ has informed its employees of their duties and responsibilities under the plan. The standardized plan is kept by _____ and is accessible by affected employees at _____.

We encourage suggestions to improve the plan because we are committed to its success. We strive for clear understanding, safe behavior, and involvement in the program from every level of the company.

Alarms

Different emergencies require different alarms to indicate what actions employees should take. Our company has established an employee alarm system. We have fewer than 10 employees, therefore we use direct voice communication as our means for alarming employees of an emergency. We will use the tornado alarm to warn employees of tornado _____.

Because we use a communication system as an alarm system, all emergency messages have priority over all non-emergency messages.

We have posted the following emergency telephone numbers near telephones, or emergency notice boards, and other conspicuous locations for use when telephones serve as a means of reporting emergencies:

- Emergency responder: _____.
- Telephone number: _____.

Emergency reporting and weather monitoring procedures

Evacuation emergency: When employees detect an emergency that requires an evacuation, such as a fire or hazardous release, they should _____. _____ will notify the _____ Fire Department.

Our backup method for reporting emergencies that require evacuation includes the following: _____.

Tornado emergency: We monitor tornadoes by _____.

Our backup method for monitoring tornadoes includes the following: _____.

Other emergency reporting or weather monitoring procedures include: _____.

Evacuation procedures

Some emergencies may require evacuation or escape procedures, while others require employees to stay indoors, or in a safe area. Our emergency escape procedures are designed to respond to many potential emergencies, depending on the degree of seriousness. Nothing in these procedures precludes the Plan Administrator's authority in determining whether employees should remain inside or evacuate.

At this company, the following types of emergency evacuations exist: _____.

Our emergency evacuation procedures and assignments are designed to respond to many potential emergencies that require them, including: _____.

Employees need to know what to do if they are alerted to a specific emergency. After an alarm is sounded to evacuate, employees should take the following steps: _____.

See the appendices to this plan for the building plans with exit route assignments for each group evacuating an area or building.

Once evacuated, employees are to move directly to their designated exterior or safe area, where a head count will be performed, and further instructions given. Following is a list of exterior refuges/safe zones:

- Departmental group: _____.
- Designated safe area: _____.
- Head count responsibility: _____.

Procedures to account for employees

Trained evacuation personnel assist in safe and orderly evacuation for all types of emergencies that require evacuation. Once evacuation is complete, they conduct head counts. The employees selected are trained in the complete workplace layout and the various alternative escape routes from the workplace.

Before leaving, these employees check rooms and other enclosed spaces in the workplace for employees who may be trapped or otherwise unable to evacuate the area. Trained and authorized personnel are:

- Name/title: _____.
- Department: _____.
- Shift: _____.

This list indicates a sufficient number of employees who have been designated by the company and trained to direct and assist in safe and orderly emergency evacuation; provide guidance and instruction for all types of emergency situations; be aware of employees with special needs who may require extra assistance; use the buddy system, and avoid hazardous areas during an emergency evacuation.

The list of trained personnel includes at least one person from every area for every shift. This means that every trained evacuation person is responsible for seeing to approximately _____ evacuated employees. The trained personnel also serve as a resource of information about emergency procedures and conduct head counts once evacuation is complete.

Frontline supervisors must be aware of the locations of those employees working on a particular day when an emergency occurs, as well as suppliers, customers, and other non-employees on the premises, when an emergency occurs, and be aware of who is absent or otherwise away from the premises.

Accounting for employees and non-employees will aid local responding fire/rescue departments in determining whether rescue efforts are necessary. We have described each frontline supervisor's employee/non-employees tracking method below:

- Name of supervisor: _____.
- Department: _____.
- Shift: _____.
- Tracking method: _____.

Each department reports to their respective representative using the following procedure: _____.

Once each evacuated group of employees have reached their evacuation destinations, each trained evacuation employee:

- Takes roll of his or her group,
- Makes sure all persons are accounted for,
- Reports in to a central checkpoint managed by _____, and
- Assumes role of department contact to answer questions.

Head count results should be given to the _____ Fire Chief or firefighter, if requested.

Other duties provided by the trained personnel during an emergency evacuation include the following: _____.

No employees are to return to the buildings until advised by _____ or designee (after determination has been made that such re-entry is safe). If anyone is injured or contaminated, the Plan Administrator will activate rescue and first aid actions. If an emergency incident expands, the EAP Administrator may send employees home by normal means or provide them with transportation to an offsite location.

Non-evacuation emergency procedures

_____ has the following non-evacuation procedures: _____.

Tornado emergency: In the event of a tornado, it is corporate policy to provide emergency warning and shelter. Once employees are made aware of a tornado situation, they are to follow these procedures: _____.

Employees should stay away from windows, but stay inside the building they are in. The following is a table with shelter assignments listed:

- Group/Department: _____.
- Assigned shelter: _____.

Employees are not to leave the shelter or return to their regular duties until the all clear is given. _____ will determine when it is safe for employees to leave their tornado shelter and return to work. At that time, the Plan Administrator will _____.

If anyone is injured or contaminated, the Plan Administrator will activate rescue and first aid actions. If there is structural damage, the Plan Administrator will _____.

Critical operations

Our company has critical operations that cannot be shut down for emergencies. These operations include the following: _____.

The employees who are designated to remain behind during evacuation to care for critical plant operations include the following:

- Name (or title): _____.
- Department: _____.
- Plan system operated: _____.

The procedures to be taken by those employees who have been selected to remain behind to care for essential plant operations until their evacuation becomes absolutely necessary include the following: _____.

Plan administrator duties

During an emergency, _____ will do the following: _____.

Rescue and first aid

Rescue and first aid may be necessary during emergency situations. Circumstances calling for rescue and/or first aid include:

- Circumstances: _____.
- Procedures: _____.

Emergency Response Team (ERT) members are responsible for performing rescue duties in case of an emergency requiring rescue. Members of the ERT include:

- Name (or title): _____.
- Department: _____.
- Shift: _____.

Designated first aid responders are to provide first aid assistance within their capabilities to employees requiring it during emergency situations. Appropriate first aid supplies have been provided. Designated first aid responders include the following individuals:

- Name (or title): _____.
- Department: _____.
- Shift: _____.

Professional emergency services responding in an emergency will help with and direct all rescue and medical duty assignments upon their arrival on site.

Training

Our Plan Administrator reviews the Emergency Action Plan with each of our employees at the following times:

- Initially when the plan is developed,
- Whenever a new employee is hired,
- Whenever the employee is assigned initially to a job,
- Whenever an employee's responsibilities or designated actions under the plan change,
- Whenever new equipment, materials, or processes are introduced into the workplace,
- Whenever the layout or design or the facility changes, and
- Whenever the plan is changed.

The training includes the following: _____.

The information in this plan is not intended for casual reading, but is intended to get the appropriate message across. We present the material for training in the following manner: _____.

We communicate the contents of this plan through a briefing delivered by supervisors followed by a demonstration and through a presentation followed by a drill.

_____ performs drills for the following emergencies: _____.

We hold these drills at least _____.

After a drill, the Plan Administrator judges the effectiveness of the plan and reviews any employee input concerning the drill. Employees performing the drill may identify something that did not follow procedure or was ineffective.

For example, they may discover doors that would not open; they may enter storage closets instead of exiting; they may get lost and confused or they may carry a suspicious package through the facility. These are the types of things the Plan Administrator needs to hear about after a drill. That way, they can be addressed before a real emergency.

Emergency equipment and support

Our company provides the following equipment and support for use by our trained personnel during emergencies: _____.

Appendices

Employees designated to remain behind to operate critical plant operations during an emergency include the following: _____.

The types of emergency action plans we have at this facility include the following: _____.

We have attached the following documents for reference to ensure a better understanding of our written program: _____.

OSHA COMPLIANCE MANUAL

Fire prevention plans (FPPs)

Introduction

A fire prevention plan is a hazard prevention plan that assures advanced planning for evacuations in fire and other emergencies. An FPP is a written document required by a particular OSHA standard. Elements of a fire plan would include:

- A list of major workplace fire hazards and their proper handling and storage procedures, potential ignition sources, their control procedures, and the type of fire protection equipment or systems which can control a fire.
- Names or job titles of those persons responsible for maintaining equipment and systems installed to prevent or control ignition of fires.
- Names or job titles of those persons responsible for controlling fuel source hazards.

Incipient stage fires

When a fire is in the initial stage or beginning stage and can be controlled or extinguished by portable fire extinguishers or Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus, it is called an incipient stage fire. When a fire goes beyond the incipient stage, outside help is almost always necessary.

Employers are generally required to provide portable fire extinguishing equipment for use in fighting incipient state fires in the workplace. However, there are several options to use regarding workplace fires.

- Evacuate all employees to a safe place.
- Evacuate all employees except those designated to use portable fire extinguishers.

Some insurance companies or local fire departments may require employers to keep portable fire extinguishers in the workplace, even though the employer does not want employees to fight fires and has a total evacuation policy in place. In this case, the extinguishers must be routinely maintained, inspected, and tested.

Fire fighting options

Employers are generally required to provide portable fire extinguishing equipment for use in fighting incipient stage fires in the workplace. Section 1910.157, however, provides alternatives for employers who do not want their employees to fight incipient stage fires in the workplace. Employers that opt for the evacuation of all or most employees to a safe area do not have to comply with certain requirements of §1910.157, depending on the option chosen. These options are:

Evacuate all employees

The employer chooses to evacuate all employees to safety when a fire occurs. Employers that select this option do not have to comply with 1910.157 unless a specific standard in part 1910 requires that portable fire extinguishers be provided. If this option is selected, compliance with §§1910.38 and 1910.39 is required through §1910.157(b)(1).

Evacuate some employees

The employer chooses to evacuate all employees except those designated to use portable fire extinguishers. Employers that select this option need not comply with the distribution requirements of §1910.157(d). This option allows the employer to distribute extinguishers so that they are available to the employees who

have been designated to fight incipient stage fires. If this option is selected, compliance with §1910.38 is required through §1910.157(b)(2).

Have fire extinguishers but evacuate all employees

Some employers keep portable fire extinguishers in the workplace, even though they do not want employees fighting fires and have a policy for total evacuation. Portable fire extinguishers may be required in the workplace by other organizations such as insurance companies or local fire departments. Portable fire extinguishers that are not intended for employee use may still pose a hazard if they are not properly maintained. Employers who select this option must comply only with the maintenance, inspection, and testing requirements in paragraphs (e) and (f) of §1910.157.

All employees fight fires

Employers who do not select any of these options but instead provide portable fire extinguishers for use by any employee to use in fighting incipient stage fires must comply with §1910.157 in its entirety. Employers that provide portable fire extinguishers for employee use must provide an educational program to familiarize then with the general principles of fire extinguisher use. Those employees expected to use portable fire extinguishers must receive "hands on" training in the use of the fire extinguishing equipment. If the employer chooses to comply with all of §1910.157, there is no requirement to comply with §1910.38 or §1910.39.

OSHA standards requiring FPPs

1. Ethylene Oxide, §1910.1047
2. Methylenedianiline - §1910.1050
3. 1,3-Butadiene - §1910.1051

Fire prevention plan elements

Your company probably already has an adequate EAP/FPP, but the following elements may provide ideas for additional safety features not included in your basic plan. It is important to list in detail the procedures to be taken by employees who will remain behind to care for essential plant operations until their evacuation becomes absolutely necessary. Essential plant operations may include:

- Monitoring plant power supplies, water supplies, and other essential services which cannot be shut down for every emergency alarm.
- Chemical or manufacturing processes which must be shut down in stages or steps where certain employees must be present to assure that safe shut down procedures are completed.

Include floor plans or workplace maps which clearly show the emergency escape routes. Color coding will aid employees in determining their route assignments. Develop and explain in detail what rescue and medical first aid duties are to be performed and by whom. Train all employees what actions they are to take in emergency situations that may occur in the workplace.

Emergency evacuation

At the time of a fire emergency, employees should know what type of evacuation is necessary and what their role is in carrying out the plan.

- Total and immediate evacuation.
- Partial evacuation of nonessential employees with a delayed evacuation of others.
- Only those employees in the immediate area of the fire may be expected to evacuate or move to a safe area, such as when a local application fire suppression system discharge employee alarm is sounded.

Safe areas

Designated refuge or safe areas for evacuation should be determined and identified in the plan. In a building divided into fire zones by fire walls, the refuge area may still be within the same building but in a different zone from where the emergency occurs.

Exterior refuge or safe areas may include parking lots, open fields, or streets which are located away from the site of the emergency and which provide sufficient space to accommodate the employees. Employees should be instructed to move away from the exit discharge doors of the building, and to avoid congregating close to the building where they may hamper emergency operations.

Evacuation wardens

Plan for an adequate number of employees to be available at all times during working hours to act as evacuation wardens to guide employees from the danger location to the safe areas. Generally, one warden for each twenty employees in the workplace should be able to provide adequate guidance and instruction at the time of a fire emergency.

The employees selected or who volunteer to serve as wardens should be trained in the complete workplace layout and the various alternative escape routes from the workplace. All wardens and fellow employees need to know about handicapped employees who may need extra assistance, such as using the buddy system, and of hazardous areas to be avoided during emergencies.

Before leaving, wardens should check rooms and other enclosed spaces in the workplace for employees who may be trapped or otherwise unable to evacuate the area. After the desired degree of evacuation is completed, the wardens should be able to account for or otherwise verify that all employees are in the safe areas.

Coordinating evacuation plans

In buildings with several places of employment, coordinate your plans with the other employers in the building. A building-wide or standardized plan for the whole building is acceptable, provided that all employers inform their employees of their duties and responsibilities under the plan.

The standardized plan need not be kept by each employer in the multi-employer building, provided there is an accessible location within the building where the plan can be reviewed by all employees. When multi-employer building-wide plans are not feasible, coordinate your plan with the other employers in the building to assure that conflicts and confusion are avoided during times of emergencies. In multi-story buildings where more than one employer is on a single floor, it is essential that employers coordinate their plans with each other to avoid conflicts and confusion.

Housekeeping safety factors

Proper housekeeping is essential to control the of accumulation of flammable and combustible waste materials which can lead to a fast developing fire, rapid spread of toxic smoke, or an explosion. Employees need to be aware of the hazardous properties of materials in their workplaces and the degree of hazard each poses.

Certainly oil soaked rags have to be treated differently than general paper trash in office areas. However, large accumulations of waste paper or corrugated boxes can pose a significant fire hazard. Accumulations of materials which can cause large fires or generate dense smoke that are easily ignited or may start from spontaneous combustion must be controlled. Such combustible materials may be easily ignited by matches, welder's sparks, cigarettes and similar low level energy ignition sources.

Equipment maintenance

Workplaces often contain equipment to control heat sources or to detect fuel leaks, such as temperature limit switches on deep-fat food fryers found in restaurants. There may be similar switches for high temperature dip tanks, or flame failure and flashback arrester devices on furnaces and similar heat producing equipment. If these devices are not properly maintained or if they become inoperative, a definite fire hazard exists.

Employees and supervisors should be aware of the specific type of control devices on equipment involved with combustible materials in the workplace and should make sure, through periodic inspection or testing, that these controls are operable. Manufacturers' recommendations should be followed to assure proper maintenance procedures.

EAPs for all emergencies

While you may not be able to anticipate every emergency situation that could occur in your workplace, you should have a good idea what can reasonably happen. Taking steps to assess for those hazardous situations, then developing a plan to address "worst-case scenarios" will go a long way to protecting your workers, your materials, and your facility.

Fire prevention plan

Purpose

OSHA's Fire Prevention Plan regulation, found at 1910.39, requires our company to have a written Fire Prevention Plan (FPP). This plan applies to all operations in our company where employees may encounter a fire.

This Fire Prevention Plan (FPP) is in place at this company to control and reduce the possibility of fire and to specify the type of equipment to use in case of fire. This plan addresses the following issues:

- Major workplace fire hazards and proper handling and storage procedures for hazardous materials.
- Potential ignition sources and their control.
- The type of fire protection equipment necessary to control each major hazard.
- Procedures to control accumulations of flammable and combustible waste materials.
- Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials.
- The name of job title of employees responsible for maintaining equipment to prevent or control sources of ignition or fires.
- The name of job title of employees responsible for the control of fuel source hazards.

Under this plan, our employees will be informed of the plan's purpose, preferred means of reporting fires and other emergencies, types of evacuations to be used in various emergency situations, and the alarm system. The plan is closely tied to our Emergency Action Plan where procedures are described for emergency evacuation procedures and exit route assignments, procedures to account for all employees after emergency evacuation has been completed, and rescue and medical duties for those employees who perform them. Please see the Emergency Action Plan for this information.

_____ is the Plan Coordinator, acting as the representative of the Facility Manager, who has overall responsibility for the plan. The written plan is kept in _____. _____ will review and update the plan as necessary. Copies of this plan may be obtained from _____.

The FPP communicates to employees, policies and procedures to follow in a fire emergency. This written plan is available, on request, to employees, their designated representatives, and OSHA officials.

We encourage suggestions to make improvements to the plan because we are committed to the success of our fire prevention program. We strive for clear understanding, safe behavior, and involvement in the plan from every level of the company.

Plan coordinator responsibilities

At _____, the Plan Coordinator is responsible for the following activities:

- Develop a written Fire Prevention Plan for regular and after-hours work conditions.
- Immediately notify the _____ fire or police departments, and the building owner/superintendent in the event of a fire affecting the facility.
- Integrate the FPP with the existing general emergency plan covering the building occupied.
- Distribute procedures for reporting a fire, the location of fire exits, and exit routes to each employee.
- Conduct drills to acquaint the employees with fire procedures, and to judge their effectiveness.
- Satisfy all local fire codes and regulations as specified.
- Train designated employees in the use of fire extinguishers and the application of medical first-aid techniques.
- Keep key management personnel home telephone numbers in a safe place in the facility for immediate use in the event of a fire. Distribute a copy of the list to key persons to be retained in their homes for use in communicating a fire occurring during non-work hours.Decide to have employees and non-employees remain in or evacuate the facility in the event of a fire.

If evacuation is deemed necessary, the Plan Coordinator ensures that:

- All employees are notified and evacuated and a head count is taken to confirm total evacuation of all employees.
- When practical, equipment is placed and locked in storage rooms or desks for protection.
- The building owner/superintendent is contacted, informed of the action taken, and asked to assist in coordinating security protection.
- In locations where the building owner/superintendent is not available, security measures to protect employee records and property are arranged as necessary.

In addition, the Plan Coordinator is responsible for the following duties unique to this facility: _____.

Fire hazards

Fire prevention measures involving proper handling and storage of hazardous materials have been developed. These include: _____.

Fuel is used throughout the facility as an energy source for various systems or equipment. This fuel can be a significant fire hazard and must be monitored and controlled. These include: _____.

Potential ignition sources

Flammable or combustible materials and other fuel sources may not ignite on their own without an external source of ignition. The following procedures are used to control known ignition sources at this company: _____.

Fire protection equipment

Fire protection equipment used at this company is selected and purchased by _____. This equipment includes the following types of extinguishers: _____.

In addition, the following equipment is also on site to control fires: _____.

Fire protection equipment and systems are indicated on the building floor plan in an appendix to this plan.

Maintenance of equipment/systems

It is our intent to ensure the reliability of fire protection equipment and equipment and systems installed on heat-producing equipment to prevent the accidental ignition of combustible materials. The following employees are responsible for maintaining equipment and systems installed to prevent or control sources of ignition or fires: _____.

Our procedures for maintaining equipment/systems are as follows: _____.

Housekeeping procedures

Our company controls accumulations of flammable and combustible waste materials and residues so that they do not contribute to a fire. We have identified the following potential hazards in our facility: _____.

The following procedures have been developed to eliminate or minimize the risk of fire due to improperly stored or disposed of materials._____.

Training

Fire prevention plan

At the time of a fire, employees should know what type of evacuation is necessary and what their role is in carrying out the plan. In cases where the fire is large, total and immediate evacuation of all employees is necessary. In smaller fires, a partial evacuation of nonessential employees with a delayed evacuation of others may be necessary for continued operation. We must be sure that employees know what is expected of them during a fire to assure their safety.

Our company trains employees through classroom instruction followed by a drill. Managers and supervisors also give all their employees (divided into small groups) a thorough briefing and demonstration.

Training, conducted on initial assignment, includes:

- Fire hazards to which an employee is exposed;
- What to do if employee discovers a fire;
- Demonstration of alarm, if more than one type exists;
- How to recognize fire exits;
- Evacuation routes;
- Assisting employees with disabilities;
- Measures to contain fire (e.g., closing office doors and windows in immediate vicinity);
- Head count procedures (see EAP for details);
- Return to building after the “all-clear” signal; and
- Those parts of the Fire Prevention Plan necessary for self-protection.

If the Plan Coordinator has reason to believe an employee does not have the understanding required, the employee must be retrained. _____ certifies in writing that the employee has received and understands the Fire Prevention Plan training.

Any employee who does not comply with this plan will be disciplined.

Our building houses several places of employment, so we have set up a building-wide FPP including all employers in the building. _____ has informed its employees of their duties and responsibilities under the plan. Each employer in the facility has a copy of the standardized plan and it is accessible by affected employees.

Together we have coordinated the FPPs of all employers in the building to avoid confusion and conflicts during a fire.

Fire protection equipment

The Plan Coordinator provides training for each employee whose job duties require the use of fire protection equipment. Employees may not use fire protection equipment without appropriate training. Training, before an individual is assigned responsibility to fight a fire, includes:

- Types of fires,
- Types of fire prevention equipment,
- Location of fire prevention equipment,
- How to use fire prevention equipment,
- Limitations of fire prevention equipment,
- Proper care and maintenance of assigned fire prevention equipment, and _____.

Employees must demonstrate an understanding of the training and the ability to use the equipment properly before they are allowed to perform work requiring the use of the equipment.

If the Plan Coordinator has reason to believe an employee does not have the understanding or skill required, the employee must be retrained. _____ certifies in writing that the employee has received and understands the fire protection equipment training.

Appendix

We have attached the following documents to this plan to ensure better understanding of our Fire Protection Plan: _____.

Reserved

OSHA COMPLIANCE MANUAL

Hazardous waste operations and emergency response HAZWOPER

Introduction

The dumping of hazardous waste poses a significant threat to the environment. In 1995, the Environmental Protection Agency (EPA) managed about 277 million metric tons of hazardous waste at licensed Resource Conservation and Recovery Act (RCRA) sites. Hazardous waste is a serious safety and health problem that continues to endanger human and animal life and environmental quality. Hazardous waste — discarded chemicals that are toxic, flammable or corrosive — can cause fires, explosions, and pollution of air, water, and land. Unless hazardous waste is properly treated, stored, or disposed of, it will continue to do great harm to all living things that come into contact with it now or in the future.

Because of the seriousness of the safety and health hazards related to hazardous waste operations, OSHA developed the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, found at §1910.120, specifically to protect workers in this environment and to help them handle hazardous wastes safely and effectively.

Scope

The standard covers workers employed in clean-up operations at uncontrolled hazardous waste sites and at EPA-licensed waste treatment, storage and disposal (TSD) facilities; as well as workers responding to emergencies involving hazardous materials (e.g., spills). State, county, and municipal employees such as police, ambulance workers, and firefighters with local fire departments, are covered by the regulations issued by the 25 states operating their own OSHA-approved safety and health programs. EPA regulations cover these employees in states without state plans.

Specifically, HAZWOPER covers employees involved in:

- Clean-up operations required by a governmental body, whether federal, state, local or other, involving hazardous substances that are conducted at uncontrolled hazardous waste sites;
- Corrective actions involving clean-up operations at sites covered by Resource Conservation and Recovery Act (RCRA);
- Voluntary clean-up operations at sites recognized by federal, state, local or other governmental bodies as uncontrolled hazardous waste sites;
- Operations involving hazardous wastes that are conducted at treatment, storage and disposal facilities licensed under RCRA;
- Emergency response operations for release of, or substantial threats of release of, hazardous substances.

Exceptions are permitted if an employer can demonstrate that the operation does not involve employee exposure or a reasonable possibility of such exposure to hazards.

The following information discusses OSHA's requirements for hazardous waste operations and emergency response at uncontrolled hazardous waste sites and TSD facilities and summarizes the steps an employer must take to protect the health and safety of workers in these environments.

Safety and health program

An effective and comprehensive safety and health program is essential in reducing work-related injuries and illnesses and in maintaining a safe and healthful work environment. HAZWOPER requires each covered employer to develop and implement a written safety and health program that identifies, evaluates, and

controls safety and health hazards and provides emergency response procedures for each hazardous waste site or treatment, storage, and disposal facility.

This written program has to include specific and detailed information on the following topics:

- An organizational workplan,
- Site evaluation and control,
- A site-specific program,
- Information and training program,
- Personal protective equipment program,
- Monitoring,
- Medical surveillance program,
- Decontamination procedures, and
- Emergency response program.

The written program must be periodically updated and made available to all affected employees, contractors and subcontractors. The employer also must inform contractors and subcontractors of any identifiable safety and health hazards or potential fire or explosion hazards before they enter the worksite. The components of the safety and health program are discussed in the following paragraphs.

Workplan
§1910.120(b)

Planning is the key element in a hazardous waste control program. Proper planning will greatly reduce worker hazards at waste sites. A workplan should support the overall objectives of the control program and provide procedures (SOPs) for implementation and should incorporate the employer's standard operating procedures for safety and health.

Establishing a chain of command will specify employer and employee responsibilities in carrying out the safety and health program. For example, the plan should include the following:

- Supervisor and employee responsibilities and means of communication,
- Name of person who supervises all of the hazardous waste operations, and
- The site supervisor with responsibility for an authority to develop and implement the site safety and health program and to verify compliance.

In addition to this organizational structure, the plan should define the tasks and objectives of site operation as well as the logistics and resources required to fulfill these tasks. For example, the following topics should be addressed:

- The anticipated clean-up and/or operating procedures,
- A definition of work tasks and objectives and methods of accomplishment,
- The established personnel requirements for implementing the plan, and
- Procedures for implementing training, informational programs, and medical surveillance requirements.

Necessary coordination between the general program and site-specific activities also should be included in the actual operations workplan.

Site evaluation and control
§1910.120(c) and (d)

Site evaluation, both initial and periodic, is crucial to the safety and heath of workers. Site evaluation provides employers with the information needed to identify site hazards so they can select appropriate protection methods for employees.

It is extremely important, and a requirement of the standard, that a trained person conduct a preliminary evaluation of an uncontrolled hazardous waste site before entering the site. The evaluation must include all suspected conditions that are immediately dangerous to life or health or that may cause serious harm to employees (e.g., confined space entry, potentially explosive or flammable situation, visible vapor clouds, etc.) As available, the evaluation must include the location and size of the site, site topography, site accessibility by air and roads, pathways for hazardous substances to disperse, a description of worker duties, and the time needed to perform a given task, as well as the present status and capabilities of the emergency response teams.

Periodic reevaluations should also be conducted for treatment, storage, and disposal facilities, as conditions or operations change.

Controlling the activities of workers and the movement of equipment is an important aspect of the overall safety and health program. Effective control of the site will minimize potential contamination of workers, protect the public from hazards, and prevent vandalism. The following information is useful in implementing the site control program: a site map, site work zones, site communication, safe work practices, and the name, location and phone number of the nearest medical assistance.

The use of a "buddy system" is also required as a protective measure to assist in the rescue of an employee who becomes unconscious, trapped, or seriously disabled on site. In the buddy system, two employees pair up to keep an eye on each other. Only one buddy should be in a specific dangerous area at a time, so that if that person gets in trouble, the second can call for help.

Site-specific safety and health plan
§1910.120(b)

A site-specific safety and health plan is a complementary program element that aids in eliminating or effectively controlling anticipated safety and health hazards. The site-specific plan needs to include all of the basic requirements of the overall safety and health program, but with attention to those characteristics unique to the particular site.

For example, the site-specific plan may outline procedures for confined space entry, air and personal monitoring and environmental sampling, and a spill containment program to address the particular hazards present at the site.

The site safety and health plan must identify the hazards of each phase of the specific site operation and must be kept on the worksite. Pre-entry briefings need to be conducted prior to site entry and at other times as necessary to ensure that employees are aware of the site safety and health plan and its implementation. The employer must also ensure that periodic safety and health inspections are made of the site and that all known deficiencies are corrected prior to work at the site.

Information and training program
§1910.120(e)

As part of the safety and health program, employers are required to develop and implement a program to inform workers performing hazardous waste operations of the level and degree of exposure they are likely to encounter. This includes contractors and subcontractors.

Employers also are required to develop and implement procedures for introducing effective new technologies that provide improved worker protection in hazardous waste operations. Examples include foams, absorbents, adsorbents, or neutralizers.

Training makes workers aware of the potential hazards they may encounter and provides the necessary knowledge and skills to perform their work with minimal risk to their safety and health. Develop a training program for all employees exposed to safety and health hazards during hazardous waste operations. Both supervisors and workers have to be trained to:

- Recognize hazards and to prevent them;
- Select, care for, and use respirators properly as well as other types of personal protective equipment;
- Understand engineering controls and their use;
- Use proper decontamination procedures;
- Understand the emergency response plan, medical surveillance requirements, confined space entry procedures, spill containment program, and any appropriate work practices; and
- Know the names of personnel and their alternatives responsible for site safety and health.

The amount of instruction differs with the nature of the work operations, as indicated in the following Tables 1 and 2.

Employees at all sites can not perform any hazardous waste operation unless they have been trained to the level required by their job function and responsibility and have been certified by their instructor as having completed the necessary training. All emergency responders must receive annual refresher training sufficient to maintain or demonstrate competency. Employee training requirements are further defined by the nature of the work (e.g., temporary emergency response personnel, firefighters, safety officers, HAZMAT personnel, incident commanders).

These requirements may include recognizing and knowing the hazardous materials and their risks, knowing how to select and use appropriate control, containment, or confinement procedures and how to implement them. The specific training and competency requirements for each personnel category are explained fully in the HAZWOPER standard. For a brief summary of training requirements, see Tables 1 and 2.

Employees who receive the training specified (see Table 1) must be given a written certificate upon successful completion of that training. That training need not be repeated if the employee goes to work at a new site; however, the employee must receive whatever additional training is needed to work safely at the new site. Employees who worked at hazardous waste sites before 1987 and received equivalent training need not repeat the initial training specified in Table 1, if the employer can demonstrate that in writing and certify that the employee has received such training.

Table 1. Training requirements
Hazardous waste clean-up sites

Staff	
Routine site employees	40 hours initial 24 hours field 8 hours annual refresher
Routine site employees (minimal exposure)	24 hours initial 8 hours field 8 hours annual refresher
Non-routine site employees	24 hours initial 8 hours field 8 hours annual refresher
Supervisor/Managers of:	
Routine site employees	40 hours initial 24 hours field 8 hours hazardous waste management 8 hours annual refresher
Routine site employees (minimal exposure)	24 hours initial 8 hours field 8 hours hazardous waste management 8 hours annual refresher
Non-routine site employees	24 hours initial 8 hours field 8 hours hazardous waste management 8 hours annual refresher
Treatment, storage, and disposal sites	
Staff	
General site employees	24 hours initial or equivalent 8 hours annual refresher
Emergency response personnel	Trained to a level of competency Annual refresher

Note: See 29 CFR 1910.120 (e) and (p)(7).

Table 2. Training requirements
Other emergency response staff

Level 1 -	First responder (awareness) level[1]	Sufficient training or proven experience in specific competencies Annual refresher
Level 2 -	First responder (operations level)[2]	Level 1 competency and 8 hours initial or proven experience in specific competencies Annual refresher
Level 3 -	HAZMAT technician[3]	24 hours of Level 2 and proven experience in specific competencies Annual refresher
Level 4 -	HAZMAT specialist[4]	24 hours of Level 3 and proven experience in specific competencies Annual refresher
Level 5 -	On-the-scene incident commander[5]	24 hours of Level 2 and additional competencies Annual refresher

Note: See 29 CFR 1910.120(q)(6).
[1]Witnesses or discovers a release of hazardous materials and who are trained to notify the proper authorities.
[2]Responds to releases of hazardous substances in a defensive manner, without trying to stop the releases.
[3]Responds aggressively to stop the release of hazardous substances.
[4]Responds with and in support to HAZMAT technicians, but who have specific knowledge of various hazardous substances.
[5]Assumes control of the incident scene beyond the first-responder awareness level.

Personal protective equipment program §1910.120(g)

HAZWOPER requires the employer to develop a written personal protective program for all employees involved in hazardous waste operations. As mentioned earlier, this program is also part of the site-specific safety and health program. The personal protective equipment program has to include:

- An explanation of equipment selection and use,
- Maintenance and storage,
- Decontamination and disposal,
- Training and proper fit,
- Donning and doffing procedures,
- Inspection,
- In-use monitoring,
- Program evaluation, and
- Equipment limitations.

Provide and require the use of personal protective equipment where engineering control methods are infeasible to reduce worker exposures at or below the permissible exposure limit. Personal protective equipment has to be selected that is appropriate to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.

As necessary, furnish the employee with positive-pressure self-contained breathing apparatus or positive-pressure air-line respirators equipped with an escape air supply, and with totally encapsulating chemical protective suits.

Monitoring
§1910.120(h)

Airborne contaminants can present a significant threat to employee safety and health, thus making air monitoring an important component of an effective safety and health program. Conduct monitoring before site entry at uncontrolled hazardous waste sites to identify conditions immediately dangerous to life and health, such as oxygen-deficient atmospheres and areas where toxic substance exposures are above permissible limits. Accurate information on the identification and qualification of airborne contaminants is useful for the following:

- Selecting personal protective equipment,
- Delineating areas where protection and controls are needed,
- Assessing the potential health effects of exposure, and
- Determining the need for specific medical monitoring.

After a hazardous waste clean-up operation begins, periodically monitor those employees who are likely to have higher exposures to determine if they have been exposed to hazardous substances in excess of permissible exposure limits. Also monitor for any potential condition that is immediately dangerous to life and health or for higher exposures that may occur as a result of new work operations.

Medical surveillance
§1910.120(f)

A medical surveillance program will help to assess and monitor the health and fitness of employees working with hazardous substances. Establish a medical surveillance program for the following personnel:

- All employees exposed or potentially exposed to hazardous substances or health hazards above the permissible exposure limits for more than 30 days per year;
- Workers exposed above the published exposure levels (if there is no permissible exposure limit for these substances) for 30 days or more a year;
- Workers who wear approved respirators for 30 or more days per year on site;
- Workers who are exposed to unexpected or emergency releases of hazardous wastes above exposure limits (without wearing appropriate protective equipment) or who show signs, symptoms or illness that may have resulted from exposure to hazardous substances; and
- Members of hazardous materials (HAZMAT) teams.

All examinations have to be performed under the supervision of a licensed physician, without cost to the employee, without loss of pay and at a reasonable time and place. Examinations must include a medical and work history with special emphasis on symptoms related to the handling of hazardous substances and health hazards and to fitness for duty including the ability to wear any required personal protective equipment under conditions that may be expected at the worksite. These examinations must be given as follows:

- Prior to job assignment and annually thereafter (or every two years if a physician determines that is sufficient),

- At the termination of employment,*
- Before reassignment to an area where medical examinations are not required,*
- If the examining physician believes that a periodic follow-up is medically necessary, and
- As soon as possible for employees injured or becoming ill from exposure to hazardous substances during an emergency, or who develop signs or symptoms of overexposure from hazardous substances.

Provide the examining physician with a copy of the standard and its appendices, a description of the employee's duties relating to his/her exposure, the exposure level or anticipated exposure level, a description of any personal protective and respiratory equipment used or to be used, and any information from previous medical examinations.

Obtain a written opinion from the physician that contains the results of the medical examination and any detected medical conditions that would place the employee at an increased risk from exposure, any recommended limitations on the employee or upon the use of personal protective equipment, and a statement that the employee has been informed by the physician of the results of the medical examination. For employee privacy reasons, the physician is not to reveal in the written opinion given to the employer specific findings or diagnoses unrelated to employment.

Decontamination procedures
§1910.120(k)

Decontamination procedures are a component of the site-specific safety and health plan and, consequently, must be developed, communicated to employees, and implemented before workers enter a hazardous waste site. As necessary, the site safety and health officer must require and monitor decontamination of the employee or decontamination and disposal of the employee's clothing and equipment, as well as the solvents used for decontamination, before the employee leaves the work area.

If an employee's nonimpermeable clothing becomes grossly contaminated with hazardous substances, the employee must immediately remove that clothing and take a shower. Decontaminate impermeable protective clothing before being removed by the employee.

Protective clothing and equipment must be decontaminated, cleaned, laundered, maintained, or replaced to retain effectiveness. Inform any person who launders or cleans such clothing or equipment of the potentially harmful effects of exposure to hazardous substances.

Employees who are required to shower must be provided showers and change rooms that meet the requirements of §1910.141, General Environmental Controls. In addition, unauthorized employees must not remove their protective clothing or equipment from change rooms unless authorized to do so.

Emergency response
§1910.120(l)

Proper emergency planning and response are important elements of the safety and health program that help minimize employee exposure and injury. Develop and implement a written emergency response plan to handle possible emergencies before actively performing hazardous waste operations. At uncontrolled hazardous waste sites and at treatment, storage, and disposal facilities, the plan must include the following elements:**

- Personnel roles, lines of authority, and communication procedures,
- Pre-emergency planning,
- Emergency recognition and prevention,
- Emergency medical and first-aid treatment,

* If the employee has not had an examination within the last 6 months.

* *Emergency response to the release of hazardous substances beyond clean-up and TSD sites must also have plans that include these elements and other specific requirements as indicated in 1910.120(q).

- Methods or procedures for alerting onsite employees,
- Safe distances and places of refuge,
- Site security and control,
- Decontamination procedures,
- Critique of response and follow-up,
- Personal protective and emergency equipment, and
- Evacuation routes and procedures.

In addition to these requirements, the plan must include site topography, layout, and prevailing weather conditions; and procedures for reporting incidents to local, state, and federal government agencies.

The procedures have to be compatible with, and integrated into, the disaster, fire and/or emergency response plans of the site's nearest local, state, and federal agencies. Emergency response organizations may use the local or state emergency response plans, or both, as part of their emergency response plan to avoid duplication of federal regulations.

Reherse the plan requirements regularly, review periodically, and amend as necessary to keep them current with new or changing site conditions or information. The emergency plan also must be made available for inspection and copying by employees, their representatives, OSHA personnel and other governmental agencies with relevant responsibilities.

A distinguishable and distinct alarm system must be in operation to notify employees of emergencies.

When deemed necessary, employees must wear positive-pressure self-contained breathing apparatus and approved self-contained compressed-air breathing apparatus with approved cylinders. In addition, back-up and first-aid support personnel must be available for assistance or rescue.

Other provisions

As already indicated, as part of an effective safety and health program, the employer must institute control methods and work practices that are appropriate to the specific characteristics of the site. Such controls are essential to successful worker protection. Some control methods are described in the following paragraphs.

Engineering controls and work practices §1910.120(g)

To the extent feasible, institute engineering controls and work practices to help reduce and maintain employee exposure at or below permissible exposure limits. To the extent *not* feasible, engineering and work practice controls may be supplemented with personal protective equipment.

Examples of suitable and feasible engineering controls include the use or pressurized cabs or control booths on equipment, and/or remotely operated materials handling equipment. Examples of safe work practices include removing all non-essential employees from potential exposure while opening drums, wetting down dusty operations, and placing employees upwind of potential hazards.

Handling and labeling drums and containers §1910.120(j)

Prior to handling a drum or container, the employer must assure that drums or containers meet the required OSHA, EPA (40 CFR Parts 264-265 and 300), and Department of Transportation (DOT) regulations (49 CFR Parts 171-178) and are properly inspected and labeled. Damaged drums or containers must be emptied of their contents, using a device classified for the material being transferred, and properly discarded. In areas where spills, leaks or ruptures occur, furnish employees with salvage drums or containers, a suitable quantity of absorbent material, and approved fire extinguishing equipment in the event of small fires.

Inform employees of the appropriate hazard warnings of labeled drums, the removal of soil or coverings, and the dangers of handling unlabeled drums or containers without prior identification of their contents. To the extent feasible, Keep the moving of drums or containers to a minimum, and implement a program to contain and isolate hazardous substances being transferred into drums or containers. In addition, use an approved EPA ground-penetrating device to determine the location and depth of any improperly discarded drums or containers.

Ensure that safe work practices are instituted before opening a drum or container. For example, air-line respirators and approved electrical equipment must be protected from possible contamination, and all equipment kept behind any existing explosion barrier.* Only tools or equipment that prevent ignition may be used. Locate all employees who are not performing the operation at a safe distance and behind a suitable barrier to protect them from accidental explosions.

In addition, standing on or working from drums or containers is prohibited. Special care also must be given when an employee handles containers of shock-sensitive waste, explosive materials, or laboratory waste packs. Where an emergency exists, have procedures in place to ensure the following:

- Evacuate non-essential employees from the transfer area,
- Protect equipment operators from exploding containers by using a barrier, and
- Make available a continuous means of communication (e.g., suitable radios or telephones), and a distinguishable and distinct alarm system to signal the beginning and end of activities where explosive wastes are handled.

If drums or containers bulge or swell or show crystalline material on the outside, do not move them onto or from the site unless appropriate containment procedures have been implemented. In addition, lab packs must be opened only when necessary and only by a qualified person. Prior to shipment to a licensed disposal facility, ensure that all drums or containers are properly labeled and packaged. Staging areas also must be kept to a minimum and provided with adequate access and egress routes.

Sanitation of temporary workplaces §1910.120(n)

Each temporary worksite must have a supply of potable water that is stored in tightly closed and clearly labeled containers and equipped with a tap. Provide disposal cups and a receptacle for their disposal. Clearly mark all water outlets that are unsafe for drinking, washing, or cooking. Equip temporary worksites with toilet facilities. If there are no sanitary sewers close to or on the hazardous waste site, provide the following toilet facilities (unless prohibited by local codes):

- Privies,
- Chemical toilets,
- Recirculating toilets, or
- Combustion toilets.

Provide heated, well-ventilated, and well-lighted sleeping quarters for workers who guard the worksite. In addition, washing facilities for all workers must be near the worksite, within controlled work zones,** and equipped to enable employees to remove hazardous substances. It is also the employer's responsibility to ensure that food service facilities are licensed.

Recordkeeping §1910.120(f)

In 1988, OSHA revised the "Access to Employee Exposure and Medical Records" standard at §1910.1020 requiring employers to provide employees with information to assist in the management of their own safety

* A physical barricade, natural or man-made, that has been designed and constructed of sufficient thickness and density to withstand or deflect the impact loads of an adjacent explosion.

** A designated work area within the worksite.

and health. This standard permits direct access to the records of employees exposed to hazardous materials by their designated representatives and by OSHA.

Keep exposure records for 30 years and medical records for at least the duration of employment plus 30 years. Records of employees who have worked for less than one year need not be retained after employment, but you must provide these records to the employee upon termination of employment. First aid records of one-time treatment are not required to be kept for any specified period.

Inform each employee of the existence, location, and availability of these records. Whenever an employer plans to stop doing business and there is no successor employer to receive and maintain these records, the employer must notify employees of their right to access to records at least three months before the employer ceases to do business. At the same time, notify the National Institute for Occupational Safety and Health.

Under the HAZWOPER standard, medical records must include, at a minimum, the following information:

- Employee's name and social security number,
- Physicians' written opinions,
- Employee's medical complaints related to exposure to hazardous substances, and
- Information provided to the treating physician.

Summary

Hazardous wastes, when not handled properly, can pose a significant safety and health risk. OSHA has recognized the need to improve the quality of the hazardous waste work environment by developing the HAZWOPER standard. Because this standard provides employers and employees with the information and training necessary to improve workplace safety and health, the number of injures and illnesses resulting from exposure to hazardous waste is being reduced.

Frequently asked questions

Is computer-based training acceptable for refresher training?

Computer-based training may meet some refresher training requirements, provided that it covers topics relevant to workers' assigned duties. It must be supplemented by the opportunity to ask questions of a qualified trainer and by an assessment of hands-on performance of work tasks.

For emergency response in an unknown or potentially IDLH atmosphere, what is the minimum number of people required?

At a minimum, four people are required: two working as a team inside the unknown or potentially IDLH atmosphere, and two working outside this atmosphere for assistance or rescue.

Can refresher training be given in segments?

Refresher training may be given in segments so long as the required eight hours have been completed by the employee's anniversary date.

What if refresher training isn't received in 12 months?

If the date for refresher training has lapsed, the need to repeat initial training must be determined based on the employee's familiarity with safety and health procedures used on site. The employee should take the next availably refresher training course. There should be a record in the employee's file indicating why the training has been delayed and when the training will be completed.

What are the training or certification requirements for HAZWOPER trainers?

The Hazardous Waste Operations and Emergency Response standard states in paragraph (e)(5) that "Trainers shall be qualified to instruct employees about the subject matter that is being presented in training." In addition, the paragraph explains that the qualifications of the instructors may be shown by academic degrees, completed training courses and/or work experience.

At this time, OSHA does not have any specific requirements to certify an instructor. The subjects that trainers should be able to convey to employees at hazardous waste operations who need training are summarized in paragraphs (e), (p) and (q) of the HAZWOPER standard.

What are the HAZWOPER training requirements for hospital staff?

HAZWOPER requires that workers be trained to perform their anticipated job duties without endangering themselves or others. To determine the level and type of training your workers need, you must consider the hazards in your community and what capabilities your personnel need to respond to those hazards. You should make your determination based on worst-case scenarios.

If your personnel are expected to provide limited decontamination services in order to attend to medical problems, they must be trained to the first responder operations level with emphasis on the use of PPE and decontamination procedures. This level of emergency response training is described in §1910.120(q)(6)(ii); additional guidance about the content of this training is available in HAZWOPER's Appendix E.

Hospitals may develop in-house training or they may send personnel to a standard first responder operations level course, then provide additional training in decontamination and PPE as needed. HAZWOPER requires the employer to certify that workers have the training and competencies listed in (q)(6)(ii). The standard also requires annual refresher training or demonstration of competency, as described in (q)(8).

What is the difference between an incidental and an emergency spill?

An incidental release is a release of hazardous substance which does not pose a significant safety or health hazard to employees in the immediate vicinity or to the employee cleaning it up, nor does it have the potential to become an emergency within a short time frame.

Incidental releases are limited in quantity, exposure potential, or toxicity and present minor safety or health hazards to employees in the immediate work area or those assigned to clean them up. An incidental spill may be safely cleaned up by employees who are familiar with the hazards of the chemicals with which they are working.

The properties of hazardous substances, such as toxicity, volatility, flammability, explosiveness, corrosiveness, etc., as well as the particular circumstances of the release itself, such as quantity, confined space considerations, ventilation, etc., will have an impact on what employees can handle safely and what procedures should be followed. Additionally, there are other factors that may mitigate the hazards associated with a release and its remediation, such as the knowledge of the employee in the immediate work area, the response and personal protective equipment (PPE) at hand, and the pre-established standard operating procedures for responding to releases of hazardous substances. There are some engineering control measures that will mitigate the release that employees can activate to assist them in controlling and stopping the release.

These considerations (properties of the hazardous substance, the circumstances of the release, and the mitigating factors in the work area) combine to define the distinction between incidental releases and releases that require an emergency response. The distinction is facility-specific and is a function of the emergency response plan.

What are the HAZWOPER training requirements for on-site workers who are not directly involved in clean-up activities?

Workers, such as utility workers, who must perform duties at a hazardous waste site that has not yet been characterized but where contamination is expected, do fall under the scope of §1910.120. These workers

must work under the direction of an on-site supervisor and a site-specific safety and health plan, and must be fully trained and protected pursuant to the HAZWOPER standard. When additional information becomes available through site characterization which verifies that there is minimal or no risk of employee exposure to hazardous substances, a lesser degree of PPE and worker training may be acceptable.

When site characterization shows that the area to be serviced by workers is free of potential exposure, or the proposed work assignments would not expose any of the work crew to hazardous substances, the activity can be carried out as a normal maintenance or construction operation.

... The utility contractor is bound to provide at least the minimum number of training hours specified. On a hazardous waste site that has many site specific peculiarities the employer may need to train employees beyond the 40 or 24 hour minimum set by the standard. Employees must be provided training that prepares them for their job functions and responsibilities, as stated in the general requirements in §1910.120(e).

What is the applicability of HAZWOPER to small quantity generators?

Employers who are not required to have a permit or interim status because they are conditionally exempt small quantity generators under 40 CFR 261.5 or are generators who qualify under 40 CFR 262.34 for exemptions from regulation under 40 CFR 262.34 for exemptions from regulation under 40 CFR parts 264, 265, and 270 ("excepted employers") are not covered by paragraphs (p)(1) through (p)(7) of this section [1910.120 or 1926.65]. Excepted employers who are required by the EPA or state agency to have their employees engage in emergency response or who direct their employees to engage in emergency response are covered by paragraph (p)(8) of this section [1910.120 or 1926.65], and cannot be exempted by (p)(8)(i) of this section [1910.120 or 1926.65].

What is the application of HAZWOPER to TSD facilities that store hazardous materials for 90 days or less?

Conditionally-exempt small quantity generators and generators who store hazardous wastes for less than 90 days are exempt from compliance with sections (p)(1) through (p)(7), and are thus covered only by section (p)(8), the emergency response program.

Employers who have hazardous waste storage areas in their facilities have the option of meeting the emergency response requirements of HAZWOPER by complying with either paragraph (p)(8) or paragraph (q) for those areas. The employer must meet the requirements of paragraph (q) for other areas of their facility which have potential for emergency releases of hazardous substances or hazardous raw materials.

... [Regarding the] exemption from employee training requirements under paragraph (p)(8) if the employer intends to evacuate employees in the event of an emergency. Paragraph (p)(8)(i), like paragraph (q)(1), provides an exemption from the emergency response requirements if the employer intends to evacuate all employees and provides an emergency action plan (i.e., an evacuation plan) in accordance with 29 CFR 1910.38(a).

However, the HAZWOPER standard states in paragraph (a)(2)(iii)(B) that "employers who are required by the EPA or state agency to have their employees engage in emergency response... are covered by paragraph (p)(8) of this section, and cannot be exempted by (p)(8)(i) of this section."

OSHA COMPLIANCE MANUAL

Inspection procedures for the HAZWOPER standard: Excerpts from OSHA compliance directive CPL 2-2.59A

The following information is taken from CPL 2-2.59A, which OSHA issued in April 1998 to establish policies and provide clarification for the uniform enforcement of paragraph (q) of the Hazardous Waste Operations and Emergency Response standard (HAZWOPER). Section 1910.120 of the General Industry regulations covers emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to the location of the hazard.

Appendix B of CPL 2-2.59A Guidance for emergency response compliance inspection

This appendix provides uniform guidance for OSHA compliance officers when conducting an inspection. For the employer, the information in this checklist gives valuable insight to fulfilling the requirements in §1910.120(q), Emergency response to hazardous substance releases.

Review the Emergency Response Plan (ERP)

1. Do the provisions of §1910.120(q) apply to the employer? (Would the substances present onsite require an emergency response if released?)
2. Which compliance strategy does the employer use? Evacuation of all employees in accordance with §1910.38(a), or emergency response by employees in accordance with §1910.120(q)?
3. Does the employer have an emergency response plan or an emergency action plan? If not, cite paragraph §1910.120(q)(1).
4. If the employer does not have an ERP but expresses an intent to evacuate all personnel and not allow any employees to respond, does the employer have an emergency action plan in accordance with §1910.38(a) (may be communicated orally to employees by employers with 10 or fewer employees)? If not, then cite §1910.38(a).
5. If the employer does not have an emergency response plan but has an emergency action plan, is the emergency action plan adequate? If not, then cite §1910.38(a).
6. Emergency Action Plan compliance checklist:
    - Is the Plan in writing (may be communicated orally to employees by employers with 10 or fewer employees)?
    - Are emergency escape procedures and emergency escape routes designated?
    - Are procedures established to account for all employees after the emergency evacuation has been completed?
    - Has an employee alarm system which complies with §1910.165 been established?
    - If an employee alarm system is used for other purposes, have distinctive signals for each purpose been developed?
    - Has the employer designated and trained a sufficient number of persons to assist in the safe and orderly evacuation of employees (generally one per 20 employees)?
    - Has the employer reviewed the emergency action plan with each employee covered by the plan initially, and when the plan or the employee's responsibilities under the plan change?
    - Is the written plan kept at the workplace (may be communicated orally to employees by employers with 10 or fewer employees) and made available for employee review?

- Has the plan been effectively communicated and implemented by the employer to ensure that employees do not assist in handling emergencies, or does the employer actually intend to have employees respond to emergencies?
- Does the employer intend to have employees handle incidental releases? If so, are the training, tools, equipment, and PPE appropriate for handling incidental releases of the hazardous substance available in the work area?
- Does the employer have procedures for notifying both inside and outside parties of incidents? Employees may be placed at risk in situations where they are required by the plan to remain in a temporarily safe area to shut down an operation, and the plan does not have procedures for the employer to ensure that outside responders are notified in a timely manner. CSHOs should look closely at emergency action plans that do not have procedures for immediately contacting the local fire department and other outside parties in order to determine whether such plans place any workers at risk.

NOTE: The term "outside parties" means outside responders (fire departments, police, private hazmat teams, emergency medical service personnel, and other pertinent components of the local, state, and federal emergency response system) and other employers in the surrounding area who could be affected by a hazardous substance emergency incident.

7. Is the Emergency Response Plan (ERP) in writing?
8. Is the ERP easily accessible to employees?
9. Does the employer make use of the local or State ERP in the company ERP? If so, does the local or State ERP adequately provide employee protection for this employer?

NOTE: Emergency response organizations may use the local or State ERP as part of their ERP to avoid duplication. However, the plan must address all of the provisions listed in §1910.120(q)(2) and (q)(3).

10. Does the ERP reflect pre-emergency planning and coordination with outside parties?
    - Does the plan describe procedures or existing agreements addressing how the outside parties are to be notified of an potential emergency situation and what role each should play in an incident?
    - If any response coordination procedures or agreements are included in the plan, are the local fire department and other selected outside emergency response parties aware of their roles and responsibilities as described in the plan?
    - Can outside responders identify any reasons that were not considered by the employer that would delay or prevent them from responding to an incident (e.g., distance, lack of training, etc.)?
11. Are personnel roles, lines of authority, training, and communication provided in the ERP?
12. Does the ERP address emergency recognition and prevention?
13. Does the ERP address safe distances and places of refuge adequate for all employees who may need it?
14. Does the ERP designate equipment, people, and procedures to ensure site security and control?
15. Are evacuation routes and procedures developed, and do they work well with the methods developed for emergency alerting and the designation of places of refuge?
16. Does the ERP address the setting up of a decontamination station, and the decontamination of personnel and equipment?
17. Are emergency medical treatment and first aid available to employees during an emergency response?
18. Are emergency alerting and response procedures addressed in the ERP? Is there evidence of an alerting and response system?
19. Does the ERP address the types and uses of PPE and emergency response equipment to be used?
20. Does the ERP provide procedures for the critique of emergency responses?
21. Are there any other features that are missing or should be addressed in the employer's ERP?

NOTE: The elements listed in §1910.120(q)(2) are minimum requirements. The performance-oriented aspect of the ERP is in §1910.120(q)(1), which states that the ERP "shall be developed and implemented to handle anticipated emergencies prior to the commencement of emergency response operations."

Review procedures for handling emergencies

1. Has a single individual been identified as the On-Scene Incident Commander?
2. Is there a system in place that passes the senior official position up the line of authority as more senior officials arrive on the scene?

NOTE: The senior official assists the On-Scene Incident Commander, "the individual in charge of the Incident Command System" in §1910.120(q)(3).

3. Has a safety official been identified?

NOTE: In smaller responses, the On-Scene Incident Commander may play this role.

Review training requirements

1. Has the employer certified that the employee has been provided training?

NOTE: The employee does not necessarily have to be provided with a certificate, although the employer must certify in writing that employees who have successfully completed the first responder operations, HAZMAT Technician, HAZMAT Specialist, and On-Scene Incident Commander levels are trained.

2. If employee training is done in-house, is training based on the specific duties and functions to be performed at the site?

NOTE: Keep in mind that OSHA does not endorse training programs, but may offer suggestions as to their comprehensiveness.

3. Does the employer have a "statement of training" or "statement of competency" for annual refresher training or competency for all employees trained in emergency response?

NOTE: Methods of demonstrating competency include critiques of actual incidents or "dress rehearsals" which identify any weakness and effectiveness of the response effort.

4. If employee annual refresher training is done in-house, is training adequate for the site?

NOTE: Keep in mind that OSHA does not endorse training programs, but may offer suggestions as to their comprehensiveness.

Review medical surveillance

1. Does the employer furnish the employee with the physician's written opinion indicating medical results and whether the employee is capable of working with hazardous materials?
2. Is medical recordkeeping done in a manner consistent with §1910.1020, Access to Employee Exposure and Medical Records?

Review of Personal Protective Equipment Program. Ask to review the written PPE Program required in §1910.120(q)(10).

NOTE: Subparagraph §1910.120(q)(10) refers to the provisions for PPE in §1910.120(g)(3)-(g)(5).

1. Is the PPE chosen sufficiently protective of employees, based on hazards and potential hazards?
2. Is the PPE maintained and inspected routinely?
3. Does the PPE appear to be in good condition and up to date?
4. Is air monitoring equipment available to assist the Incident Commander in determining when to increase or lower the level of PPE?

Employee interview questions

1. Does the employee have access to the ERP?
2. Has the employee ever been through an emergency response drill or an evacuation drill? Is the employee aware of the evacuation route in the event of an emergency?

NOTE: Drills may be required by SARA title III if the facility or emergency response organization is designated to be part of a community emergency response.

3. Is the employee expected to take any action, other than evacuation, during an emergency? If so, what level of training does the employee have?
4. Does the employee feel the training was sufficient to perform expected duties and functions during an emergency as an emergency responder?
5. Does the employee know how to select, use, and inspect the PPE designated for employee use during an emergency?
6. Have the employees been fitted properly for PPE?

NOTE: §1910.120(q)(10), Chemical protective clothing, refers to the provisions in §1910.120(g)(3)-(5): PPE selection (which requires selection and use of PPE in compliance with Part 1910, Subpart I), totally encapsulating chemical protective suits and a written PPE program.

7. Does the employee know how to use the emergency response equipment designated for use in performing control, containment and/or confinement operations?
8. If possible, interview the designated On-Scene Incident Commander to determine if the individual:
    - Is aware of the potential hazards and/or benefits associated with certain PPE and engineering controls;
    - Is capable of implementing appropriate emergency operations;
    - Can really designate a safety official;
    - Can implement appropriate decontamination procedures;
    - Has received training as an On-Scene Incident Commander.
9. Has the employee gone through refresher training or demonstrated competency annually?
10. Have employees who are entitled to a baseline physical and periodic consultations received them?

NOTE: Designated members of HAZMAT Teams and HAZMAT Specialists must receive baseline physicals and be part of a medical surveillance program.

11. Are employees offered medical consultation following the development of signs or symptoms resulting from exposure to hazardous substances during an emergency incident?

OSHA COMPLIANCE MANUAL

Appendix D of CPL 2-2.59A
HAZWOPER interpretive guidance

This appendix includes clarifications and interpretations to the most frequently asked questions regarding §1910.120 paragraph (q), Emergency response to hazardous substance releases. Where possible, clarifications are keyed to the most applicable paragraph or subparagraph of the HAZWOPER standard.

Scope, application, and definitions
§1910.120(a)

How (a)(1) "Scope" affects certain employers who may be engaged in hazardous waste operations

1. *Asbestos removal (a)(1)(v)*

   Occupational exposure to asbestos in all industries covered by the Occupational Safety and Health Act falls under the scope of §1910.1001, except as provided by 1910.1001(a)(2) and (a)(3). Employees are covered under §1926.1101 at construction sites and during asbestos work which involves the removal, repair, maintenance, or demolition, even if such work is performed within a facility otherwise regulated under the general industry standard. In certain emergency situations the HAZWOPER standard will apply, e.g., when asbestos is released during a transportation accident.

2. *Construction (a)(1)(i)-(v)*

   Hazardous waste operations and emergency response for construction sites is covered by §1926.65, and this directive. Paragraph (a)(2) defines the applicability of the construction HAZWOPER standard. Paragraph (a)(2)(i) states that all requirements of 29 CFR Part 1910 and Part 1926 apply pursuant to their terms to hazardous waste and emergency response operations whether covered by §1926.65 or not, and when there is a conflict between requirements, "the provision more protective of employee safety and health shall apply...."

   If an employee on a construction site is directed to engage in emergency response involving hazardous substances, then the employer is subject to all of the provisions of §1926.65(q). However, construction employers may direct that all of their employees evacuate in an emergency, and would comply with HAZWOPER paragraph (q) by having a written emergency action plan in accordance with §1926.35. (Employers who have 10 or fewer employees may communicate the emergency action plan verbally.)

3. *Contractors (a)(1)*

   Contractor employees must receive HAZWOPER training if their duties or activities fall within the scope of the standard. If a contractor is expected to be part of an emergency response, the employer must comply with the provisions of §1910.120(q). Contractors who have employees that will be called in as specialists or skilled support personnel must act in accordance with the HAZWOPER standard.

   (a) Shared responsibility. Both contractors and their clients are responsible for complying with the OSHA regulations. OSHA considers personnel providers/contractors who send their own employees to work at other facilities (e.g., utility workers) to be employers whose employees may be exposed to hazards.

   Since the contractor maintains a continuing relationship with employees, but it is the client who creates and controls the hazards, there is a shared responsibility for ensuring that employees are protected from workplace hazards. The client has the primary responsibility for such protection; however, the contractor-employer has a continuing responsibility under the OSH Act.

   (b) Contracts. It is in the interest of the contractor-employer to ensure that all steps required in the OSHA standards have been taken by the client employer to ensure a safe and healthful workplace for the contracted employees. Written contracts with clients should clearly describe the responsibility of both parties in order to ensure that all requirements of the standards are met. (See OSHA

Instruction CPL 2.103, the Field Inspection Reference Manual (FIRM), Chapter III.C.6., on Multi-employer Worksites.

4. *Hospitals as part of a community emergency response (a)(1)(v)*

Under the Superfund Amendments and Reauthorization Act (SARA) of 1986, the National Contingency Plan (NCP) was revised to require communities to prepare local emergency response plans. Designated local hospitals who will participate in the local planning committee are considered part of the emergency response organization.

(a) Hospitals with responsibility under the NCP. Hospitals, or other emergency medical services who are designated by the LEPC, SERC or local fire department, do not have to develop an entire emergency response plan for community emergency response because their role will be addressed in the contingency plan. The hospital should have designated decontamination areas, although areas dedicated solely to decontamination need not be set aside.

In terms of a community emergency response, a hospital is not expected to comply with §1910.120 if it has not been designated by a planning committee or by a hazardous waste site as a decontamination facility. The hospital may have responsibility under 1910.120(q) in terms of the potential for an emergency caused by the release of hazardous substances used at the hospital.

(b) Training in decontamination. Hospitals that will receive contaminated accident victims must stress decontamination and personal protective equipment (PPE) in the training for personnel designated to set up decontamination. For medical personnel who will receive and decontaminate accident victims, employers may develop an in-house training course that would focus on decontamination and PPE or provide additional training in decontamination and PPE after sending personnel to a standard "first responder operations level" course.

(c) Emergency medical services at release area. Facilities that create an emergency response plan under §1910.120 must coordinate with hospitals or other medical care providers prior to emergencies in case victims will need to be decontaminated at a hospital (§1910.120(q)(2) and (l)(2) list "emergency medical treatment and first aid" as one of the elements to be covered in the emergency response plan). If a hospital is selected by a facility, it must be made aware of a facility's intent to use its services so that the hospital may ensure that it is prepared for its duties (e.g., has PPE, methods of containing the hazardous material and waste water, etc.)

Hospitals that employ emergency medical service personnel who would be exposed to hazardous substances because they are expected to treat contaminated patients at the release area (i.e., ambulance personnel), are required by §1910.120(q) to train these personnel to safely perform these duties.

Other medical personnel whose expected job duties do not include treating contaminated patients may be needed to respond to accidents where the chemical's hazards were unforeseen. These employees may be considered "skilled support personnel" and must be given an initial briefing that includes instruction in the wearing of appropriate PPE, any limitations of the PPE, the chemical hazards involved, and the facility's safety and health precautions.

Employee exposure
§1910.120(a)(1)

Employee exposure or the reasonable possibility of employee exposure to safety or health hazards must consider all routes of entry (inhalation, ingestion, and skin absorption) without regard to the use of PPE. The exposure or potential exposure must be associated with a hazardous substance from operations addressed in (a)(1)(i-iv) or with the release of a hazardous substance during operations addressed in paragraph (a)(1)(v) of the standard.

Safety hazards from a hazardous substance could include fire, explosion, corrosive action, etc., from flammables, corrosive materials, etc. associated with the work site or emergency site. Health hazards from a hazardous substance could include cancer or organ function impairment from toxic, carcinogenic, or infec-

tious material associated with the work site or emergency site. Safety hazards from sources not specifically associated with the hazardous substances at the work site or the emergency site (e.g., trenching, moving machinery, slips, trips, and falls) do not require coverage under HAZWOPER. Employees are considered "exposed" when they encounter any amount of a hazardous substance in the work environment that could cause them harm.

Jurisdictional issues involving the provisions in "application" §1910.120(a)(2)

1. *U.S. Department of Transportation (a)(2)*

   The Hazardous Materials transportation Uniform Safety Act (HMTUSA) of 1990 concerns the handling of hazardous materials in the transportation industry. Under Section 7 of that act the regulation entitled "Hazardous Materials; training for Safe transportation; Rule" (49 CFR 171-177), requires employers to train their employees in the safe loading, unloading, handling, storing, and transportation of hazardous materials.

   - OSHA has limited jurisdiction for over-the-road vehicle operation. If operators of vehicles in transportation become actively involved in an emergency response to a release of hazardous substance, then they are covered by §1910.120(q).
   - The operators of vehicles involved in an emergency response would need to be trained at least to the first responder awareness level to recognize an emergency situation, understand their role in an emergency response, and call predesignated authorities for the containment and control of the release.

2. *U.S. Department of Transportation. U.S. Coast Guard (USCG) (a)(2)*

   The USCG has issued comprehensive standards regulating the safety and health of seamen (this term is intended to be non-gender specific and includes women) performing work on vessels which have been inspected and certified by the USCG ("inspected vessels"); therefore, OSHA does not apply its standards to these employees. The USCG has also issued some standards affecting the safety of seamen on uninspected vessels.

   - With these exceptions, OSHA has jurisdiction for seamen aboard vessels located on the waters within a 3-mile limit, or in the case of Florida and Texas, within the limit of three marine leagues (the territorial waters). OSHA also has jurisdiction for employees performing work on shore or at other locations not aboard a vessel but within U.S. territorial waters.
   - OSHA is not prohibited from inspecting USCG "inspected vessels" if non-seamen (e.g., contractors) are on board. (See the "Memorandum of Understanding Between the United States Coast Guard, U.S. Department of transportation, and the Occupational Safety and Health Administration, U.S. Department of Labor, Concerning their Authority to Prescribe and Enforce Standards or Regulations Affecting the Occupational Safety and Health of Seamen Aboard Vessels Inspected and Certificated by the United States Coast Guard," effective March 8, 1983.)

3. *Employees of governmental agencies and non-compensated workers (a)(2)*

   Public sector employees in states with an OSHA-approved State plan are protected by the hazardous waste standards adopted by these State plans.

   - The U.S. Environmental Protection Agency (EPA) promulgated a standard that adopts §1910.120 to protect employees who work in the public sector where there is no OSHA approved State program in place (40 CFR 311).
   - In addition, EPA specifically included "non-compensated workers" (i.e., volunteer workers) who work for governmental agencies engaged in emergency response, such as volunteer fire fighters. Therefore, volunteers who will take part in operations involving hazardous substances must be trained in accordance with the applicable sections of §1910.120.

- States with OSHA-approved State plans are encouraged both by OSHA Instruction STP 2-1.154C and EPA's standard, 40 CFR 311, to cover volunteer workers engaged in hazardous waste operations, including emergency response.
- EPA and OSHA have agreed that interpretations regarding compliance with HAZWOPER will be made by OSHA.

Clarification and interpretation of terms used in "definitions" §1910.120(a)(3)

1. *Emergency response*

   An "emergency response" is an organized response to an incident that is, or may pose, an emergency. Since every industry will experience different kinds of emergencies, OSHA will not attempt to create a formula into which all emergencies will fit. (See Appendix E of this instruction for further guidance.)

2. *Immediate release area*

   The immediate release area is the area, process, or machine which is creating the hazardous spill. This term is not meant to be used exclusively to determine whether a situation is an emergency under this standard. The key factor that must be considered on a case-by-case basis is the actual or estimated exposure or degree of danger to responders, other employees, neighbors, etc.

   In order to determine this, factors such as the size of the spill/release, the material of the spill, and the location of the incident (e.g., confined space) play a significant role. Planning must take place prior to any releases that pose an emergency. An employer must determine all likely potentials for emergencies using worst-case assumptions and plan response procedures accordingly. Past history of emergencies at the site should be used as a guide.

3. *Hazardous substance, radioactive*

   The term "hazardous substance" as defined by §1910.120 includes radioactive waste in addition to hazardous waste, and should not be confused with §1910.1200, Hazard Communication, which specifically excludes any radioactive chemicals.

   - The U.S. Nuclear Regulatory Commission (NRC) has jurisdiction "inside the fence" at NRC licensed nuclear facilities for the risks involved with licensed radioactive materials, including emergency response procedures. OSHA has jurisdiction "inside the fence" for non-licensed radioactive materials.
   - There may be both NRC and OSHA jurisdiction when there is an emergency involving mixed wastes (licensed radioactive materials and other hazardous substances) "inside the fence." HAZWOPER may also be applicable "outside the fence" to emergency response and clean-up activities involving hazardous substances, including licensed radioactive wastes.

4. *Infectious materials*

   Employers must include infectious materials in their effort to comply with §1910.120(q) if there is a possibility that a release could cause an emergency.

   - The definition of "hazardous substance" used in the standard was corrected in the *Federal Register*, April 13, 1990, to include:

     (B) Any biological agent and other disease causing agent which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring.

- Employers with employees engaged in emergency response activities involving infectious materials must comply with the requirements in §1910.120(q), and may also have to comply with the Bloodborne Pathogens standard, §1910.1030. If there is a conflict or overlap, the provision that is more protective of employee safety and health applies.

5. *Mixtures containing a hazardous substance*

The hazards of a mixture containing hazardous substances would be expected to be treated as a hazardous substance for compliance purposes, unless testing data on the mixture shows that the mixture does not possess hazardous characteristics.

Emergency response to hazardous substance releases
§1910.120(q)

Lack of an emergency response plan
§1910.120(q)(2)

If a facility does not have an emergency response plan, the employer must at least have an emergency action plan and evacuate all employees. In the event that an employer does not plan for emergencies by not complying with either provision, the employer must prove that the chemicals used in the facility will not require an emergency response if released in a reasonably predictable worst-case scenario. CSHOs must still document violations fully and be able to defend any citations. Past history of any emergencies at the site may be used as a guide.

Pre-emergency planning and coordination with outside parties
§1910.120(q)(2)

This means the establishment of procedures between employers and outside parties addressing how each party is to be notified, and what their roles are in the event of an emergency incident. The term "outside parties" means outside responders (fire, police, etc.) and other employers in the surrounding area who could be affected by a hazardous substance emergency incident.

Evacuation routes and procedures
§1910.120(q)(2)

CSHOs shall use §1910.38(a) to serve as an example of what employers need to address in the section of the emergency response plan that requires "evacuation routes and procedures" to be addressed in §1910.120(q)(2)(vi).

Specialist employees
§1910.120(q)(5)

The "specialist employees" category is to be used for employees from off-site who assist or advise the on-scene Incident Commander (IC). These employees may be individuals who work with and are trained in the hazards of a specific hazardous substance, but do not necessarily have all of the competencies of the HAZMAT technician or HAZMAT specialist.

1. Specialist employees who may be sent to the scene of an emergency to advise and assist the person in charge must receive training or demonstrate competency annually. (See §1910.120, Appendix C, section 2 for more details.)
2. Activities of all emergency responders responding to or on the scene of a release of a hazardous substance must be coordinated and controlled through the individual in charge of the Incident Command System, as per §1910.120(q)(3)(i). Specialist employees are not exempted from this requirement.

Training
§1910.120(q)(6)(i)

Fire fighters and police officers who are expected to be engaged in responding to emergencies involving hazardous substances are subject to the HAZWOPER training requirement.

- Generally, police officers should be trained to the first responder awareness level, since they are likely to witness or discover a release of a hazardous substance.
- Fire fighters expected to respond to releases of hazardous substances must be trained to at least the first responder operations level, since they will respond to releases, or potential releases, of hazardous substances for the purpose of protecting nearby persons, property, or the environment.

1. *First responder operations level (q)(6)(ii)*

   Fire fighters responding to propane and gasoline fires:

   - Fire fighters trained to the operations level, who are also trained in the hazards of propane, may enter the danger area to shut off the valves that will starve the fire and thus extinguish it. Normally, employees trained to the operations level would be restricted from taking aggressive action. This is considered to be a special case. The principle hazards from propane are fire and explosion, not toxicity. Because propane fires are common, most fire fighters are fully trained and equipped to respond to propane fires, including taking aggressive action by shutting off the valves in the danger area.

     If fire fighters are fully trained and equipped (which is a high degree of training), and have also received first responder operations level training, OSHA believes they have sufficient training to take aggressive action due to propane's relatively low toxicity. However, it would be only a technical violation of §1910.120(q)(6) for not having the additional training required of a HAZMAT technician if a fire fighter took aggressive action in the danger area during a propane fire or leak, was fully trained and equipped to handle the fire, and had first responder operations level training. In this circumstance OSHA would not issue a citation.

   - Releases of gasoline similar to the example involving propane discussed above may be addressed by operations level emergency responders if they have the required PPE, emergency response equipment, and specific training in the safety and health hazards associated with gasoline.

     Employers who expect fire fighters to shut off a gasoline valve in the danger area, and who can show that employees are trained to the operations level and adequately trained in the hazards of gasoline, have committed a technical violation of §1910.120(q)(6)(iii) for such employees not having the training required of a HAZMAT technician.

     NOTE: The fire and explosion hazards of propane and gasoline are very substantial. The interpretations herein are applicable only when fire fighters are fully trained and equipped to handle the explosion and fire hazards of propane, gasoline, or similar flammable gases and liquids.

   - If an injury occurred during an emergency response involving these responders (operations level plus additional training) the CSHO would need to consider whether the responders' training and experience were sufficient for the tasks being performed.

     A violation of training requirements that resulted in an actual injury to an employee during an emergency response by definition cannot be a "technical violation." Thus, if an injury occurred and the CSHO determined that the responders' training and experience were not sufficient for the tasks being performed, then a citation should be issued noting a violation of §1910.120(q)(6)(iii) and carrying a penalty that requires abatement. Whether abatement should require full training in all of the competencies of the HAZMAT technician level, or whether certain training requirements could safely be omitted, would depend on the training needed to safely perform the tasks in question.

     If, however, the CSHO determined that the training that had been provided to the employees in question had been adequate, then the training violation would be considered a de minimis violation and no citation would be issued for inadequate training. In this situation the CSHO might determine that the cause of the injury was due to a violation of some other requirement of

§1910.120 or other standards, for which a citation carrying a fine and requiring abatement would be appropriate.

2. *Process operators responding within a facility (q)(6)(iii)*

   Process operators who have (1) informed the incident command structure of an emergency (defined in the facility's emergency response plan), (2) adequate PPE (3) adequate training in the procedures they are to perform, and (4) employed the buddy system, may take limited action in the danger area (e.g., turning a valve) before the emergency response team arrives. The limited action taken by process operators must be addressed in the emergency response plan.

   - Once the emergency response team arrives, these employees would be restricted to the actions that their training level allows. This limited action assumes that the emergency response team is on its way and that the action taken is necessary to prevent the incident from increasing in severity (i.e., to prevent a catastrophe).
   - Employers must inform employees during their training that they are to evacuate when they lack the capabilities to respond in a safe manner and in accordance with the standard operating procedures defined in the emergency response plan.
   - If the process operator takes action beyond what they have been trained to do, and the action was comparable to the aggressive role that a HAZMAT technician would take, CSHOs shall cite the employer for a violation of §1910.120(q)(6)(iii). If the operator takes action beyond that which they have been trained to do, and the action was comparable to the defensive role that a first responder at the operations level would take, CSHOs shall cite the employer for a violation of §1910.120(q)(6)(ii).

3. *On scene incident commander (q)(6)(v)*

   The intent of the standard is to provide an incident command system that is headed by a single person who is well trained in managing emergencies of differing severity, as well as overseeing the HAZMAT team, but does not necessarily have extensive knowledge of certain technical aspects such as classification and verification of hazardous materials. Appendix C, section 6 of the standard explains:

   > "This enable[s] one individual to be in charge of managing the incident, rather than having several officers from different companies making separate, and sometimes conflicting, decisions. The individual in charge of the [incident command system] would delegate responsibility for performing various tasks..."

   Consequently, the IC requires more training in general matters, plus extensive training in command and management.

   - Training for the IC may require more than 24 hours of total training. The 24 hours covers §1910.120(q)(6)(ii)(A)-(F), and additional training would be needed for (6)(v)(A)-(F). The training hours suggested in the standard are minimums. HAZWOPER training programs often must exceed the 8, 24, or 40 hours minimums in order to include all of the required subjects.

4. *Limiting training components (q)(6)*

   An employer with a limited range of hazardous substances on-site may opt to supply their personnel with one type of PPE and require employees to wear the entire complement of PPE for any response. This strategy would relieve that particular employer of the requirement of training HAZMAT technicians to be able to "select appropriate PPE," if employees are trained in the PPE that they are required to wear and this PPE will always provide sufficient protection.

   NOTE: If an employer selects a single type of PPE for all releases that require an emergency response, the employer must be sure to evaluate the full range of performance criteria that PPE must meet, such as likely chemical exposures, heat stress, physical constraints, maintenance, and permeability.

   - Another example of requirements specified in the standard that may not be universally applicable is found in §1910.120(q)(6)(iii)(B), training for HAZMAT technicians, where knowledge of "the classification, identification, and verification of known and unknown materials by using field survey instru-

ments and equipment" is required. In many chemical manufacturing facilities this may not be necessary, because hazardous substances that have a potential for being released are known.

The emergency response plan and training components may cover this by identifying the known hazardous substances that would cause, or have the potential to cause, an emergency if released. Where mixtures of hazardous substances may occur in an emergency and/or hazardous byproducts may be formed during an emergency, the plan must anticipate, identify, and include training components about these mixtures or byproducts.

Employees trained in this limited manner would only be able to respond to spills on site that involve the limited range of hazardous substances in which they are trained. For example, employees trained to respond only to releases of chlorine may not respond to a release of ethylene oxide, without broadening their limited training.

5. *Training alternatives for employers (q)(7)*

   A video-only approach to train employees would not be sufficient, although videos could be used for part of the training if the employer can fully assure that the employee has sufficient knowledge and skills. Providing an instructor to respond to the employees' questions after the video presentations, and evaluating employee understanding of the material would be required. Higher levels of training would require hands-on training and more interaction with the instructor.

   - An in-house training program, among other options, may be developed. Credential requirements for trainers are defined in §1910.120(q)(7).
   - Equivalent training for first responder awareness level and first responder operations level is acceptable, as per §1910.120(q)(6)(i) and (ii), which state that employees must "have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas...." The employer must ensure, however, that the employee accomplishes all training objectives.
   - Refresher training (q)(8). Refresher training is required because employees must stay up-to-date in their skills and knowledge. If the employee has gone without refresher training for more than twelve months, the employer must evaluate whether the initial comprehensive training may need to be repeated.

Medical surveillance
§1910.120(q)(9)

Under §1910.120, employers are obligated to make medical surveillance and medical consultation available to specific employees without cost to the employees. However, OSHA does not require employees to participate. A record should be made in employees' personnel files indicating that the employees voluntarily chose not to take part in the medical surveillance program. The CSHO may choose to interview the employees entitled to medical surveillance whose personnel files indicate that they waived their right.

Selection of personal protective equipment
§1910.120(q)(10)

PPE shall be selected and used with the intent to protect employees from hazards and potential hazards.

1. In situations where the type of hazard is fire or thermal energy, then §1910.120(q)(3)(iii) must be followed, and when the type of chemical and its concentration are "totally unknown" or "somewhat known," the appropriate level of protection must be based on experience, judgment, and professional knowledge.
2. Obtaining air measurements with monitoring equipment for toxic concentrations of vapors, particulates, explosive potential, and the possibility of radiation exposure, would be appropriate in determining the nature, degree, and extent of the hazards. Also, use visual observation and review the existing data (including material safety data sheets).

Emergency response/post-emergency operation
§1910.120(q)(11)

As long as an emergency response team is still in control of the site and a safety or health hazard exists, the emergency situation continues to be in effect. For example, if a vacuum truck arrives to remove spilled gasoline while an emergency response team is managing the activity, the vacuum truck operator's activity is part of the emergency response operations. Once the IC has declared the response activity over or finished, and the immediate threat has been stabilized, any remaining clean-up would be considered a post-emergency operation.

1. In a large release, emergency response and post-emergency response activities may occur simultaneously, as in a marine oil spill. The IC must be careful to define the boundaries between the emergency response area and the post-emergency area in this scenario. (See OSHA Instruction CPL 2-2.51.)
2. The IC must convey information on all of the hazards that may still remain at a post-emergency clean-up site to employees who are involved in the clean-up operations. The individuals who will take control of the site to perform the post-emergency response clean-up also have a responsibility to contact the IC to determine if there are any remaining hazards or any special conditions on the site. If the IC feels that the post-emergency response clean-up crews are not sufficiently trained or prepared to perform their duties, the Commander may notify the employer or OSHA.

Post-emergency response for contract personnel
§1910.120(q)(11)(i) and (ii)

1. Contract personnel assigned full time at a plant facility are considered "plant or workplace employees" for the purposes of §1910.120(q)(11)(ii) when such employees are conducting clean-up in areas they routinely work.
2. Contractors brought in specifically for clean-up are covered by §1910.120(q)(11)(i).

Emergency response during a post-emergency response
§1910.120(q)(11)

If an emergency release of a hazardous substance occurs during a post emergency response clean-up, the HAZWOPER emergency response provision that applies would depend upon who is handling the clean-up, who will be responding, and whether the clean-up is done on plant property.

1. If the emergency is responded to by an outside response team or responders, §1910.120(q) would apply.
2. Employees who work at a hazardous waste clean-up site or RCRA corrective action (a post emergency response may be considered either), and are trained in accordance with §1910.120(e)(7), may respond to emergencies at that site.
3. The contractor hired for the clean-up procedure may respond to emergencies during the clean-up if the contractor's employees who are involved in the clean-up are trained in accordance with §1910.120(e)(7) and (l).

OSHA COMPLIANCE MANUAL

Appendix E of CPL 2-2.59A
Releases of hazardous substances that require an emergency response

The function of this appendix is to present a thorough discussion of the distinction between incidental releases of hazardous substances and releases that require an emergency response, and hence, compliance with the provisions of §1910.120(q), Emergency response to hazardous substance releases. This has been a point of considerable inquiry to and interpretation by OSHA.

An understanding of the distinction between an incidental release of a hazardous substance and a release that requires an emergency response is fundamental to proper compliance with the provisions of §1910.120(q). This part of the standard was written to cover a wide array of facilities and situations: "Emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to the location of the hazard." (§1910.120(a)(1)(v))

Potential releases of hazardous substances in the workplace can be categorized into three distinct groups in terms of the planning provisions of §1910.120(q). These groups are:

1. Releases that are clearly incidental regardless of the circumstances,
2. Releases that may be incidental or may require an emergency response depending on the circumstances, and
3. Releases that clearly require an emergency response regardless of the circumstances.

Releases that are clearly incidental

The scope of the HAZWOPER standard does not cover the inevitable release of a hazardous substance that is limited in quantity and poses no emergency or significant threat to the safety and health of employees in the immediate vicinity. This type of release is referred to as an "incidental release" in §1910.120(a)(3), where "emergency response" is defined.

An incidental release is a release of hazardous substance which does not pose a significant safety or health hazard to employees in the immediate vicinity or to the employee cleaning it up, nor does it have the potential to become an emergency within a short time frame. Incidental releases are limited in quantity, exposure potential, or toxicity and present minor safety or health hazards to employees in the immediate work area or those assigned to clean them up.

If the hazardous substances that are in the work area are always stored in very small quantities, such as a laboratory which handles amounts in pint sizes down to test tubes, and the hazardous substances do not pose a significant safety and health threat at that volume, then the risks of having a release that escalates into an emergency are minimal. In this setting incidental releases will generally be the norm and employees will be trained to protect themselves in handling incidental releases per the training requirements of the Hazard Communication standard (§1910.1200).

> For example, a tanker truck is receiving a load of hazardous materials at a tanker truck loading station. At the time of an accidental spill, the product can be contained by employees in the immediate vicinity and cleaned up utilizing absorbent without posing a threat to the safety and health of employees. As such, the employer may respond to such incidental releases (as permitted by §1910.120 definition: "Emergency response" or "Responding to emergencies").

This situation describes an "incidental spill" under the HAZWOPER. An incidental spill poses an insignificant threat to health or safety, and may be safely cleaned up by employees who are familiar with the hazards of the chemicals with which they are working.

Releases that may be incidental or require an emergency response depending on the circumstances

The properties of hazardous substances, such as toxicity, volatility, flammability, explosiveness, corrosiveness, etc., as well as the particular circumstances of the release itself, such as quantity, confined space considerations, ventilation, etc., will have an impact on what employees can handle safely and what procedures should be followed. Additionally, there are other factors that may mitigate the hazards associated with

a release and its remediation, such as the knowledge of the employee in the immediate work area, the response and personal protective equipment (PPE) at hand, and the pre-established standard operating procedures for responding to releases of hazardous substances. There are some engineering control measures that will mitigate the release that employees can activate to assist them in controlling and stopping the release.

These considerations (properties of the hazardous substance, the circumstances of the release, and the mitigating factors in the work area) combine to define the distinction between incidental releases and releases that require an emergency response. The distinction is facility-specific and is a function of the emergency response plan.

> For example: A spill of the solvent toluene in a facility that manufactures toluene may not require an emergency response because of the advanced knowledge of the personnel in the immediate vicinity and equipment available to absorb and clean up the spill. However, the same spill inside a furniture refinishing shop with personnel that have had only the basic hazard communication training on toluene, may require an emergency response by more highly trained personnel. The furniture refinishing shop's emergency response plan in this case would call for evacuation for all but the most minor spills, while evacuation and emergency response would be necessary for only much larger spills at the chemical manufacturing facility.

Releases that require an emergency response regardless of the circumstances

There are releases of hazardous substances that pose a sufficient threat to health and safety that, by their very nature, require an emergency response regardless of the circumstances surrounding the release or the mitigating factors. An employer must determine the potential for an emergency in a reasonably predictable worst-case scenario (or "anticipated emergencies," §1910.120(q)(1)) and plan response procedures accordingly.

> For example, a motor carrier is engaged in the transportation of hazardous materials. At the time of an accidental release, the product cannot be contained by employees in the immediate vicinity and cleaned up utilizing absorbent. Because of the larger problem, the motor carrier's employees evacuates the area and call for outside help, as instructed by employer.

In this instance, if in the event of a spill of a hazardous substance an employer instructs all of his/her employees to evacuate the danger area, then the employer may not be required to train those employees under §1910.120. However, the ability to decide whether a spill is an incidental spill or one requiring an emergency response requires training. Also, any employees who are expected to become actively involved in an emergency response due to a release of a hazardous substance are covered by §1910.120 and must be trained accordingly. (Note: OSHA has limited jurisdiction for over-the-road vehicle operation. In the instance of spills occurring while the material is on the vehicle or otherwise "in transportation," OSHA's HAZWOPER standard does not cover the operator per se. It does, however, cover emergency response personnel who respond to the incident. If the operator of the vehicle in transportation becomes actively involved in an emergency response, then he/she becomes an emergency responder and is covered by §1910.120(q).)

Table B.1

An emergency response includes, but is not limited to, the following situations:

1. The response comes from outside the immediate release area;
2. The release requires evacuation of employees in the area;
3. The release poses, or has the potential to pose, conditions that are immediately dangerous to life and health (IDLH);
4. The release poses a serious threat of fire or explosion (exceeds or has the potential to exceed the lower explosive limit or lower flammable limit);
5. The release requires immediate attention because of imminent danger;

6. The release may cause high levels of exposure to toxic substances;
7. There is uncertainty that the employee in the work area can handle the severity of the hazard with the PPE and equipment that has been provided and the exposure limit could easily be exceeded; and
8. The situation is unclear, or data are lacking on important factors.

Responders from outside the immediate release area

"Emergency response" is defined in §1910.120(a)(3) as follows:

> "Emergency response" . . . means a response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses within the scope of this standard. Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses.

The standard covers responses "by other designated responders." The use of the "or" means that responders are a separate group, different from employees within the immediate release area, directed to respond to the emergency by the employer. Employees working in the immediate release area (not just outsiders) are covered if the employer designates them as emergency responders. The standard, §1910.120(q), uses the term "responders" generally to refer to employees who respond to emergencies.

The Superfund Amendments and Reauthorization Act (SARA), the statute that mandated HAZWOPER, directs broad coverage of all employees responding to emergencies with no limitation on their location. SARA states, ". . . standards shall set forth responding requirements for training of workers who are responsible for responding to hazardous emergency situations who may be exposed to toxic substances." (See SARA 126(d)(4)) For an emergency to be covered by the standard, conditions causing a dangerous situation which involve hazardous substances are sufficient; there need not be both an emergency and a response by outside responders before the employer prepares for an emergency.

> For example: A release of chlorine gas above the IDLH, obscuring visibility and moving through a facility, is an emergency situation even if the initial responders are from the immediate release area. Employees who would respond to this hypothetical situation, whether they work in the immediate area or come from outside, would need to act in accordance with §1910.120(q).

Employees must not be made to respond to releases in the immediate release area that would otherwise require outside assistance from a trained hazardous materials team merely because the definition of an emergency response states that an emergency response is ". . . a response effort by employees from outside the immediate release area."

Conversely, incidental releases of hazardous substances that are routinely cleaned up by those from outside the immediate release area need not be considered emergency responses solely because the employee responsible for cleaning it up comes from outside the immediate release area.

> For example: Paint thinner is spilled in an art studio and the janitor is called from outside the immediate release area to mop it up. The janitor does not have to respond in accordance with §1910.120, although the janitor would be expected to understand the hazards associated with paint thinner through hazard communication training.

Other OSHA standards

Other standards that impact emergency response to fires, chemical releases, or other incidents should be part of an emergency response compliance evaluation. Flammable chemical spills and other small fires are covered by §1910.156 as well as §1910.157. The "Process Safety Management for Highly Hazardous

Chemicals," §1910.119, and "Hazard Communication," §1910.1200, as well as some of the specific expanded health standards in Subpart Z would also apply.

Appendix F of CPL 2-2.59A
Relationship of §1910.120(q) with other OSHA standards

The function of this appendix is to explain the HAZWOPER standard's interface with other OSHA standards. It also covers Federal agency regulations as well as consensus guideline documents, which are not included in this document.

Relationship of §1910.120 with other OSHA standards

Expanded health standards

Section 1910.120 (a)(2)(i) states that when there is a conflict or overlap of coverage between standards, the provision that is more protective of employee safety and health shall apply. Employers must comply with all safety and health standards that are applicable to their workplace; however, certain provisions of HAZWOPER may be more protective than the analogous provisions of an expanded health standard. HAZWOPER does not completely supersede any standard; only those provisions of another standard that are addressed by HAZWOPER may be superseded if HAZWOPER is more protective.

1. For example, Compliance Safety and Health Officers (CSHOs) may cite the provisions of one of two standards, the Ethylene Oxide (EtO) standard or HAZWOPER, depending on which provision offers more protection. The EtO standard provides instruction on exposure monitoring that is more protective than HAZWOPER; however, HAZWOPER offers more protection to employees responding to emergencies involving releases of EtO through its incident command system and HAZMAT training requirements.
2. When a hospital uses EtO to sterilize instruments and there is a potential for a release that would cause an emergency, the hospital must establish an emergency action plan in accordance with §1910.38(a) if it evacuates all employees in the danger area and calls in outside assistance, or an emergency response plan in accordance with §1910.120(q)(1) if it expects its own employees to respond to releases.
3. Other hazardous substances used by the hospital must also be addressed in their emergency response plan and/or emergency action plan, if there is a potential for a release that would cause an emergency.

Hazard Communication Standard (HCS) §1910.1200

The HCS requires that employers train employees who may be exposed or potentially exposed to hazardous chemicals. Employers are to train employees in (1) methods to detect a hazardous chemical, (2) the hazards of chemicals in the work area, (3) measures employees can take to protect themselves, and (4) the details of the hazard communication program (further clarified in §1910.1200(h)). It is important to note the objectives of both HAZWOPER and the HCS, especially where the two standards require training:

1. The HCS is designed to ensure that employees are informed of the hazards associated with hazardous chemicals in the workplace, so that they may make informed judgments to protect themselves from exposure. The HCS does not require the employer to develop emergency procedures although HCS does require training in emergency procedures if the employer has already developed them. For example, when another standard (such as the Formaldehyde standard) requires an employer to develop emergency procedures, the employer would be required to incorporate those procedures into the HCS training program.
2. Employers who fall under the scope of HAZWOPER must have either a written emergency response plan and/or an emergency action plan in accordance with §1910.38(a). If employers expect their own employees to respond to a potential emergency involving hazardous substances, then the employer

must create an emergency response plan and the employees must be trained to perform the duties expected of them. HAZWOPER does not cover responses to incidental spills that do not have the potential for becoming an emergency. In such cases, OSHA enforces other applicable standards such as HCS, §§1910.119, 1910.132, 1910.134, and other OSHA standards.

3. If employees are required to respond to spills that have the potential for becoming an emergency, then all of the provisions of §1910.120(q) are applicable. Therefore, in workplaces where there is a potential for emergencies, the employer's HCS training program would have to address the HAZWOPER emergency response plan and/or emergency action plan. (Note that the HCS training can be adapted easily to encompass all of the required training competencies in §1910.120(q)(6)(i), the first responder awareness level, and that a single training session could satisfy the requirements of both standards.)

Employee emergency plans and fire prevention plans §§1910.38 and 1910.39

Employers who will evacuate all employees from the danger area, and who will not permit any employees to assist in handling the emergency, have the option of creating a written emergency action plan in accordance with §1910.38 in lieu of an emergency response plan. Employers with 10 or fewer employees can communicate the emergency action plan orally and the employer need not maintain a written plan.

1. When used to meet the requirements of HAZWOPER, §1910.38 requires employers to have an effective alarm system to alert employees of an emergency, evacuate all employees, and notify an emergency response team, such as a fire department that is trained in accordance with HAZWOPER.
2. Employers who will train some of their employees to respond to an emergency release must create an emergency response plan. An emergency action plan is to be part of the emergency response plan for the evacuation of all employees in the area that are not essential for the response to the emergency.
3. CSHOs shall follow the guidance below when citing an employer who has opted to create an emergency action plan in lieu of an emergency response plan:

   (a) The CSHO shall cite §1910.38 if an employer with more than 10 employees merely expresses the intent to evacuate all employees from the danger area, and would not allow employees to assist in handling the emergency, but does not have a written emergency action plan. This intent must have been communicated to employees, which the CSHO may verify by employee interviews.

   (b) The CSHO shall cite §1910.38 and §1910.165, the Employee Alarm Systems standard (referenced in §1910.38), if there are deficiencies found in a written emergency action plan or alarm system.

   (c) The CSHO shall cite §1910.120(q)(1) if the employer does not have a written emergency action plan, and has not expressed any intention to employees (i.e., the employer has done absolutely nothing in planning for emergencies).

   (d) The CSHO shall cite §1910.38 if the employer has not established reasonable procedures in the plan for notifying both inside and outside parties of incidents so that employees are not at risk.

Occupational exposure to hazardous chemicals in laboratories §1910.1450

Spills or releases of hazardous substances, emergency situations, etc., that occur inside a laboratory under the purview of the Laboratory standard, §1910.1450, and require an emergency response are covered by HAZWOPER. Incidental releases that can be safely handled by employees working with a chemical are not considered emergency responses. (For a discussion of the distinction between an incidental release and a release that requires an emergency, see Appendix E.)

Process safety management for highly hazardous chemicals
§1910.119

The standard for Process Safety Management of Highly Hazardous Chemicals (PSM) covers processes in quantities at or above the threshold quantities specified in §1910.119(a)(1), except as provided by §1910.119(a)(2). The purpose of the standard is to prevent catastrophic releases of highly hazardous chemicals.

1. Due to the nature of the facilities covered by the scope of the PSM standard, facilities covered by §1910.119 would have the potential for an emergency release.
2. Facilities that fall under the scope of PSM shall establish and implement an emergency action plan in accordance with §1910.38(a). Paragraph (n) of the PSM standard states that employers covered by PSM "may also be subject" to the hazardous waste and emergency response provisions of §1910.120. If the employer plans to direct its employees to respond to emergency releases, the employer would be subject to §1910.120(q). (For further guidance see Appendix C of §1910.119 and OSHA Instruction CPL 2-2.45A, "Process Safety Management of Highly Hazardous Chemicals — Compliance Guidelines and Enforcement Procedures.")
3. The requirements of the PSM standard are geared toward preventing catastrophic releases, but they do not address the specific procedures for responding to such releases. HAZWOPER's emergency response provisions apply to the actual emergency response effort at facilities covered by the PSM standard.

Occupational exposure to bloodborne pathogens
§1910.1030

The definition of "hazardous substance" found in HAZWOPER includes any biological agent or infectious material that may cause disease or death.

1. The following are three scenarios where the Bloodborne Pathogens standard may interface with HAZWOPER:
    - clean-up of a hazardous waste site containing infectious waste (overlap with §1910.120(b)-(o) for clean-up operations);
    - Operation of a RCRA-permitted incinerator that burns infectious waste (overlap with §1910.120(p) for treatment storage and disposal (TSD) facilities); and
    - Response to an emergency caused by the uncontrolled release of an infectious waste, or where infectious waste is part of the release (overlap with §1910.120(q) for emergency responses not otherwise covered by the standard).
2. In the past, a medical waste incinerator was defined as a treatment, storage, and disposal (TSD) facility by the Federal Environmental Protection Agency (EPA). However, recently Federal EPA allowed this definition to lapse and left the responsibility of specifying the status of a medical waste incinerator as a TSD facility to the State. Therefore, in States where medical waste incinerators are considered TSD facilities, §1910.120(p) applies.
3. Section 1910.120(q) may apply to any other medical waste incinerator. In addition to complying with the Bloodborne Pathogens standard, these employers would be expected to comply with §1910.120 (q), which would require an emergency response plan and/or an emergency action plan. Employers may create one plan that would incorporate all of the applicable components of both standards.

Permit-required confined spaces
§1910.146

The Permit-Required Confined Spaces (PRCS) standard covers sites or facilities that contain permit-required confined spaces as defined in §1910.146(b), "Definitions." The purpose of the standard is to prevent unauthorized entry into a permit space and to establish adequate precautions and procedures for entry into permit spaces.

1. Hazardous materials emergency response may involve permit-required confined spaces. Emergency response personnel and outside response parties may be required to enter permit spaces for rescue operations.
2. While HAZWOPER addresses response procedures to emergency releases, it does not address response to incidents involving PRCSs with the detail provided in §1910.146. The requirements of the PRCS standard are targeted specifically toward work and emergency rescue as they relate to permit spaces. Employers who decide that their employees will enter PRCSs shall establish a PRCS program in accordance with §1910.146(d).
3. The PRCS standard details specific requirements applicable to employers who have employees enter permit spaces to perform rescue services. These requirements include employee training, coordination with outside rescue services, and rescue retrieval systems, methods, and annual rehearsals.

Fire brigades
§1910.156

The Fire brigade standard contains requirements for organization, training, selection of PPE, and preplanning during emergencies for private or industrial fire departments.

1. The Fire brigade standard uses broader language than HAZWOPER in §1910.156(c): "The employer shall provide training and education for all fire brigade members commensurate with those duties and functions that members are expected to perform."
2. The Fire brigade standard addresses the need for industrial fire fighters to be aware of the MSDS, and requires written procedures and training for flammable toxic and radioactive materials; however, the emphasis is on structural fires. Employees within a fire brigade who are expected to respond to incidents involving hazardous substances must also receive HAZWOPER training.

Hazardous Waste Operations and Emergency Response (HAZWOPER) Program

Administrative duties

_____ is responsible for developing and maintaining _____ Hazardous Waste Operations and Emergency Response program. The program is available for review and is kept at _____.

General

HAZWOPER is a complicated regulation, with many different elements required. We have developed the following programs to meet OSHA's requirements and keep our employees safe and healthy. Copies of these written plans are attached.

- An Emergency Response Plan for employees who are responsible for addressing unplanned chemical spills, leaks, and air emissions.
- A Medical Surveillance Plan because of the exposures and potential exposures that certain employees may have at our facility.
- Personal Protective Equipment and/or Respiratory Protection plans for employees who must use protective equipment in their day-to-day operations, or in the event of a chemical spill.

Part of our general compliance is to involve local response authorities, when appropriate. We have notified the local fire department as to what chemicals, and in what quantities, we use and store in our facility.

_____ is responsible for the HAZWOPER safety and health programs.

The decontamination procedures used at our facility are: _____.

The site control measures used are: _____.

HAZWOPER training program

As part of the HAZWOPER program, _____ has developed and implemented a program to inform employees (including contractors and subcontractors) performing hazardous waste or emergency response operations of the level and degree of exposure they are likely to encounter.

_____ has also implemented procedures for introducing effective new technologies that provide improved employee protection in hazardous waste operations and spill/leak cleanup. We use PPE, foam, absorbents, adsorbents, neutralizers, and _____.

Our affected employees receive training in the potential hazards they may encounter and the necessary knowledge and skills they need to perform their work with minimal risk to their safety and health. Supervisors and affected employees receive training that covers how to:

- Recognize hazards and to prevent them;
- Select, care for, and use respirators properly as well as other types of personal protective equipment;
- Understand engineering controls and their use;
- Use proper decontamination procedures;
- Understand the Emergency Response Plan, medical surveillance requirements, confined space entry procedures, spill containment program, and any appropriate work practices; and
- Know the names of personnel and their alternatives responsible for site safety and health.

The amount of instruction differs with the nature of the work operations. Our employees will not perform any hazardous waste or emergency response operations unless they have been trained to the level required by their job function and responsibility and have been certified by their instructor as having completed the necessary training.

All emergency responders receive annual refresher training sufficient to maintain or demonstrate competency. Employee training requirements are further defined by the nature of the work (e.g., temporary emergency response personnel, firefighters, safety officers, HAZMAT personnel, or incident commanders).

At our facility, _____ is responsible for conducting training. We determine whom to train by using the following criteria: _____.

The procedure to train new employees at the time of their initial assignment is _____. Tracking the training and retraining will be accomplished by _____.

Certificates signed by employees are handed out upon completion of their training. Employees at all hazardous waste sites have been trained to the level required by their job function and responsibility prior to performing any hazardous waste operation. All emergency responders receive refresher training sufficient to maintain or demonstrate competency annually.

We provide for pre-entry briefing prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of the site safety and health plan. We ascertain that this plan is being followed by _____.

Organizational structure

_____ is the general supervisor who has the responsibility and authority to direct all hazardous waste operations. _____is the site safety and health supervisor who has the responsibility and authority to develop and implement the site safety and health plan and verify compliance.

Other personnel who are needed for hazardous waste site operations and emergency response are _____. Their general functions and responsibilities are _____ _____.

The lines of authority, responsibility, and communication are as follows: _____.

Our organizational structure is reviewed and updated as necessary to reflect the current status of waste site operations.

Site-specific safety and health plan

Our site-specific safety and health plan aids in eliminating or effectively controlling anticipated safety and health hazards. It identifies and addresses the hazards of each phase of the specific-site operation and includes the requirements and procedures for employee protection.

The plan contains a safety and health risk or hazard analysis for each site task and operation identified in the work plan. Personal protective equipment is used by employees for some of the site tasks and operations being conducted. See the attached Personal Protective Equipment Plan for details.

_____ performs general air monitoring/testing using the following procedures: _____.

When personnel monitoring is necessary, we: _____.

The environmental sampling techniques and instrumentation that are used, including methods of maintenance and calibration of monitoring and sampling equipment used, are: _____.

There are permit-required confined spaces in our facility. We have established confined space entry procedures. A copy of the Permit-Required Confined Space Entry Program is attached.

Our spill containment program includes the following elements: _____.

The general work plan is kept at _____. We conduct inspections to detect deficiencies in the site-specific safety and health plan as follows: _____.

Contractor safety

Our company uses contractors/subcontractors for work in hazardous waste operations. Prior to performing any work on our job sites, we hold a conference to inform them of the site emergency response procedures and any potential fire, explosion, health, safety, or other hazards related to the operation.

We make the written safety and health program available to any contractor who will be involved with the hazardous waste operation.

Attachments

We have attached the following documents to this written plan: _____.

Process safety management of highly hazardous chemicals (PSM)

The purpose of the Process Safety Management (PSM) standard is to prevent the catastrophic releases of toxic, reactive, flammable, or explosive chemicals. These releases may result in toxic, fire, or explosion hazards. The safe management of these substances is extremely important at facilities where employees and the surrounding community is at risk of exposure. The following information provides simple guidance for implementing an OSHA-compliant PSM program. For details, you should consult the regulation at §1910.119.

Process hazard analysis

OSHA created the Process Safety Management of Highly Hazardous Chemicals standard (PSM) to help employers control dangerous chemicals in their facilities. The key to PSM is a process hazard analysis. This analysis involves a careful review of what could go wrong and what safeguards have to be implemented to prevent unexpected chemical releases.

A process is ...
Any activity or combination of activities including any use, storage, manufacturing, handling or the on-site movement of highly hazardous chemicals (HHCs).

A process includes ...
Any group of vessels which are interconnected and separate vessels which are located such that an HHC could be involved in a potential release.

Application

The PSM standard applies to companies that have a process which contains a threshold quantity or greater amount of a toxic or reactive HHC as specified in Appendix A. It also applies to flammable liquids and gases in quantities of 10,000 pounds or greater, and to the process activity of manufacturing explosives and pyrotechnics.

This standard applies if you have a process which involves:

- A chemical at or above the specified threshold quantities listed in Appendix A of the standard;
- A process which involves a Category 1 flammable gas (as defined in 1910.1200(c)) or a flammable liquid with a flashpoint below 100 °F (37.8 °C) on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more except for:
  - Hydrocarbon fuels used solely for workplace consumption as a fuel (e.g., propane used for comfort heating, gasoline for vehicle refueling), if such fuels are not a part of a process containing another highly hazardous chemical covered by this standard; or
  - Flammable liquids with a flashpoint below 100 °F (37.8 °C) stored in atmospheric tanks or transferred which are kept below their normal boiling point without benefit of chilling or refrigeration.

Exemptions

The PSM standard does not apply to:

- Retail facilities;
- Oil or gas well drilling or servicing operations;
- Normally unoccupied remote facilities.

Elements of a PSM program

An effective program requires the employer to take a systematic approach when evaluating the whole chemical process, which should include:

- Process design and technology,
- Process changes,
- Operational and maintenance activities and procedures,
- Non-routine activities and procedures,
- Emergency preparedness plans and procedures,
- Training programs, and
- Other elements that affect the process.

For small employers that may have limited resources, alternatives to decrease risks include reducing inventory of the highly hazardous chemicals to below the threshold limit, dispersing inventory to several locations, or substituting less hazardous chemicals.

Process safety information

OSHA requires covered employers to compile written information about their processes' chemicals, technology, and equipment. This information is essential to an effective process safety management program and to a process hazard analysis.

Chemicals

Chemical information needs to be comprehensive enough for an accurate assessment of the fire and explosion characteristics, reactivity hazards, the safety and health hazards to workers, and the corrosion and erosion effects on the process equipment and monitoring tools.

Technology

Process technology information should include:

- Employer-established criteria for maximum inventory levels for process chemicals;
- Limits beyond which would be considered upset conditions; and
- A qualitative analysis of the consequences or results of deviation that could occur if operating beyond the established process limits.

Equipment

The information about process equipment design must be documented. Piping and instrument diagrams may be the best type of diagrams to show some of the details as well as display the information for the piping designer and engineering staff. Where the process technology requires a design that departs from the applicable codes and standards, you have to document that the design and construction are suitable for the intended purpose.

Employee involvement

Employees must be consulted on the development of process hazards analyses and other elements of the PSM system. This information must be included in the PSM written plan and made available to employees.

Process hazard analysis

A process hazard analysis (PHA), or evaluation, is one of the most important elements of the process safety management program. A PHA is a systematic method to identify and analyze the significance of potential hazards associated with the processing or handling of highly hazardous chemicals.

A PHA provides information that will assist both employers and employees in making decisions for improving safety and reducing the consequences of unplanned hazardous chemical releases. A PHA uses one or more of the following methodologies that are appropriate to determine and evaluate the hazards of the process being analyzed:

- What-if,
- Checklist,
- What-if/Checklist ,
- Hazard and Operability Study (HAZOP),
- Failure Mode and Effects Analysis (FMEA),
- Fault Tree Analysis, or
- An appropriate equivalent methodology.

Operating procedures

Operating procedures provide specific instruction or details on what steps are to be followed in carrying out the stated procedures. The procedures need to be technically accurate, understandable to employees, and revised periodically to ensure that they reflect current operations.

Operating procedures describe:

- Tasks to be performed,
- Data to be recorded,
- Operating conditions to be maintained,
- Samples to be collected, and
- Safety and health precautions to be taken.

The process safety information package helps to ensure that the operating procedures and practices are consistent with the known hazards of the chemical in the process and that the operating parameters are correct. Operating procedures should be reviewed by engineering staff and operating personnel to ensure their accuracy and that they provide practical instructions on how to actually carry out job duties safely. Also, the employer must certify annually that the operating procedures are current and accurate.

Employee training

All employees, including maintenance and contractor employees involved with highly hazardous chemicals, need to fully understand the safety and health hazards of the chemicals and processes they work with so they can protect themselves, their coworkers, and the nearby communities.

Training should cover:

- Chemicals used (include how to read and understand MSDSs),
- Operating procedures and safe work practices,
- Emergency evacuation and response,
- Safety procedures,
- Routine and non-routine work authorization activities, and
- Other areas pertinent to process safety and health also need to be covered.

In establishing your training program, first identify the employees to be trained, the subjects to be covered, and the goals and objectives to be achieved. Hands-on training, where employees actually apply lessons learned in simulated or real situations, will enhance learning.

Periodically evaluate your program to see if the necessary skills, knowledge, and routines are being properly understood and implemented by employees. Ensure that employees, including maintenance and contract employees, receive current and updated training.

Contractors

If you employ contractors to perform work in and around processes that involve highly hazardous chemical, you must establish a screening process. This will ensure that only contractors who do the job tasks without compromising the safety and health are hired. For contractors whose safety performance on the job is not known, obtain information on their injury and illness rates, experience, and references prior to hiring them.

You (*the worksite employer*) have to identify your responsibilities and the contract employer's with respect to contract employees involved in:

- Maintenance,
- Repair,
- Turnaround, or
- Major renovation or specialty work that is done on or near covered processes.

Contract employers are required to:

- Train their employees to safely perform their jobs,
- Document that employees received and understand training,
- Ensure that employees know about potential process hazards and the worksite employer's emergency action plan,
- Assure that employees follow safety rules of the facility, and
- Advise the work site employer of hazards contract work itself poses or hazards identified by contract employees.

Additionally, ensure that the contractor has the appropriate job skills, knowledge, and certifications. Contract employees must perform their work safely. Considering that contractors often perform very specialized and potentially hazardous tasks, such as confined space entry activities and non-routine repair activities, their work must be especially controlled while they are on or near a process covered by PSM.

Pre-startup safety review

A pre-startup safety review confirms that, before the introduction of highly hazardous chemicals to a process, the following elements have been completed:

- Construction and equipment meets design specifications;
- Safety, operating, maintenance, and emergency procedures are adequate and in place; and
- Training of each employee involved in operating a process has been completed.

For new facilities or processes, a process hazard analysis must be performed to ensure the safe design and construction of the process. The PHA recommendations should be incorporated before final installations are completed and prior to startup.

Mechanical integrity of equipment

The first step of an effective mechanical integrity program is to compile and categorize a list of process equipment and instrumentation to include in the program. Review your maintenance programs and schedules to see if there are areas where "breakdown" maintenance is used rather than the more preferable on-going mechanical integrity program.

Equipment used to process, store, or handle highly hazardous chemicals has to be designed, constructed, installed, and maintained to minimize the risk of chemical releases. This requires that a mechanical integrity program be in place to ensure the continued integrity of process equipment.

Program elements

Elements of a mechanical integrity program include:

- Identifying and categorizing equipment and instrumentation,
- Inspections and tests and their frequency;
- Maintenance procedures;
- Training maintenance personnel;
- Criteria for acceptable test results;
- Documenting test and inspection results; and
- Documenting manufacturer recommendations for equipment and instrumentation.

Finally, a quality assurance system will help ensure the use of proper construction material, the proper fabrication and inspection procedures, and appropriate installation procedures that recognize field installation concerns.

Quality assurance is an essential part of the mechanical integrity program and will help maintain the primary and secondary lines of defense designed into the process to prevent unwanted chemical releases or to control a release.

Process defenses

The first line of defense you have is to operate and maintain the process as designed and to contain the chemicals. This is backed up by the second line of defense which is to control the release of chemicals through venting to scrubbers or flares, or to surge or overflow tanks designed to receive such chemicals.

Other control methods include:

- Fixed fire protection systems like sprinklers, water spray, or

- Deluge systems,
- Monitor guns,
- Dikes,
- Designed drainage systems, and
- Other systems to control or mitigate hazardous chemicals once an unwanted release occurs.

Non-routine work authorizations

Non-routine work conducted in process areas has to be controlled in a consistent manner. The hazards involving the work to be done need to be conveyed, not only to those doing the work, but also to operational personnel whose work could affect the safety of the process.

Issue a work authorization notice or permit which describes the steps the maintenance supervisor, contractor representative, or other personnel need to follow to obtain the necessary clearance to start the job. The work authorization has to consider applicable procedures such as:

- Lockout/tagout,
- Line breaking,
- Confined space entry, and
- Hot work authorizations.

This permit procedure also must provide clear steps to follow once the job is completed and equipment can be returned to normal.

Managing change

In the PSM standard, change includes all modifications to equipment, procedures, raw materials, and processing conditions other than "replacement in kind." These changes must be properly managed by identifying and reviewing them prior to implementation.

Copies of process changes have to be kept in an accessible location to ensure that design changes are available to operating personnel as well as to PHA team members when an analysis is being prepared or updated.

Incident investigation

Incident investigation is the process of identifying the underlying causes of incidents and implementing steps to prevent similar events from occurring. The intent of an incident investigation is for employers to learn from past experiences and avoid repeating past mistakes.

OSHA expects employers to develop the in-house capability to investigate incidents that occur in their facilities. The incidents you should be able to recognize and investigate are the types of events that resulted in, or could reasonably have resulted in, a catastrophic release. These events are sometimes referred to as "near misses," meaning that a serious consequence did not occur, but could have.

Emergency preparedness

Each employer must address what actions employees will take when there is an emergency chemical release. Emergency preparedness is your third line of defense that will be relied on along with the second line of defense, which is to control the release of chemicals. Control releases and emergency preparedness will take place when the first line of defense to operate and maintain the process and contain the chemicals fails to stop the release.

Employee actions

In preparing for an emergency chemical release, you will need to decide if you want:

- Employees to handle and stop small or minor incidental releases;
- To mobilize the available resources at the plant and have employees brought to bear on a more significant release;
- Employees to evacuate the danger area and promptly escape to a preplanned safe zone area, and then allow the local community emergency response organizations to handle the release; or
- To use some combination of these actions.

After you decide which emergency actions to follow, you will have to:

- Develop the necessary emergency plans and procedures,
- Train employees in their emergency duties and responsibilities, and
- Implement these emergency action plans.

NOTE: OSHA requires that, at a minimum, you must have an emergency action plan that will facilitate the prompt evacuation of employees when there is an unwanted release of a highly hazardous chemical.

Compliance audits

An audit is a technique used to gather sufficient facts and information, including statistical information, to verify compliance with standards. You must select a trained individual or assemble a trained team to audit the process safety management system and program.

The PSM audit includes an evaluation of the design and effectiveness of the process safety management system and a field inspection of the safety and health conditions and practices to verify that the employer's systems are effectively implemented. OSHA requires that a compliance audit be done at least every three years and that the employer retain the two most recent audits.

Process safety management program

General company policy

The purpose of this policy is to inform interested persons, including employees, that _____ complies with OSHA's Process Safety Management of Highly Hazardous Chemicals standard at 1910.119. In this way we promote overall plant and worker safety.

_____ PSM program enables us to prevent the occurrence, and minimize the consequences, of significant releases of toxic substances as well as fires, explosions, and other types of catastrophic accidents. It focuses on the rules, procedures, and practices that govern our processes, activities, and equipment. These rules and procedures are communicated to and accepted by all individuals in our company.

The PSM program contains the following elements:

- Purpose statement,
- Employee participation plan,
- Process safety information,
- Process hazard analysis records,
- Operating procedures,
- Training,

- Contractors,
- Process equipment integrity maintenance procedures,
- Non-routine work,
- Management of change procedures,
- Incident investigation reports,
- Compliance audit reports, and
- Emergency Action Plan.

The Program Coordinator, _____, has overall responsibility for the program. _____ will review and update the program, as necessary. Information about this PSM program may be obtained from the Program Coordinator.

After reading this program, if you find that improvements can be made, please contact the Program Coordinator. We encourage all suggestions because we are committed to the success of our PSM program. We strive for a comprehensive, integrated prevention system that obtains clear understanding, safe behavior, and involvement in the program from every level of the facility and the public.

Purpose statement

For the safe management of operations involving hazardous chemicals and other substances at our facility, we have established a PSM program that meets OSHA's general requirements. Our facility has the following processes: _____.

Employee participation

Our employees are essential in helping _____ implement and maintain an effective PSM program. Our facility strongly encourages employees to participate in:

1. Gathering process safety information,
2. Conducting and developing the PSM program elements and hazards assessments as well as incident investigation findings, and
3. Obtaining access to process hazards analyses and the rest of the PSM program.

Employees participate in the following ways: _____.

Process safety information

Accurate and complete written information concerning the process chemicals, technology, and equipment is an important to a process hazards analysis. The information we have compiled is a necessary resource to a variety of users including:

- The team that will perform the process hazards analysis;
- Those developing the training programs and the operating procedures;
- Contractors whose employees will be working with the process;
- Those conducting the pre-startup reviews;
- Local emergency preparedness planners; and
- Insurance and enforcement officials.

The data compiled about chemicals, including process intermediates, is comprehensive enough for accurate assessments of the fire and explosion characteristics, reactivity hazards, the safety and health hazards to workers, and the corrosion and erosion effects on the process equipment and monitoring tools.

The following information is either attached to this PSM program and/or described here:

Hazards of each highly hazardous chemical used in each process: _____.

Technology of processes: _____.

Equipment involved in processes: _____.

We have equipment that complies with the latest recognized and generally accepted engineering practices (documents attached).

Process hazard analysis records

The process hazard analysis (PHA) is one of the most important elements of our PSM program. Our PHA program systematically identifies and analyzes the significance of potential hazards associated with the processing of highly hazardous chemicals in our facility. It also provides information that will assist _____ in making decisions for improving safety and reducing the consequences of unplanned chemical releases.

The team members who perform our process hazard analysis are: _____.

Their qualifications include: _____.

The PHA team conducts the process hazard analyses in the following order: _____ _____.

It uses the following methodologies: _____.

We have determined the hazards of each process are: _____.

We have had the following incidents with potential serious consequences in this facility: _____ _____.

Our facility has the following engineering and administrative controls applicable to our hazards and their interrelationships: _____.

We follow-up on any recommendations or findings that result from the team's process hazard analysis in the following manner: _____. Team recommendations, resolutions, and dates of resolutions are either attached to this PSM program and/or described here: _____.

Operating procedures

Our operating procedures describe tasks to be performed, data to be recorded, operating conditions to be maintained, samples to be collected, and safety and health precautions to be taken. Our procedures are revised periodically to ensure that they reflect current operations. Operating procedures for safely conducting activities involved in each process are attached to this PSM program and/or described here: _____.

Operating procedures are located at: _____.

_____ is responsible for reviewing the operating procedures to ensure they are current, accurate, and for changes from process chemicals, technology, equipment, or the facility. _____ is responsible for certifying the operating procedures each year.

Safe work practices which limit employee and contractor exposure to process areas and which control hazards in situations such as lockout/tagout, confined space entry, opening process equipment or piping, and control over entrance into a facility by maintenance, contractor, laboratory, or other support personnel are attached. _____ is responsible for performing a pre-startup safety review when changes to processes or facility renovations occur.

Training

All employees, including maintenance and contractor employees, who are involved with highly hazardous chemicals need to fully understand the safety and health hazards of the chemicals and processes they work with. In addition to understanding material safety data sheet (MSDS) information, PSM training will cover:

- Operating procedures and safety work practices,
- Emergency evacuation and response,
- Safety procedures,
- Routine and non-routine work authorization activities, and
- Other areas pertinent to process safety and health.

_____ coordinates the employee training program. New employees are trained at the time of their initial assignment. Additional training occurs when a new hazard is introduced, or as needed.

All training and retraining records containing the identity of the employee and the date of training are signed by the employee to certify successful completion of the course. These records are available at _____.

Contractors

_____ uses contractors to perform work in and around processes that involve highly hazardous chemicals. Our goal is to hire contractors who can perform the job without compromising the safety and health of employees at the facility.

Our facility obtains and periodically evaluates contractor's safety performance and programs in the following manner: _____.

We explain the Emergency Action Plan to contract employers and inform them of the known potential fire, explosion, or toxic release hazards related to their work and processes in the following manner: _____.

We keep the contract employee injury and illness log related to contractor's work in process areas in the following location: _____.

We ensure that the contract employer advises us of any unique hazards presented by or found during their work by: _____.

Process equipment integrity maintenance procedures

Our process equipment integrity maintenance procedures are designed to ensure that process equipment receives appropriate, regularly scheduled maintenance. These maintenance procedures are attached to this PSM program and/or described here: _____.

Our facility ensures that employees involved in maintaining the on-going integrity of process equipment are trained in the proper procedures by: _____.

Documentation for inspections and tests on process equipment covers:

- Date of inspection or test,
- Description of the inspection or test performed,
- Name of the person who performed the inspection or test,
- Results of the inspection or test,
- Serial number or other identifier of the equipment that was inspected or tested.

Routine tests and inspections are performed at the following frequency: _____.

Test and inspection documents are attached to this PSM program.

Our facility ensures that new equipment, maintenance materials, spare equipment, and parts meet design and material specifications in order to protect against the use of improper materials in the following manner: _____.

_____ is responsible for the quality assurance including ensuring that proper materials of construction are used, that fabrication and inspection procedures are proper, and that installation procedures recognize field installation concerns.

Non-routine work

Non-routine work (i.e., lockout/tagout, line breaking, confined space entry, and hot work) are controlled in a consistent manner, following specific procedures. Non-routine tasks that may be conducted in process areas include: _____.

We have attached sample permits to this PSM program. Permits for operations currently in progress are filed at: _____. Employees are notified of non-routine operations by: _____.

Change procedures

PSM changes include modifications to equipment, procedures, raw materials, processing conditions other than "replacement in kind," and temporary changes. General procedures to manage changes (except for replacements in kind) to process chemicals, technology, equipment, procedures, and facilities are either attached to this PSM program and/or described here: _____.

Employees involved in operating a process and maintenance and affected contract employees are informed of, and trained in, changes prior to start-up of the process or affected part of the process by: _____.

Incident investigation reports

We use the process of incident investigation to identify the underlying cause of an incident and implement steps to prevent similar events from occurring. The following team members and their qualifications are responsible for incident investigations: _____.

All reports for incident investigations that have occurred within the last five years are attached to this PSM program. The reports indicate, at minimum:

- Date of the incident;
- Description of the incident;
- Recommendations resulting from the investigation;
- Date the investigation began; and
- Factors that contributed to the incident.

Our company promptly addresses and resolves an incident report's findings and recommendations in the following manner: _____.

Affected personnel whose job tasks are relevant to an incident finding (including contract employees) review the report.

Compliance audit reports

At least every three years, the Program Coordinator completes a PSM compliance audit. This audit evaluates and certifies that procedures and practices developed in the PSM are adequate and are being followed.

The two most recent compliance audit reports and their findings are attached to this PSM program. We have also attached and/or described here any responses to each of the findings of the audit reports and indicated the corrective status of the problems identified.

Emergency action plan

_____ Emergency Action Plan addresses what actions our employees are to take when there is an unwanted release of highly hazardous chemicals. A copy of the Emergency Action Plan is attached.

Appendix

We have attached the following additional documents to ensure better understanding of our Process Safety Management program: _____.

Workplace first aid program

Introduction

First aid is emergency care provided for injury or sudden illness before emergency medical treatment is available. The first aid provider in the workplace is someone who is trained in the delivery of initial medical emergency procedures, using a limited amount of equipment to perform a primary assessment and intervention while awaiting arrival of emergency medical service (EMS) personnel.

First aid training is primarily received through the American Red Cross, the National Safety Council, and private institutions. The American Red Cross offers standard and advanced first aid courses via their local chapters. After completing the course and successfully passing the written and practical tests, trainees receive two certificates: adult CPR and first aid. An emphasis on quick response to first aid situations is incorporated throughout the program.

Employers are responsible for the type, amount, and maintenance of first aid supplies needed for their particular program. The training program should be periodically reviewed with current first aid techniques and knowledge. Basic adult CPR retesting should occur annually and first aid skills and knowledge should be reviewed every three years.

In June 2007, OSHA cancelled its long-standing directive that provided guidance on an acceptable first aid training course. The directive, CPL 02-02-053, was published in 1991 and used by compliance officers when evaluating employers' first aid programs during inspections. OSHA set a new policy to follow the guidelines specified in a best practice guide issued in 2006. The following information is from OSHA's Best Practices Guide: Fundamentals of a Workplace First Aid Program, OSHA 3317-06N 2006.

Purpose of a first aid program

A workplace first aid program is part of a comprehensive safety and health management system that includes the following four essential elements:

- Management leadership and employee involvement ,
- Worksite analysis,
- Hazard prevention and control , and
- Safety and health training.

OSHA's guide OSHA has developed a guide to help employers establish a first aid program in the workplace. The elements covered in the guide include:

1. Identifying and assessing the workplace risks that have potential to cause worker injury or illness.

2. Designing and implementing a workplace first aid program that:
    - Aims to minimize the outcome of accidents or exposures;
    - Complies with OSHA requirements relating to first aid;
    - Includes sufficient quantities of appropriate and readily accessible first aid supplies and first aid equipment, such as bandages and automated external defibrillators;
    - Assigns and trains first-aid providers who receive: first aid training suitable to the specific workplace, and periodic refresher courses on first aid skills and knowledge.
3. Instructing all workers about the first aid program, including what workers should do if a coworker is injured or ill. Putting the policies and program in writing is recommended to implement this and other program elements.
4. Providing for scheduled evaluation and changing of the first aid program to keep the program current and applicable to emerging risks in the workplace, including regular assessment of the adequacy of the first aid training course.

This guide also includes an outline of the essential elements of safe and effective first aid training for the workplace as guidance to institutions teaching first aid courses and to the consumers of these courses.

Assess the specific risks and design a first aid program

Obtaining and evaluating information about the injuries, illnesses and fatalities at a worksite are essential first steps in planning a first aid program. Employers can use the OSHA 300 log, OSHA 301 forms, workers' compensation insurance carrier reports, or other records to help identify the first aid needs for their businesses.

Risk assessment

For risk assessment purposes, national data for injuries, illnesses and fatalities may be obtained from the Bureau of Labor Statistics (BLS) website at *www.bls.gov/iif*. The annual data, beginning in 2003, are grouped by the North American Industrial Classification System (NAICS) that assigns a numeric code for each type of work establishment. Prior to 2003, the Standard Industrial Classification (SIC) system was used to categorize the data instead of NAICS.

Employers should make an effort to obtain estimates of EMS response times for all permanent and temporary locations and for all times of the day and night at which they have workers on duty. They should use the information when planning their first aid program. When developing a workplace first aid program, consultation with the local fire and rescue service or emergency medical professionals may be helpful for response time information and other program issues. Because it can be a workplace event, sudden cardiac arrest (SCA) should be considered by employers when planning a first aid program.

Written and understandable

OSHA advises putting the First Aid Program policies and procedures in writing. Policies and procedures should be communicated to all employees, including those workers who may not read or speak English. Language barriers should be addressed both in instructing employees on first aid policies and procedures and when designating individuals who will receive first aid training and become the on-site first aid providers.

OSHA requirements

Sudden injuries or illnesses, some of which may be life-threatening, occur at work. The OSHA First Aid standard (29 CFR 1910.151) requires trained first aid providers at all workplaces of any size if there is no "infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees."

In addition to first aid requirements of 1910.151, several OSHA standards also require training in cardiopulmonary resuscitation (CPR) because sudden cardiac arrest from asphyxiation, electrocution, or exertion may occur. CPR may keep the victim alive until EMS arrives to provide the next level of medical care. However, survival from this kind of care is low, only 5 to 7 percent, according to the American Heart Association.

The OSHA standards requiring CPR training are:

- Permit-Required Confined Spaces 1910.146,
- Logging Operations – First Aid and CPR Training 1910.266, Appendix B,
- Electric Power Generation, Transmission, and Distribution 1910.269,
- Qualifications of Dive Team 1910.410, and
- Construction Subpart V, Power Transmission and Distribution 1926.950.

If an employee is expected to render first aid as part of his or her job duties, the employee is covered by the requirements of the Occupational Exposure to Bloodborne Pathogens standard at 1910.1030. This standard includes specific training requirements.

A few of the medical emergency procedures mentioned in this guide as first aid may be considered medical treatment for OSHA recordkeeping purposes. The OSHA Recording and Reporting Occupational Injuries and Illnesses regulation (29 CFR 1904) provides specific definitions of first aid and medical treatment. If a medical emergency procedure which is considered by Part 1904 to be medical treatment is performed on an employee with an occupational injury or illness, then the injury or illness will be regarded as recordable on the OSHA 300 Log.

First aid supplies

OSHA suggests that the employer give a specific person the responsibility for choosing the types and amounts of first aid supplies and for maintaining these supplies. The supplies must:

- Be adequate,
- Should reflect the kinds of injuries that occur, and
- Be stored in an area where they are readily available for emergency access.

An automated external defibrillator (AED) should be considered when selecting first aid supplies and equipment.

A specific example of the minimal contents of a workplace first aid kit is described in American National Standards Institute ANSI Z308.1–2003, *Minimum Requirements for Workplace First Aid Kits*. The kits described are suitable for small businesses. For large operations, employers should determine how many first aid kits are needed, and if it is appropriate to augment the kits with additional first aid equipment and supplies.

Employers who have unique or changing first aid needs should consider upgrading their first aid kits. The employer can use the OSHA 300 Log, OSHA 301 reports, or other records to identify the first aid supply needs of their worksite. Consultation with the local fire and rescue service or emergency medical professionals may be beneficial.

By assessing the specific needs of their workplaces, employers can ensure the availability of adequate first aid supplies. Employers should periodically reassess the demand for these supplies and adjust their inventories.

Automated external defibrillators

With recent advances in technology, automated external defibrillators (AEDs) are now widely available, safe, effective, portable, and easy to use. They provide the critical and necessary treatment for sudden cardiac arrest caused by ventricular fibrillation, the uncoordinated beating of the heart leading to collapse and death.

Using AEDs as soon as possible after sudden cardiac arrest, within 3-4 minutes, can lead to a 60 percent survival rate.[1] CPR is of value because it supports the circulation and ventilation of the victim until an electric shock delivered by an AED can restore the fibrillating heart to normal.

[1]American Heart Association in collaboration with International Liaison Committee on Resuscitation. *Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care: International Consensus on Science, Part 4: The Automated External Defibrillator.* Circulation. 2000; Vol. 102, Supplement: I 61. Figure 1.

AED program

All worksites are potential candidates for AED programs because of the possibility of SCA and the need for timely defibrillation. Each workplace should assess its own requirements for an AED program as part of its first aid response.

A number of issues should be considered in setting up a worksite AED program:

- Physician oversight;
- Compliance with local, state and federal regulations;
- Coordination with local EMS;
- A quality assurance program; and
- A periodic review, among others.

The OSHA website at *www.osha.gov* or the websites of the American College of Occupational and Environmental Medicine at *www.acoem.org*, the American Heart Association at *www.americanheart.org*, the American Red Cross at *www.redcross.org*, Federal Occupational Health at *www.foh.dhhs.gov*, and the National Center for Early Defibrillation at *www.early-defib.org* can provide additional information about AED program development.

First aid courses

Training for first aid is offered by the American Heart Association, the American Red Cross, the National Safety Council, and other nationally recognized and private educational organizations. OSHA does not teach first aid courses or certify first aid training courses for instructors or trainees.

First aid courses should be individualized to the needs of the workplace. Some of the noted program elements may be optional for a particular plant or facility. On the other hand, unique conditions at a specific worksite may necessitate the addition of customized elements to a first aid training program.

Elements of a first aid training program

There are a number of elements to include when planning a first aid training program for a particular workplace. These recommendations are based on the best practices and evidence available at the time this guide was written. Statistical information is available from BLS to help assess the risks for specific types of work. Program elements to be considered are:

1. Teaching methods

Training programs should incorporate the following principles:

- Basing the curriculum on a consensus of scientific evidence where available;
- Having trainees develop "hands-on" skills through the use of mannequins and partner practice;
- Having appropriate first aid supplies and equipment available;
- Exposing trainees to acute injury and illness settings as well as to the appropriate response through the use of visual aids;
- Including a course information resource for reference both during and after training;
- Allowing enough time for emphasis on commonly occurring situations;
- Emphasizing skills training and confidence-building over classroom lectures; and
- Emphasizing quick response to first aid situations.

2. Preparing to respond to a health emergency

The training program should include instruction or discussion in the following:

- Prevention as a strategy in reducing fatalities, illnesses and injuries;
- Interacting with the local EMS system;
- Maintaining a current list of emergency telephone numbers (police, fire, ambulance, poison control) accessible by all employees;
- Understanding the legal aspects of providing first aid care, including Good Samaritan legislation, consent, abandonment, negligence, assault and battery, State laws and regulations;
- Understanding the effects of stress, fear of infection, panic; how they interfere with performance; and what to do to overcome these barriers to action;
- Learning the importance of universal precautions and body substance isolation to provide protection from bloodborne pathogens and other potentially infectious materials;
- Learning about personal protective equipment — gloves, eye protection, masks, and respiratory barrier devices;
- Appropriate management and disposal of blood-contaminated sharps and surfaces; and
- Awareness of OSHA's Bloodborne Pathogens standard.

3. Assessing the scene and the victim(s)

The training program should include instruction in the following:

- Assessing the scene for safety, number of injured, and nature of the event;
- Assessing the toxic potential of the environment and the need for respiratory protection;
- Establishing the presence of a confined space and the need for respiratory protection and specialized training to perform a rescue;
- Prioritizing care when there are several injured;
- Assessing each victim for responsiveness, airway patency (blockage), breathing, circulation, and medical alert tags;
- Taking a victim's history at the scene, including determining the mechanism of injury;
- Performing a logical head-to-toe check for injuries;

- Stressing the need to continuously monitor the victim;
- Emphasizing early activation of EMS;
- Indications for and methods of safely moving and rescuing victims; and
- Repositioning ill/injured victims to prevent further injury.

4. Responding to life-threatening emergencies

The training program should be designed or adapted for the specific worksite and may include first aid instruction in the following:

- Establishing responsiveness;
- Establishing and maintaining an open and clear airway;
- Performing rescue breathing;
- Treating airway obstruction in a conscious victim;
- Performing CPR;
- Using an AED;
- Recognizing the signs and symptoms of shock and providing first aid for shock due to illness or injury;
- Assessing and treating a victim who has an unexplained change in level of consciousness or sudden illness;
- Controlling bleeding with direct pressure;
- Poisoning:
    - Ingested poisons: alkali, acid, and systemic poisons. Role of the Poison Control Center (1-800-222-1222);
    - Inhaled poisons: carbon monoxide; hydrogen sulfide; smoke; and other chemical fumes, vapors, and gases. Assessing the toxic potential of the environment and the need for respirators;
    - Knowledge of the chemicals at the worksite and of first aid and treatment for inhalation or ingestion;
    - Effects of alcohol and illicit drugs so that the first aid provider can recognize the physiologic and behavioral effects of these substances.
- Recognizing asphyxiation and the danger of entering a confined space without appropriate respiratory protection. Additional training is required if first aid personnel will assist in the rescue from the confined space.
- Responding to medical emergencies:
    - Chest pain;
    - Stroke;
    - Breathing problems;
    - Anaphylactic reaction;
    - Hypoglycemia in diabetics taking insulin;

- Seizures;
- Pregnancy complications;
- Abdominal injury;
- Reduced level of consciousness; and
- Impaled object.

5. Responding to non-life-threatening emergencies

The training program should be designed for the specific worksite and include first aid instruction for the management of the following:

- Wounds:
  - Assessment and first aid for wounds including abrasions, cuts, lacerations, punctures, avulsions, amputations and crush injuries;
  - Principles of wound care, including infection precautions; and
  - Principles of body substance isolation, universal precautions and use of personal protective equipment.
- Burns:
  - Assessing the severity of a burn;
  - Recognizing whether a burn is thermal, electrical, or chemical and the appropriate first aid; and
  - Reviewing corrosive chemicals at a specific worksite, along with appropriate first aid.
- Temperature extremes:
  - Exposure to cold, including frostbite and hypothermia; and
  - Exposure to heat, including heat cramps, heat exhaustion and heat stroke.
- Musculoskeletal injuries:
  - Fractures;
  - Sprains, strains, contusions and cramps;
  - Head, neck, back and spinal injuries; and
  - Appropriate handling of amputated body parts.
- Eye injuries:
  - First aid for eye injuries; and
  - First aid for chemical burns.
- Mouth and teeth injuries:
  - Oral injuries; lip and tongue injuries; broken and missing teeth; and
  - The importance of preventing aspiration of blood and/or teeth.
- Bites and stings:
  - Human and animal bites;
  - Bites and stings from insects; and

- Instruction in first aid treatment of anaphylactic shock.

Trainee assessment

Assessment of successful completion of the first aid training program should include instructor observation of acquired skills and written performance assessments.

Skills update

First aid responders may have long intervals between learning and using CPR and AED skills. Numerous studies have shown a retention rate of 6-12 months of these critical skills.

The American Heart Association's Emergency Cardiovascular Care Committee encourages skills review and practice sessions at least every 6 months for CPR and AED skills. Instructor-led retraining for life-threatening emergencies should occur at least annually. Retraining for non-life-threatening response should occur periodically.

Program update

The first aid program should be reviewed periodically to determine if it continues to address the needs of the specific workplace. Training, supplies, equipment and first aid policies should be added or modified to account for changes in workplace safety and health hazards, worksite locations and worker schedules since the last program review. The first aid training program should be kept up-to-date with current first-aid techniques and knowledge. Outdated training and reference materials should be replaced or removed.

Emergency eyewashes/showers

OSHA's 1910.151 standard also covers emergency eywashes and showers. The regulation, however, is not very detailed. It simply requires that an eyewash/shower be provided where persons may be exposed to "injurious corrosive materials."

The standard does not set specifications for emergency eyewash and shower equipment, but OSHA has said that equipment that complies with the industry standard known as ANSI Z358.1 would usually meet the intent of the OSHA standard. The ANSI standard addresses such things as location of the equipment, flow rate, maintenance, installation, and testing. Following is a general eyewash/shower checklist, reproduced from a Minnesota OSHA Fact Sheet, that covers some common eyewash/shower issues:

____If shower is needed, a separate eyewash is required (combination unit is acceptable).

___ Quick opening valve that remains open (simple to operate in ≤1 second).

___ Operational with both hands free.

___ Water temperature must be tepid or lukewarm (between 15º and 38ºC or 60º and 100ºF).

___ Travel time ≤ 10 seconds. ANSI recommends eyewashes be located immediately adjacent to the hazard for pH ≤ 1 or ≥ 12. The unit shall be on the same level as the hazardous substance.

___ Location well lit, highly visible, marked with highly visible sign.

___ Unobstructed passages and access to units.

___ Operable at all times with provisions to prevent unauthorized shutoff.

___ Sewer connection or drain not required unless special hazards noted.

___ Plumbed units activated weekly for a period long enough to verify operation and ensure fluid is available.

___ Units shall be installed in accordance with manufacturer's instructions.

For purchasing information on the ANSI Z358.1 standard, visit www.safetyequipment.org/c/eyewash.cfm.

Summary

Employers are required by OSHA standard 29 CFR 1910.151 to have a person or persons adequately trained to render first aid for worksites that are not in near proximity to an infirmary, clinic, or hospital.

OSHA advises employers that the first aid program for a particular workplace be designed to reflect the known and anticipated risks of the specific work environment. Consultation with local emergency medical experts and providers of first aid training is encouraged when developing a first aid program.

The program must comply with all applicable OSHA standards and regulations. OSHA requires certain employers to have CPR-trained rescuers on site. Sudden cardiac arrest is a potential risk at all worksites, regardless of the type of work. Serious consideration should be given to establishing a workplace AED program. First aid supplies must be available in adequate quantities and be readily accessible.

First aid training courses should include instruction in general and workplace hazard-specific knowledge and skills. CPR training should incorporate AED training if an AED is available at the worksite. First aid training should be repeated periodically to maintain and update knowledge and skills. Management commitment and worker involvement is vital in developing, implementing and assessing a workplace first aid program.

First aid safety program

Purpose

_____ is dedicated to the protection of its employees from on-the-job injuries and illnesses. However, when injuries or illnesses do occur, we are prepared to immediately respond to the needs of the injured or ill.

This First Aid Program ensures that our company meets OSHA's requirements at 1910.151, Medical Services and First Aid.

Administrative duties

_____, our First Aid Program administrator, is responsible for establishing and implementing the First Aid Program. This person has full authority to make necessary decisions to ensure the success of the program.

A copy of this program may be obtained from _____ in _____. If after reading this program, you find that improvements can be made, please contact _____. We encourage all suggestions because we are committed to the protection of our employees and the success of this program.

Designated first aid personnel

_____ is readily available for advice and consultation on health matters: _____.

We follow the National EMS Education and Practice Blueprint which lists the following first aid designations:

- **First aid provider**: Occupationally required to be trained in first aid even though they may not be specifically obligated by law to perform first aid. Responds as a "Good Samaritan."Uses a limited amount of equipment to perform initial assessment and provide immediate life support and care while awaiting arrival of emergency medical services (EMS).
- **First responder**: Uses a limited amount of equipment to perform initial assessment and intervention and is trained to assist other EMS.
- **Emergency Medical Technician (EMT)-Basic**: The 2nd level of professional emergency medical care provider. Qualified to function as the minimum staff for an ambulance.
- **EMT-Intermediate**: The 3rd level of professional emergency medical care provider. Can perform essential advanced techniques and administer a limited number of medications.

- **Paramedic**: The 4th level of professional emergency medical care provider. Can administer additional interventions and medications.

The following person(s) are trained and responsible to render first aid at _____.

Name/Title/First aid designation	Department/ Phone	Responsibilities	Roles

Hazard and medical services assessment

_____ has assessed _____ for hazards to determine whether any pose the risk of a life-threatening or permanently disabling injury or illness.

It was determined that the following injuries or illnesses are likely:

Injury/Illness type	Injury/Illness	Department

The nearest hospital/clinic _____ is located at _____. This facility is considered in "near proximity" because it is within three to four minutes away.

When hazards or locations change, _____ will reassess our risk and determine whether or not we must train and require at least one on-site employee in first aid.

First aid supplies and equipment

It is important that our first aid supplies and equipment meet the specific needs of our company's operations and hazard risks.

_____ is responsible to ensure that adequate first aid supplies are readily available, including: _____.

We provide these supplies in _____ located at _____.

_____ is responsible for ensuring the first aid supplies are adequate. Supplies are replaced promptly when expended. In addition to first aid supplies, our first aid program includes: _____.

Because we have injurious corrosive materials, drenching and flushing equipment that meet the specifications of ANSI Z358.1, *Emergency Eyewash and Shower Equipment* is installed at _____.

Designated employees who respond to emergencies or clean up after them have the potential for exposure to blood and body fluids. For their safety and protection, we provide the following personal protective equipment: _____. See our Exposure Control Program for further details.

Posting

To help those responding to a medical emergency, we have posted signs directing personnel to emergency equipment and supplies:

Sign	Sign message	Sign location

Training

Training is the heart of our First Aid Program. Employees must not attempt to rescue or treat an injured or ill employee unless they are trained and qualified to do so. They are trained to contact a designated qualified individual.

Employees who are trained and qualified to render first aid have completed _____ first aid training program. _____ is responsible for conducting training. His/Her qualifications include: _____.

First aid training is done _____. The training program includes: _____. See the attached training materials and general information.

Training certification

After an employee has completed the training program, _____ certifies that the employee can successfully render first aid. _____ is responsible for keeping records verifying certification of employees who have completed training.

Each certificate includes the name of the employee, the date(s) of the training, and the signature of the person who performed the training and evaluation.

Retraining

Trained employees receive refresher training _____ to keep their skills and certification current.

First aid procedures

Our first aid procedures include: _____.

Accident reporting

Employees are trained to report all injuries and illnesses to management, including first aid cases and near-miss events. Those injuries and illnesses involving a fatality, medical treatment, days away from work, or job transfer must be reported to the employee's supervisor immediately.

Recordkeeping

_____ is responsible for maintaining the following records relating to our company's first aid, injury, illness, and accidents cases:

Record	Description	Location of record

Program evaluation

_____ ensures that our First Aid Program is effective by thoroughly evaluating and revising the program as necessary. Program evaluation is performed _____. The evaluation includes the following elements: _____.

Appendix

The following documents are attached to this First Aid Program: _____.

OSHA COMPLIANCE MANUAL

LABELS, SIGNS, AND MARKINGS

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OSHA COMPLIANCE MANUAL

Reserved

OSHA COMPLIANCE MANUAL

Labels, signs, and markings

Introduction

Throughout the 1910 regulations, you will find many different types of labeling and marking required, from labels on chemical containers to lockout/tagout markings. In this chapter, you have all the various labeling and marking regulations pulled together. Instead of hunting through all the plant safety regulations, you have the convenience of checking one place — this chapter.

Whether you are just implementing a plant labeling system, and need top to bottom information, or are looking for confirmation that what you have already done is sufficient, you will find it in this chapter. We will start at the beginning of 1910 and proceed with each section that involves labeling.

Walking working surfaces

General requirements
§1910.22(b)(2); (d)(1)

Aisles and passageways

Permanent aisles and passageways have to be appropriately marked.

Care and use of ladders

Ladders that have developed defects have to be taken out of service for repair or destruction. They must be tagged or marked as follows:

DANGEROUS
DO NOT USE

Portable metal ladders
§1910.26(c)(2)

Ladders that have defects have to be marked and taken out of service until repaired.

Exit routes

Maintenance, safeguards, and operational features for exit routes
§1910.37(b)

Exit markings

Each exit has to be clearly visible and marked by a sign reading “Exit” in plainly legible letters not less than six inches (15.2 cm) high, with the principal strokes of the letters in the word “Exit” not less than three-fourths of an inch (1.9 cm) wide.

Each exit sign must be illuminated to a surface value of at least five foot-candles (54 lux) by a reliable light source and be distinctive in color. Self-luminous or electroluminescent signs that have a minimum luminance surface value of at least .06 footlamberts (0.21 cd/m2) are permitted.

Exit routes

Exit route doors must be free of decorations, signs, or anything that obscures visibility. Mark every doorway or passage along an exit route that could be mistaken for an exit with a sign stating "Not an Exit" or similar designation. Or identify the door by a sign indicating its actual use (e.g., closet).

If the travel direction is not immediately apparent, post signs along the exit route indicating the direction of travel to the nearest exit and exit discharge. Line-of-sight to an exit sign must clearly be visible at all times.

Powered platforms, manlifts, and vehicle-mounted work platforms

Powered platforms for building maintenance §1910.66(f)(3), (f)(5), (f)(7), (i)(2)

Powered platform installations

Each carriage position is to be identified by location markings or position indicators, or both.

Suspended equipment

Suspended units must be provided with a load rating plate stating the unit weight and rated load of the suspended unit. The load rating plate must be conspicuously located.

Two and four-point suspended working platforms

Portable fire extinguishers must be provided and securely attached on all working platforms.

Roof powered platforms must have an emergency electric operating device near the hoisting machine. The emergency electric operating device must be mounted in a secured compartment, and the compartment must be labeled with instructions for use.

Suspension wire ropes and rope connections

When a suspension wire rope is to be used at a specific location and will remain at that location, a corrosion-resistant tag must be securely attached to one of the wire rope fastenings. The tag must contain the following information about the wire rope:

- The diameter (inches and/or mm);
- Construction classification;
- Whether non-preformed or preformed;
- The grade of the material;
- The manufacturer's rated strength;
- The manufacturer's name;
- The month and year the ropes were installed;
- The name of the person or company which installed the ropes.

A new tag must be installed at each rope renewal. When ropes are resocketed, the original tag must either be stamped with the date of resocketing, or the original tag must be retained and a supplemental tag must be provided. The supplemental tag must show the date of resocketing and the name of the person or company that resocketed the rope.

Operations

An anemometer (an instrument for measuring wind velocity) must be mounted on the working platform to provide information of on-site wind velocities prior to and during the use of the platform. A portable (hand held) anemometer which is temporarily mounted during the platform use is acceptable.

Manlifts
§1910.68(c)(7)

Instruction and warning signs

Signs giving instructions for the use of the manlift have to be posted at each landing or stenciled on the belt. The signs should be conspicuous and easy to read. The wording must read approximately as follows:

Top floor warning sign and light

At the top floor an illuminated sign must be displayed reading:

Signs must be in block letters at least 2 inches high. This sign has to be located within easy view of an ascending passenger and not more than 2 feet above the top terminal landing.

In addition to the sign, a red warning light (at least a 40-watt rating) must be provided immediately below the upper landing terminal and located so that it will shine in the passenger's face.

Visitor warning

A conspicuous sign having the following legend must be displayed at each landing.

AUTHORIZED PERSONNEL ONLY

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL

Nonionizing radiation
§1910.97(a)(3)

Warning symbol

The warning symbol for radio frequency radiation hazards consists of a red isosceles triangle above an inverted black isosceles triangle, separated and outlined by an aluminum color border. The upper triangle must bear the following words:

HAZARDOUS MATERIALS

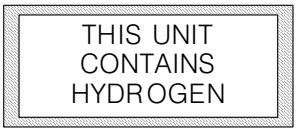
Hydrogen
§1910.103(b)(1)(i), (v); (c)(1)(iii), (2)(i)

Gaseous hydrogen systems

Each portable container has to be marked with the identifying name:

HYDROGEN

Each manifolded hydrogen supply unit has to be marked "HYDROGEN" or a legend such as:



Storage location

The hydrogen storage location has to be permanently placarded as follows:

Liquified hydrogen systems

Each container must be marked:

Storage location

Storage sites have to be fenced and posted to prevent entrance by unauthorized personnel. These sites must also be placarded as follows:

Oxygen

§1910.104(b)(8)(vii)

Bulk oxygen storage locations must be permanently placarded.

Flammable liquids

§1910.106(d)(3)(ii)

Storage cabinets where flammable liquids are stored must be conspicuously labeled.

Spray finishing using flammable and combustible materials

§1910.107(g)(7); (j)(4)(v); (l)(4)(iii); (m)(2)

No smoking signs

There are three areas where "NO SMOKING" signs have to be posted. The signs must be in large letters on a contrasting background. The following areas must be posted:

- All spraying areas and paint storage rooms
- Powder coating areas and powder storage rooms
- Areas where organic peroxides are stored, mixed, or applied.

Drying, curing, or fusion apparatus

The drying apparatus must have a prominently located, permanently attached warning sign telling employees that ventilation should be maintained during the drying period and that spraying should not be conducted in the area that spray will get on the apparatus.

OSHA COMPLIANCE MANUAL

Explosives and blasting agents
§1910.109(c)(2)(iii); (d)(2)(ii); (e)(1)(vii); (i)(4)(ii)

Storage of explosives

Property where Class I magazines are located and property where Class II magazines are located outside of buildings must be posted with signs reading:

EXPLOSIVES
KEEP OFF

Transportation of explosives

Every vehicle used for transporting explosives and oxidizing materials listed below must be marked using exterior markings or placards.

Explosives, Class A, any quantity or a combination of Class A and Class B explosives:

EXPLOSIVES A
(red letters on white background)

Explosive, Class B, any quantity:

EXPLOSIVES B
(red letters on white background)

Oxidizing material (blasting agents, ammonium nitrate, etc.), 1,000 pounds or more gross weight:

OXIDIZERS
(yellow letters on black background)

These markings or placards have to be displayed at the front, rear, and on each side of the motor vehicle or trailer, or other cargo carrying body while it contains explosives or other dangerous articles of this type and in a quantity specified in Subpart H, §1910.109(d)(1)(ii)(a). The front marking or placard may be displayed on the front of either the truck, truck body, truck tractor or the trailer.

Any motor vehicle containing more than one kind of explosive as well as an oxidizing material requiring a placard that has an aggregate gross weight which totals 1,000 pounds or more, has to be marked or placarded "DANGEROUS" as well as "EXPLOSIVE A" or "EXPLOSIVE B."

Use of explosives and blasting agents

Precautions must be taken against the accidental discharge of electric blasting caps. One of the precautions is the posting of signs warning against the use of mobile radio transmitters on all roads within 350 feet of the blasting operations.

Explosives at piers, railway stations, and cars or vessels not otherwise specified in Part 1910

Explosives can not be delivered to any carrier unless the explosive conforms in all respects, including marking and packing, to the U.S. Department of Transportation Regulations for the Transportation of Explosives.

Railway cars containing explosives must have cards attached to both sides and ends of the car that read:

EXPLOSIVES
HANDLE CAREFULLY
KEEP FIRE AWAY

The text has to be in red letters at least $1^1/_2$ inches high on a white background.

Storage of ammonium nitrate

Ammonium nitrate storage bins or piles must be clearly identified by signs with letters at least 2 inches high.

AMMONIUM NITRATE

Storage and handling of liquified petroleum gases
§1910.110(b)(5), (11), (15); (c)(2); (h)(3), (12)

Markings on containers

Containers specified in Subpart H §1910.110(b)(3)(i)-(v) must be marked:

- With a marking identifying compliance with and other markings required by, the rules of the reference under which the container is constructed; or with the stamp and other markings required by the National Board of Boiler and Pressure Vessel Inspectors.
- With notation as to whether the container is designed for underground or aboveground installation or both. If intended for both and different style hoods are provided, the marking shall indicate the proper hood for each type of installation.
- With the name and address of the supplier of the container, or with the trade name of the container.
- With the water capacity of the container in pounds or gallons, U.S. Standard.
- With the pressure in p.s.i.g., for which the container is designed.
- With the wording "This container shall not contain a product having a vapor pressure in excess of p.s.i.g. at 100°F."
- With the tare weight in pounds or other identified unit of weight for containers with a water capacity of 300 pounds or less.
- With marking indicating the maximum level to which the container may be filled with liquid at temperatures between 20°F and 130°F, except on containers provided with fixed maximum level indicators or which are filled by weighing. Markings shall be in increments of not more than 20 °F. This marking may be located on the liquid level gaging device.
- With the outside surface area in square feet.
- Markings specified must be on a metal nameplate attached to the container and located in such a manner as to remain visible after the container is installed.
- When LP-Gas and one or more other gases are stored or used in the same area, the containers have to be marked to identify their content. Marking must be in compliance with American National Standard Z48.1-1954, "Method of Marking Portable Compressed Gas Containers To Identify the Material Contained."

Vaporizer and housing

Indirect fired vaporizers that use steam, water, or other means of heating have to be permanently marked with the:

- Code marking that gives the specifications to which the vaporizer is constructed.
- Allowable working pressure and temperature for which the vaporizer is designed.
- Sum of the outside surface area and the inside heat exchange surface area expressed in square feet.
- Name or symbol of the manufacturer.

Loading or unloading points and operations

When a tank car or transport truck is loading or unloading, a "TANK CAR CONNECTED" sign has to be installed at the active end or ends of the siding while the tank car is connected.

Cylinder systems

Containers have to be marked according to DOT regulations. Additional markings that don't conflict with DOT regulations may be used.

- Except as provided below, each container shall be marked with its water capacity in pounds or other identified unit of weight.
- If a container is filled and maintained only by the owner or his representative and if the water capacity of each container is identified by a code, compliance with the above paragraph is not required.

Liquified petroleum gas service stations

All container inlets and outlets except those listed below have to be labeled to show whether they connect with vapor or liquid (labels may be on valves).

- Safety relief valves.
- Liquid-level gaging devices.
- Pressure gages.

"NO SMOKING" signs have to be posted where the customer being served can see them. The letters on these signs have to be at least 4 inches high.

Storage and handling of anhydrous ammonia
§1910.111(b)(3), (4), (8), (9), (13); (e)(1); (g)(5)

Marking nonrefrigerated containers

System nameplates, when required, must be permanently attached to the system. All containers covered in §1910.111(c), (f), (g), and (h) have to be marked with the:

- Notation "ANHYDROUS AMMONIA."
- Marking identifying compliance with the rules of the Code under which the container is constructed.

  Underground: Container and system nameplate
  Aboveground: Container

- Notation whether the system is designed for underground or aboveground installation or both.
- Name and address of the supplier of the system or the trade name of the system and the date of fabrication.

  Underground and aboveground: System nameplate

- Water capacity of the container in pounds at 60°F or gallons, U.S. Standard.

  Underground: Container and system nameplate
  Aboveground: Container

- Design pressure in pounds per square inch.

  Underground: Container and system nameplate
  Abov ground: Container

- Wall thickness of the shell and heads.

  Underground: Container and system nameplate
  Aboveground: Container

- With marking indicating the maximum level to which the container may be filled with liquid anhydrous ammonia at temperatures between 20°F and 130°F except on containers provided with fixed level indicators, such as fixed length dip tubes, or containers that are filled with weight. Markings shall be in increments of not more than 20°F.

  Aboveground and underground: System name plate or on liquid-level gaging device

- Total outside surface area of the container in square feet.

  Underground: System nameplate
  Aboveground: No requirements

- Marking specified on the container has to be on the container itself or on a nameplate permanently attached to it.

Marking refrigerated containers

Marking specified on the container has to be on the container itself or on a nameplate permanently attached to it. Each container has to be marked with the:

- Notation "ANHYDROUS AMMONIA."
- Name and address of the builder and the date of fabrication.
- Water capacity of the container in gallons, U.S. Standard.
- Design pressure.
- Minimum temperature in degrees Fahrenheit for which the container was designed.
- Maximum allowable water level to which the container may be filled for test purposes.
- Density of the product in pounds per cubic foot for which the container was designed.
- Maximum level to which the container may be filled with liquid anhydrous ammonia.

Hose specifications

All hose $^1/_2$ inch outside diameter and larger, used for the transfer of anhydrous ammonia liquid or vapor, must be etched, cast, or impressed every 5 feet with the following:

"ANHYDROUS AMMONIA" XXX p.s.i.g. (maximum working pressure),
manufacturer's name or trademark, year of manufacture.

The same information may be contained on a nameplate permanently attached to the hose instead of the above requirement.

Safety relief devices

Every container safety-relief valve used with systems covered by §1910.111(c), (f), (g), and (h) of this section shall be plainly and permanently marked as follows:

- With the symbol "NH_3" or "AA";
- With the pressure in pounds-per-square inch gage at which the valve is set to start-to-discharge;
- With the actual rate of discharge of the valve at its full open position in cubic feet per minute of air at 60° F and atmospheric pressure; and
- With the manufacturer's name and catalog number.

For example, "NH_3 250–4050 Air" indicates that the valve

- is suitable for use on an anhydrous ammonia container,
- is set to start-to-discharge at a pressure of 250 p.s.i.g., and
- that its rate of discharge at full open position is 4,050 cubic feet per minute of air.

Tank car unloading

Caution signs must be placed on the track or car to give necessary warning to persons approaching the car and shall be left there until after the car is unloaded and disconnected from discharge connections. Signs have to be made of metal or other suitable material, be at least 12 by 15 inches in size and read as follows:

or

The word "STOP" must be in letters at least 4 inches high and the other words have to be at least 2 inches high.

Systems using portable DOT containers

Cylinders must comply with DOT specifications and have to be marked and labeled to comply with 49 CFR Chapter I and Marking Portable Compressed Containers to Identify the Material Contained, ANSI Z48.1-1954 (R1970).

Systems mounted on farm vehicles

Each side and the rear end of the container must be marked, in letters at least 4 inches high, "Caution — Ammonia;" or the container must be marked according to DOT regulations.

Hazardous waste operations and emergency response
§1910.120(j)(1)(iv)

Unlabeled drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

Additional requirements for dipping and coating operations that use flammable or combustible liquids
§1910.125(e)(5)

Smoking is prohibited in vapor areas and a readily visible "NO SMOKING" sign must be placed near each dip tank.

Personal protective equipment

Respiratory protection
§1910.134(h)

Maintenance and care of respirators

Storage. The employer must ensure that respirators are stored in compartments or in covers that are clearly marked as containing emergency respirators.

Inspection. For respirators maintained for emergency use, the employer must:

- Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator; and
- Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

§1910.134(i)

Breathing air quality and use

The employer must ensure that cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Type 1-Grade D breathing air.

Compressors used to supply breathing air to respirators must have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag shall be maintained at the compressor.

Breathing gas containers marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84 must be used.

§1910.134(j)

Identification of filters, cartridges, and canisters

All filters, cartridges and canisters used in the workplace must be labeled and color coded with the NIOSH approval label. Labels must not be removed and remain legible.

General environmental controls

Color coding is a standard way of quickly transmitting information. Traffic lights use red for stop, yellow for caution, and green for go. The National Fire Protection Association (NFPA) uses red—fire, blue—health, and yellow—reactivity. OSHA has also developed color codes to convey safety information.

Safety color code for marking physical hazards
§1910.144(a)(1)(i)-(iii), (3)

Red

Red is the basic identification color of:

- Fire protection equipment and apparatus
- Danger
- Stop

Safety cans or other portable containers of flammable liquids that have a flash point at or below 80° F, table containers of flammable liquids (open cup tester), excluding shipping containers, have to be painted red with some additional, clearly visible identification either in the form of a yellow band around the can or the name of the contents clearly stenciled or painted on the can in yellow.

Red lights must be provided at barricades and at temporary obstructions, as specified in ANSI Safety Code for Building Construction, A10.2-1944.

Danger signs have to be painted red.

Emergency stop bars on hazardous machines such as rubber mills, wire blocks, flat work ironers, etc., must be red.

Stop buttons or electrical switches on which letters or other markings appear, used for emergency stopping of machinery must be red.

Reserved

Yellow

Yellow is the basic color for designating caution and for marking physical hazards such as:

- striking against,
- stumbling,
- falling,
- tripping, and
- caught-in-between.

Specifications for accident prevention signs and tags §1910.145(a)-(f)

These specifications are intended to cover all safety signs except those designed for streets, highways, railroads, and marine regulations. These specifications do not apply to plant bulletin boards or to safety posters.

Sign design

All signs must have rounded or blunt corners and should not have any sharp edges, burrs, splinters or other sharp projections. The ends or heads of bolts or other fastening devices shall be located in such a way that they do not constitute a hazard.

Classification of signs

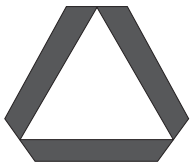
The color specifications for signs found in Subpart J §1910.145(d)(2)-(6) are as follows:

Danger signs indicate immediate danger and that special precautions are necessary. The colors used for danger signs are red, black, and white.

Caution signs indicate a possible hazard against which proper precautions should be taken. The standard color of the background on a caution sign must be yellow; and the panel, black with yellow letters. Any letters used against the yellow background must be black.

The colors specified above must be those of opaque glossy samples that are given by the American National Standard Institute (ANSI) in Table 1 of ANSI Z53.1-1967.

The **slow-moving vehicle** emblem shall be used only on vehicles, which by design, move slowly (25 m.p.h. or less) on the public roads. This emblem is a fluorescent yellow-orange triangle with a dark red reflective border.



The **biological hazard** warning shall be used to signify the actual or potential presence of a biohazard (infectious agent which presents a risk of death, injury or illness to employees).

Wording

The wording of any sign should:

- be easily read and to the point,
- contain sufficient, easy to understand information,
- make a positive suggestion, and
- be accurate in fact.

Accident prevention tags

Tags are used as a means to prevent accidental injury or illness to employees who are exposed to hazardous or potentially hazardous conditions, equipment or operations which are out of the ordinary.

All required tags (Danger, Caution, Warning, Biological Hazard) have to meet the following criteria:

- Tags shall contain a signal word (a word or words that gets the employees immediate attention) and a major message.
- The signal word shall be readable at a minimum distance of five feet (1.52 m).
- The tag's major message shall be presented in either pictographs, written text, or both.
- The signal word shall be understandable to all employees.
- All employees shall be informed as to the meaning of various tags used throughout the workplace.
- Tags shall be affixed as close as safely possible to their respective hazards.

Permit-required confined spaces
§1910.146(c)(2);(e)(3)

Exposed employees must be informed of the existence and location of and the danger posed by permit-required confined spaces through the posting of signs or by any other equally effective means.

A sign reading "DANGER—PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or using other similar language would satisfy the requirement for a sign. The completed permit for entry into a permit-required confined space must be made available at the time of entry to all authorized entrants, by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed.

Control of hazardous energy(lockout/tagout)
§1910.147(c)(5)(iii)

Tagout devices must warn against hazardous conditions if the machine or equipment is energized and have to include a legend such as the following: Do Not Start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate.

FIRE PROTECTION

Portable fire extinguishers
§1910.157(c)(1)

The employer must provide portable fire extinguishers and shall mount, locate, and identify them so that they are readily accessible to employees without subjecting the employees to possible injury.

Fixed extinguishing systems, general
§1910.160(b)(5)

The employer has to post hazard warning or caution signs at the entrance to, and inside of, areas protected by fixed extinguishing systems which use agents in concentrations known to be hazardous to employee safety and health.

OSHA COMPLIANCE MANUAL

MATERIALS HANDLING AND STORAGE

Handling materials—General
§1910.176(a); (e)

Aisles and passageways

Where mechanical handling equipment is used, sufficient safe clearances have to be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways must be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard.

All permanent aisles and passageways must be appropriately marked.

Clearance limits

Clearance signs to warn of clearance limits must be provided.

Powered industrial trucks
§1910.178(a)(3), (5)

This section contains requirements relating to fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines.

If the powered industrial truck is accepted by a nationally recognized testing laboratory it should bear a label or some other identifying mark indicating approval by the testing laboratory.

If the truck is equipped with front-end attachments other than factory installed attachments, the user shall request that the truck be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered.

All nameplates and markings must be in place and be maintained in a legible condition.

OSHA COMPLIANCE MANUAL

Overhead and Gantry Cranes
§1910.179(b)(5); (l)(2)

Rated Load Marking

The rated load of the crane has to be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist has to have its rated load marked on it or its load block.

This marking must be clearly legible from the ground or the floor.

Maintenance

Before adjustment and repairs are started on a crane, "WARNING" or "OUT OF ORDER" signs must be placed on the crane also on the floor beneath the crane or on the hook where it is visible from the floor.

Crawler Locomotive and Truck Cranes
§1910.180(c)(2)

Load Rating Chart

A substantial and durable rating chart with clearly legible letters and numbers shall be provided with each crane and securely fastened to the crane cab in a location that is easily seen by the operator while he is seated at his control station.

Derricks
§1910.181(c)(1); (f)(2)

Rated Load Markings

For permanently installed derricks with fixed lengths of boom, guy, and mast, a substantial, durable, and clearly legible rating chart must be provided with each derrick and securely fastened where it can be seen by personnel responsible for the safe operation of the equipment.

The chart shall include the following data:

- Manufacturer's approved load ratings at corresponding ranges of boom angle or operating radii.
- Specific lengths of components on which the load ratings are based.
- Required parts for hoist reeving. Size and construction of rope may be shown either on the rating chart or in the operating manual.

Maintenance

Before adjustments and repairs are started on a derrick "WARNING" or "OUT OF ORDER" signs must be placed on the derrick and hoist.

OSHA COMPLIANCE MANUAL

MACHINERY AND MACHINE GUARDING

Woodworking Machinery
§1910.213(h)(5)

Radial Saws

The direction of the saw rotation must be conspicuously marked on the hood. In addition, a permanent label at least $1^1/_2$ inches by $^3/_4$ inch must be affixed to the rear of the guard at about the level of the arbor. The label has to read as follows:

Design, Construction, Setting and Feeding of Dies
§1910.217(d)(6)

All dies must be:

1) stamped with tonnage and stroke requirements or have these characteristics recorded if these records are readily available to the die setter;

2) stamped to indicate upper die weight when necessary for air counter-balance pressure adjustment; and

3) stamped to indicate complete die weight when handling equipment may become overloaded.

Mechanical Power Presses
§1910.217 (h)(11)

Presence Sensing Device Initiation (PSDI)

Prior to the initial use of any mechanical press in the PSDI mode, two sets of certification and validation are required.

A label has to be affixed to the press as part of each installation certification/validation and the most recent recertification/revalidation. The label must indicate:

- Press serial number;
- Minimum safety distance (Ds) required by paragraph (h)(9)(v) of §1910.217;
- Fulfillment of design certification/validation;
- Employer's signed certification;
- Identification of the OSHA-recognized third-party validation organization, its signed validation; and
- Date the certification/validation and recertification/revalidation are issued.

Hand and portable powered tools and other hand held equipment

Guarding of portable powered tools

§1910.243(e)(1)–(2)

Power lawn mowers

The words "Caution — Be sure the operating control(s) is in neutral before starting the engine" or similar wording must be clearly visible at an engine starting control point on self-propelled mowers.

Walk-behind and riding rotary mowers

Warning instructions must be affixed to the mower near the opening stating that the mower shall not be used without either the catcher assembly or the guard in place.

The word "CAUTION" or stronger wording must be placed on the mower at or near each discharge opening.

Other portable tools and equipment

§1910.244(a)(1)(ii), (a)(2)(viii)

Jacks - loading and marking

The rated load must be legibly and permanently marked in a prominent location on the jack by casting, stamping, or other suitable means.

Jacks which are out of order have to be tagged accordingly.

Welding, cutting, and brazing

General requirements

§1910.252(b)(2)(ii), (b)(4)(vii); (c)(1)(iv)

Protection of personnel

Lenses (of shields or goggles) must have some distinctive marking by which the source and shade may be readily identified.

After welding operations are completed, the welder has to mark the hot metal or provide some other means of warning other workers.

Health protection and ventilation

The employer must include the potentially hazardous materials employed in fluxes, coatings, coverings, and filler metals, all of which are potentially used in welding and cutting, or are released to the atmosphere during welding and cutting, in the program established to comply with the Hazard Communication Standard (HCS) (§1910.1200).

The employer must ensure that each employee has access to labels on containers of such materials and safety data sheets, and is trained in accordance with the provisions of §1910.1200.

Potentially hazardous materials include but are not limited to the materials itemized in paragraphs (c)(5) through (c)(12) of §1910.252.

The suppliers must determine and label in accordance with §1910.1200 any hazards associated with the use of their materials in welding, cutting, and brazing.

In addition to any requirements imposed by §1910.1200, all filler metals and fusible granular materials must carry the following notice, as a minimum, on tags, boxes, or other containers:

- "Do not use in areas without adequate ventilation. See ANSI Z49.1–1967 Safety in Welding, Cutting, and Allied Processes published by the American Welding Society."

Where brazing (welding) filler metals contain cadmium in significant amounts, the labels must indicate the hazards associated with cadmium including cancer, lung and kidney effects, and acute toxicity effects.

Where brazing and gas welding fluxes contain fluorine compounds, the labels must indicate the hazards associated with fluorine compounds including eye and respiratory tract effects.

Oxygen-fuel gas welding and cutting

§1910.253(b)(1)(ii), (b)(5)(iii); (c)(3)(v); (d)(4)(ii)–(iii); (e)(6)(iii); (g)(1)(ii)

Cylinders and containers

Compressed gas cylinders must be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas.

Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable. Whenever practical, the marking shall be located on the shoulder of the cylinder.

OSHA COMPLIANCE MANUAL

This method conforms to the American National Standard Method for Marking Portable Compressed Gas Containers to Identify the Material Contained, ANSI Z48.1-1954.

A warning should be placed near cylinders having leaking fuse plugs or other leaking safety devices not to approach them with a lighted cigarette or other source of ignition. Such cylinders should be plainly tagged.

Manifolding of Cylinders

The following sign must be conspicuously posted at each low-pressure oxygen manifold (for use with cylinders having a Department of Transportation service pressure not exceeding 200 p.s.i.g.):

LOW-PRESSURE MANIFOLD
DO NOT CONNECT HIGH PRESSURE CYCLINDERS
MAXIMUM PRESSURE - 250 P.S.I.G.

Service Piping Systems

Above ground piping systems must be marked in accordance with the American National Standard Scheme for the Identification of Piping Systems, ANSI A13.1-1956.

Station outlets have to be marked to indicate the name of the gas.

Protective Equipment, Hose, and Regulators

Gages on oxygen regulators must be marked “USE NO OIL.”

Acetylene Generators

Generators must be plainly marked with:

- Maximum rate of acetylene in cubic feet per hour for which they are designed;
- Weight and size of carbide necessary for a single charge;
- Manufacturer’s name and address; and
- Name or number of the type of generator.

Calcium Carbide Storage

Packages containing calcium carbide have to be conspicuously marked with the following phrase or an equivalent warning:

CALCIUM CARBIDE
DANGEROUS IF NOT KEPT DRY

OSHA COMPLIANCE MANUAL

SPECIAL INDUSTRIES

Pulp, Paper, and Paperboard Mills
§1910.261(a)(3); (c)(9) and (c)(16)

This section applies to establishments where pulp, paper, and paperboard are manufactured and converted. Establishments subject to this section must comply with several standards of the American National Standards Institute, including Specifications for Accident Prevention Signs, Z35.1-1968.

Traffic Warning Signs or Signals

A flagman must direct the movement of cranes or locomotives being moved across railroad tracks or roads, and at any points where the vision of the operator is restricted. The flagman must always remain in sight of the operator when the crane or locomotive is in motion.

The blue flag policy must be used to mark stationary cars day and night. This policy shall include marking the track in advance of the spotted cars (flag for daytime, light for darkness).

After cars are spotted for loading or unloading, warning flags or signs have to be placed in the center of the track at least 50 feet away from the cars and a derail set to protect workmen in the car.

Signs

Where conveyors cross walkways or roadways in the yards, signs with the following phrase or an equivalent warning must be erected, in accordance with American National Standard Z35.1-1968.

DANGER OVERHEAD CONVEYOR

Textiles
§1910.262(c)(7)-(8)

General Safety Requirements

Identification of piping systems must conform to American National Standard A13.1-1956 and physical hazards must meet the requirements of §1910.144.

Sawmills
§1910.265(c)(6), (11), (26), (31)

Building Facilities, and Isolated Equipment

Where a doorway opens upon a railroad track or upon a tramway or dock over which vehicles travel, a barrier or other warning device shall be placed to prevent workmen from stepping into moving traffic.

Physical hazards must be marked as specified in §1910.144.

Where the return of trucks from unstacker to stacker is by mechanical power or gravity, adequate signs, warning devices or barriers shall be erected to prevent entry into the hazardous area.

Railroad tracks and other hazardous crossings shall be plainly posted and appropriate traffic control devices (American National Standard D8.1-1967 for Railroad-Highway Grade Crossing Protection) should be used.

Log Handling, Sorting, and Storage

Signs prohibiting unauthorized foot or vehicle traffic in log unloading and storage areas must be posted.

Log Breakdown and Related Machinery and Facilities

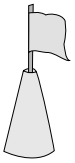
A barrier must be provided to prevent employees from entering the space necessary for travel of the carriage, with headblocks fully receded, for the full length and extreme ends of carriage runways.

Post warning signs at possible entry points to this area.

Telecommunications
§1910.268(d)(2); (p)(2)

Employee Protection in Public Work Areas

Before work is begun in the vicinity of vehicular or pedestrian traffic which may endanger employees, warning signs and/or flags or other traffic control devices shall be placed conspicuously to alert and channel approaching traffic.



Where further protection is needed, barriers shall be used. At night, warning lights shall be prominently displayed, and excavated areas shall be enclosed with protective barricades.

If work exposes energized or moving parts that are normally protected, danger signs shall be displayed and barricades erected, as necessary, to warn other personnel in the area.

Microwave Transmission

Accessible areas associated with microwave communication systems where the electromagnetic radiation level exceeds the radiation protection guide given in §1910.97 shall be posted as described in that section.

The lower half of the warning symbol shall include the following:

RADIATION IN THIS AREA MAY EXCEED HAZARD LIMITATIONS
AND SPECIAL PRECAUTIONS ARE REQUIRED.

OBTAIN SPECIFIC INSTRUCTION BEFORE ENTERING.

Electric Power Generation, Transmission and Distribution
§1910.269(d)(3); (m)(3); (s)(1); (u)(4); (v)(4), (7), (8), (10); (w)(6)

Hazardous Energy Control (lockout/tagout)

Lockout devices and tagout devices must be standardized within the facility in at least one of the following criteria: color, shape, size. Additionally, in the case of tagout devices, print and format must be standardized.

Lockout devices must be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or metal cutting tools.

Tagout devices, including their means of attachment, must be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means must be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and must have the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.

Each lockout device or tagout device must include provisions for the identification of the employee applying the device.

OSHA COMPLIANCE MANUAL

Tagout devices must warn against hazardous conditions if the machine or equipment is energized and must include a legend such as the following: Do Not Start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate.

Note: For specific provisions covering accident prevention tags, see §1910.145 of this Part.

Deenergizing Lines and Equipment for Employee Protection

All switches, disconnectors, jumpers, taps, and other means through which known sources of electric energy may be supplied to the particular lines and equipment to be deenergized must be opened. Such means will be rendered inoperable, unless its design does not so permit, and tagged to indicate that employees are at work.

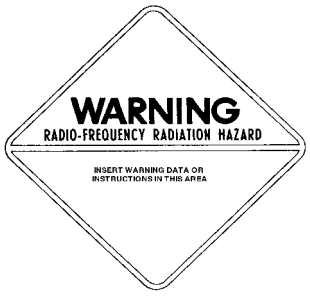
Automatically and remotely controlled switches that could cause the opened disconnecting means to close must also be tagged at the point of control. The automatic or remote control feature will be rendered inoperable, unless its design does not so permit.

Tags must prohibit operation of the disconnecting means and will indicate that employees are at work.

Communication Facilities

If the electromagnetic radiation level within an accessible area associated with microwave communications systems exceeds the radiation protection guide given in §1910.97(a)(2), the area must be posted with the following warning symbol. The lower half of the warning symbol must include the following statements or ones that the employer can demonstrate are equivalent:

> **Radiation in this area may exceed hazard limitations and special precautions are required. Obtain specific instruction before entering.**



Substations

Signs warning unqualified persons to keep out must be displayed at entrances to the rooms and spaces.

Power Generation

Signs warning unqualified persons to keep out must be diplayed at entrances to the rooms and spaces containing electric supply equipment.

The area has to be posted with signs restricting entry and warning of the hazards of fire and explosion for the chemical cleaning of boilers and pressure vessels.

Chlorine system enclosures must be posted with signs restricting entry and warning of the hazard to health and the hazards of fire and explosion.

Smoking and other ignition sources are prohibited near hydrogen or hydrogen sealing systems, and signs warning of the danger of explosion and fire must be posted.

Special conditions for employee protection in public work areas:

Before work is begun in the vicinity of vehicular or pedestrian traffic that may endanger employees, warning signs or flags and other traffic control devices must be placed in conspicuous locations to alert and channel approaching traffic.

At night, warning lights must be prominently displayed.

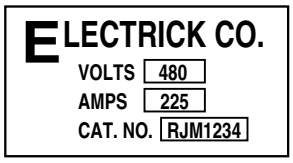
Electrical

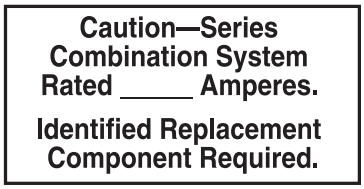
General requirements
§1910.303(e); (f); (g); (h)

Identification of manufacturer and ratings

Electrical equipment may not be used unless the manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product may be identified is placed on the equipment.

Other markings must be provided giving voltage, current, wattage, or other ratings as necessary. The marking have to be durable enough to withstand the environment involved.





Disconnecting means and circuits

Each disconnecting means required by Subpart S for motors and appliances must be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident.

Each service, feeder, and branch circuit, at its disconnecting means or overcurrent device, must be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident. The marking has to be durable enough to withstand the environment involved.

Equipment enclosures must be legibly marked in the field to indicate that the equipment has been applied with a series combination rating. The marking must state "Caution — Series Combination System Rated ____ Amperes. Identified Replacement Component Required."

600 volts, nominal, or less

Entrances to rooms and other guarded locations containing exposed live parts must be marked with conspicuous warning signs prohibiting unqualified persons to enter.

Over 600 volts, nominal

Metal-enclosed switchgear, unit substations, transformers, pull boxes, connection boxes, and other similar associated equipment has to be marked with appropriate caution signs.

Entrances to all buildings, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 600 volts, nominal, must be kept locked unless they are under the observation of a qualified person at all times. Permanent and conspicuous warning signs must be placed that read "DANGER—HIGH VOLTAGE—KEEP OUT."

Wiring design and protection
§1910.304(b); (e); (f)

Branch circuits

A nongrounding-type receptacle may be replaced with a ground-fault circuit-interrupter-type receptacle that is marked "No Equipment Ground."

A replacement receptacle must be marked "GFCI Protected" and "No Equipment Ground."

Services

Signs warning of high voltage must be posted where unqualified employees might come in contact with live parts.

Overcurrent protection

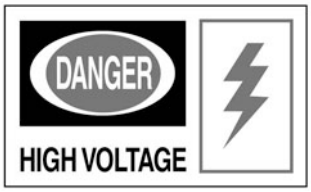
Circuit breakers used as switches in 120-volt and 277-volt fluorescent lighting circuits must be listed and marked "SWD."

Wiring methods, components, and equipment for general use
§1910.305(b); (c); (j)

Cabinets, boxes, and fittings

Pull and junction boxes for systems over 600 volts, nominal have to be closed by suitable covers securely fastened in place. Underground box covers that weigh over 100 pounds meet this requirement.

Covers for boxes must be permanently marked "HIGH VOLTAGE." The marking has to be on the outside of the box cover and must be readily visible and legible.



Switches

Installations having blades and terminals supplying the load of a switch may be energized when the switch is in the open position where the switch is connected to circuits or equipment capable of providing a backfeed source of power. These installations must have a permanent sign on the switch enclosure or immediately adjacent to open switches that reads "WARNING—LOAD SIDE TERMINALS MAY BE ENERGIZED BY BACKFEED."

Equipment for general use

Each electric appliance must have a nameplate with the identifying name and the rating in volts and amperes, or in volts and watts. If the appliance is to be used on a specific frequency or frequencies, it must be marked. Where motor overload protection external to the appliance is required, the appliance must be marked.

The operating voltage of exposed live parts of transformer installations must be indicated by signs or visible markings on the equipment or structure.

Specific purpose equipment and installations

§1910.306(c); (g)

Elevators, dumbwaiters, escalators, and moving walks

When there is more than one driving machine in a machine room, the disconnecting means has to be numbered to correspond to the identifying number of the driving machine that they control. The disconnecting means must have a sign to identify the location of the supply-side overcurrent protective device.

A warning sign must be placed on or next to the disconnecting means where multiple disconnecting means are used and parts of the controllers remain energized from a source other than the one disconnected. The sign has to be clearly legible and read "WARNING — PARTS OF THE CONTROLLER ARE NOT DEENERGIZED BY THIS SWITCH."

The sign must be clearly legible and read:

This sign also has to be posted where interconnections between controllers are necessary for the operation of the system on multicar installations that remain energized from a source other than the one disconnected.

Induction and dielectric heating equipment

Warning labels or signs that read "DANGER—HIGH VOLTAGE—KEEP OUT" must be attached to the equipment and be plainly visible where persons might contact energized parts when doors are opened or closed or when panels are removed from compartments containing voltages of over 250 volts ac or dc.

Hazardous (classified) locations

§1910.307(c)

Electrical installations

Equipment must be marked to show the class, group, and operating temperature or temperature range, based on operation in an 40°C ambient, for which it is approved.

Electric equipment suitable for ambient temperatures exceeding 40°C (104°F) must be marked with both the maximum ambient temperature and the operating temperature or temperature range at that ambient temperature.

Special systems

§1910.308(a); (b); (c); (d)

Systems over 600 volts, nominal

Unless fused cutouts are interlocked with the switch to prevent opening of the cutouts under load, a conspicuous sign must be placed at the cutouts that reads "WARNING—DO NOT OPERATE UNDER LOAD."

Where more than one switch is installed with interconnected load terminals to provide for alternate connection to different supply conductors, each switch must be marked with a conspicuous sign reading "WARNING—SWITCH MAY BE ENERGIZED BY BACKFEED."

Emergency power systems

A sign must be placed at the service entrance equipment indicating the type and location of onsite emergency power sources. However, a sign is not required for individual unit equipment.

Where the grounded circuit conductor connected to the emergency source is connected to a grounding electrode conductor at a location remote from the emergency source, there must be a sign at the grounding location that identifies all emergency and normal sources connnected at that location.

Class 1, Class 2, and Class 3 remote control, signaling, and power-limited circuits

A Class 2 or Class 3 power supply unit must be durably marked where plainly visible to indicate the class of supply and its electrical rating.

Fire alarm systems

Fire alarm circuits must be identified at terminal and junction locations in a manner that will prevent unintentional interference with the signaling circuit during testing and servicing. Power-limited fire alarm circuits must be durably marked where plainly visible at terminations.

Toxic and hazardous substances

OSHA has developed specific health standards for twenty-five toxic and hazardous substances. There are warning sign and label rules within each standard. Appropriate signs and instructions have to be posted at the entrance to, and exit from, regulated areas. They must tell employees the procedures that must be followed when entering or leaving a regulated area.

Asbestos

§1910.1001(j)(3)–(4)

Warning signs must be provided and displayed at each regulated area. In addition, warning signs must be posted at all approaches to regulated areas so that an employee can read the signs and take necessary protective steps before entering the area.

Entrances to regulated areas have to be posted with signs that read:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use the alternate wording specified in 1910.1001(j)(4)(ii)(c) for warning signs.

In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

Note: Prior to June 1, 2016, employers may use the alternate wording specified in 1910.1001(j)(4)(ii)(D) for the respirator warning.

Warning labels have to be placed on all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers. The label must include the following information:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

Note: Prior to June 1, 2015, employers may use the alternate wording specified in 1910.1001(j)(5)(iii) for labels.

13 carcinogens (4-nitrobiphenyl, etc.)

§1910.1003 (e)(1)–(4)

In March 1996 OSHA issued an amendment to the subpart Z standard merging the 13 carcinogen standards from §1910.1003 through §1910.1016 into one rule at §1910.1003. Because of the similarities of these substances, a single rule combining these repetitious provisions makes it easier to comply.

The rule, "13 Carcinogens," is located at §1910.1003, and covers the following chemical substances: 4-Nitrobiphenyl, alpha-Naphthylamine, Methyl chloromethyl ether, 3,3´-Dichlorobenzidine (and its salts), bis-Chloromethyl ether, beta-Naphthylamine, Benzidine, 4-Aminodiphenyl, Ethyleneimine, beta-Propiolactone, 2-Acetylaminofluorene, 4-Dimethylaminoazobenzene, and N-Nitrosodimethylamine. The following sign and label requirements apply for all the substances.

No statement may appear on or near any required sign, label, or instruction which contradicts or detracts from the effect of any required warning, information or instruction.

Entrances to regulated areas where the toxic and hazardous substances listed above are manufactured, processed, repackaged, released, handled, or stored have to be posted with signs that read:

DANGER
[CHEMICAL IDENTIFICATION]
MAY CAUSE CANCER
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use the alternate wording specified in 1910.1003(e)(2)(iii) for the above.

Entrances to regulated areas where cleanup of leaks or spills, maintenance or repair operations on contaminated systems or equipment, or any operations where direct contact with a toxic or hazardous substance could result, have to be posted with signs that read:

DANGER
[CHEMICAL IDENTIFICATION]
MAY CAUSE CANCER
WEAR AIR-SUPPLIED HOODS,
IMPERVIOUS SUITS, AND PROTECTIVE
EQUIPMENT IN THIS AREA
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use the alternate wording specified in 1910.1003(e)(2)(iv) for the above.

Container contents identification

Employers must include the 13 carcinogens in the HazCom program ensuring access to appropriate container labels.

Vinyl chloride

§1910.1017(l)(1)–(6)

Entrances to regulated areas have to be posted with signs that read:

DANGER
VINYL CHLORIDE
MAY CAUSE CANCER
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternative wording from 1910.1017(l)(2)(iii).

Areas containing hazardous operations or where an emergency currently exists have to be posted with signs that read:

DANGER
VINYL CHLORIDE
MAY CAUSE CANCER
WEAR RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING IN THIS AREA
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternative wording from 1910.1017(l)(2)(iv).

Containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride have to be labeled:

CONTAMINATED WITH VINYL CHLORIDE
MAY CAUSE CANCER

Note: Prior to June 1, 2015, employers may use alternative wording from 1910.1017(l)(3)(ii).

Containers of polyvinyl chloride must be labeled in accordance with 1910.1200; except that until June 1, 2015, employers may use the alternate wording from 1910.1017(l)(4) and (5).

Inorganic arsenic

§1910.1018(j)(2)(vii), (p)(1)–(3)

Containers of contaminated protective clothing and equipment must be labeled with the following:

DANGER: CONTAMINATED WITH
INORGANIC ARSENIC. MAY CAUSE
CANCER. DO NOT REMOVE DUST BY
BLOWING OR SHAKING. DISPOSE OF
INORGANIC ARSENIC CONTAMINATED
WASH WATER IN ACCORDANCE WITH
APPLICABLE LOCAL, STATE OR
FEDERAL REGULATIONS.

Note: Prior to June 1, 2015, employers may use alternative wording from 1910.1018(j)(2)(Vii)(B).

Regulated areas must be marked with signs that read:

DANGER
INORGANIC ARSENIC
MAY CAUSE CANCER
DO NOT EAT, DRINK OR SMOKE
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternative wording from 1910.1018(p)(2)(ii).

Containers of inorganic arsenic must be labeled in accordance with 1910.1200; except that until June 1, 2015, employers may use the alternate wording from 1910.1018(p)(3)(i).

Lead

§1910.1025(g)(2)(vii), (m)(1) and (2)

Bags or containers of contaminated protective clothing and equipment must include:

DANGER: CLOTHING AND EQUIPMENT
CONTAMINATED WITH LEAD. MAY
DAMAGE FERTILITY OR THE UNBORN
CHILD. CAUSES DAMAGE TO THE
CENTRAL NERVOUS SYSTEM. DO NOT
EAT, DRINK OR SMOKE WHEN
HANDLING. DO NOT REMOVE DUST BY
BLOWING OR SHAKING. DISPOSE OF
LEAD CONTAMINATED WASH WATER
IN ACCORDANCE WITH APPLICABLE
LOCAL, STATE, OR FEDERAL
REGULATIONS.

Note: Prior to June 1, 2015, employers may use alternative wording from 1910.1025(g)(2)(VII)(B).

The employer has to post the following warning signs in each area where the permissible exposure limit (PEL) is exceeded:

DANGER
LEAD
MAY DAMAGE FERTILITY OR THE
UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL
NERVOUS SYSTEM
DO NOT EAT, DRINK OR SMOKE IN THIS
AREA

Note: Prior to June 1, 2016, employers may use alternative wording from 1910.1025(m)(2)(v).

Containers of lead must be labeled in accordance with 1910.1200.

Chromium (VI)

§1910.1026(e), (h)(2), (j)(3)

Employers have to establish a regulated area wherever airborne exposures to chromium (VI) exceed, or can be expected to exceed, the PEL. Each regulated area has to be marked in a manner that establishes and alerts employees of its boundaries.

Bags or containers of clothing or equipment contaminated with chromium (VI) that are removed from change rooms for laundering, cleaning, maintenance, or disposal have to be labeled according to the Hazard Communication standard. Bags or containers of waste, scrap, debris, and any other materials contaminated with chromium (VI) that are consigned for disposal have to be labeled according to the Hazard Communication standard.

Cadmium

§1910.1027(e)(2), (k)(7), (m)

Employers must post signs in all regulated areas and at all approaches to regulated areas, so that an employee may read the sign and take necessary protective steps before entering the area. These signs are to bear the following legend:

DANGER
CADMIUM
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS AND
KIDNEYS
WEAR RESPIRATORY PROTECTION IN
THIS AREA
MAY CAUSE CANCER
AUTHORIZED PERSONNEL ONLY

The employer must ensure that signs required by this paragraph are illuminated, cleaned, and maintained as necessary so that the legend is readily visible.

Note: Prior to June 1, 2016, employer may use alternative wording from 1910.1027(m)(2)(iv).

Shipping and storage containers containing cadmium, cadmium compounds, or cadmium contaminated clothing, equipment, waste, scrap, or debris must bear appropriate warning labels containing at least the following:

DANGER
CONTAINS CADMIUM
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS AND
KIDNEYS
AVOID CREATING DUST

Note: Prior to June 1, 2015, employers may use alternative wording from 1910.1027(m)(3)(iii).

Where feasible, installed cadmium products must have a visible label or other indication that cadmium is present.

Benzene

§1910.1028(j)(1)

The employer must post the following warning signs at entrances to regulated areas:

DANGER
BENZENE
MAY CAUSE CANCER
HIGHLY FLAMMABLE LIQUID AND VAPOR
DO NOT SMOKE
WEAR RESPIRATORY PROTECTION IN THIS AREA
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1028(j)(2)(ii).

Containers of benzene have to be labeled in accordance with 1910.1200, except prior to June 1, 2015, employers may use wording from 1910.1028(j)(2)(iv).

Coke oven emissions

§1910.1029(l)(2)–(3)

Signs that read as follows must be posted in the regulated areas:

DANGER
COKE OVEN EMISSIONS
MAY CAUSE CANCER
DO NOT EAT, DRINK OR SMOKE
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY.

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1029(l)(2)(v).

In areas where the PEL is exceeded, the following signs have to be posted:

WEAR RESPIRATORY PROTECTION IN
THIS AREA

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1029(l)(2)(vi).

The employer has to put labels on all containers of protective clothing contaminated with coke oven emissions. The labels must read:

CONTAMINATED WITH COKE EMISSIONS
MAY CAUSE CANCER
DO NOT REMOVE DUST BY BLOWING OR
SHAKING

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1029(l)(3)(ii).

Bloodborne pathogens

§1910.1030(d)(2)(xiii)–(xiv), (3)(viii), (4)(iii); (e)(2)(ii)(d); (g)(1)

The containers for storage, transport, or shipping of specimens of blood or other potentially infectious material must be labeled or color-coded according to paragraph (g)(1)(i). When a facility utilizes Universal Precautions in the handling of all specimens, the labeling/color-coding of specimens is not necessary provided containers are recognizable as containing specimens. This exemption only applies while the specimens/containers remain within the facility. Labeling or color-coding in accordance with (g)(1)(i) is required if the specimens or containers leave the facility.

A readily observable label in accordance with (g)(1)(i)(H) must be attached to equipment contaminated with blood or other potentially infectious materials. The label must state which portions of the equipment remain contaminated.

Personal protective equipment which is removed must be placed in a appropriately designated area or container for storage, washing, decontamination, or disposal.

Contaminated sharps and regulated waste must be placed in containers which are labeled in accordance with (g)(1)(i). Contaminated laundry is to be placed and transported in bags or containers labeled or color-coded in accordance with (g)(1)(i). Alternative labeling is permitted when a facility utilizes Universal Precautions in the handling of all soiled laundry as long as the alternative labeling or coding permits all employees to recognize the containers as requiring compliance with Universal Precautions. If the laundry is shipped off-site to a facility that does not utilize Universal Precautions in the handling of all laundry, the facility generating the laundry must place it in bags or containers labeled or color-coded in accordance with paragraph (g)(1)(i).

In an HIV or HBV research laboratory or production facility, contaminated materials that are to be decontaminated at a site away from the work area must be placed in a durable, leakproof, labeled or color-coded container that is closed before being removed from the work area. When other potentially infectious materials or infected animals are present in the work area or containment module, a hazard warning sign incorporating the universal biohazard symbol must be posted on all access doors. The hazard warning sign must comply with paragraph (g)(1)(ii).

Warning labels must be affixed to containers of regulated waste, refrigerators and freezers containing blood or other potentially infectious material, and other containers used to store, transport, or ship blood or other potentially infectious material, except as provided in paragraphs (g)(1)(i)(E), (F), and (G).

The labels must include the following legend:

The labels must be fluorescent orange or orange-red or predominantly so, with lettering and symbols in a contrasting color. The labels should be affixed as close as possible to the container with string, wire, adhesive, or other method that prevents their loss or unintentional removal.

Red bags or red containers may be substituted for labels. Containers of blood, blood components, or blood products that are labeled as to their contents and have been released for transfusion or other clinical use are exempted from the labeling requirements. Individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment, or disposal are exempted from the labeling requirement.

Labels for contaminated equipment must comply with the requirements of paragraph (g) and must state which portions of the equipment remain contaminated. Regulated waste that has been decontaminated need not be labeled or color-coded.

Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure.

Employers must post signs at the entrance to work areas specified in paragraph (e), HIV and HBV research laboratories and production facilities. The signs must be fluorescent orange-red, or predominantly so, with lettering and symbols in a contrasting color and shall bear the following legend:

BIOHAZARD

[Name of Infectious Agent]
[Special requirements for entering the area]
[Name, telephone number of the laboratory director or other responsible person]

Cotton dust

§1910.1043(j)

The employer has to post the following warning sign in each work area where the permissible exposure limit for cotton dust is exceeded:

DANGER
COTTON DUST
CAUSES DAMAGE TO LUNGS
(BYSSINOSIS)
WEAR RESPIRATORY PROTECTION IN THIS AREA

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1043(j)(2).

1,2-dibromo-3-chloropropane (dbcp)

§1910.1044(j)(2), (o)(1)–(3)

Containers of contaminated protective devices or work clothing must be labeled with:

- "CONTAMINATED WITH 1,2-Dibromo-3-chloropropane (DBCP), MAY CAUSE CANCER."

The employer has to post signs to clearly indicate all regulated areas. The signs have to read:

DANGER
1,2-Dibromo-3-chloropropane
MAY CAUSE CANCER
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1044(o)(2)(ii).

All containers of DBCP and products containing DBCP in the workplace have to be labeled in accordance with 1910.1200; except prior to June 1, 2015, alternate wording from 1910.1044(o)(3)(iii) may be used.

Acrylonitrile

§1910.1045(p)

Employers must include acrylonitrile (AN) in the hazard communication program from 1910.1200.

The employer must post signs where AN concentrations exceed the permissible exposure limits:

DANGER
ACRYLONITRILE (AN)
MAY CAUSE CANCER
RESPIRATORY PROTECTION MAY BE
REQUIRED IN THIS AREA
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1045(p)(2)(iii).

Containers must be labeled in accordance with 1910.1200, except prior to June 1, 2015, alternate wording from 1910.1045(p)(3)(ii) may be used.

Ethylene oxide

§1910.1047(j)

The employer must post and maintain signs that show regulated areas and entrances or accessways to regulated areas. The warning signs must read as follows:

DANGER
ETHYLENE OXIDE
MAY CAUSE CANCER
MAY DAMAGE FERTILITY OR THE
UNBORN CHILD
RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING MAY BE
REQUIRED IN THIS AREA
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1047(j)(2)(i)(B).

Labels have to be put on all containers of ethylene oxide whose contents are capable of causing employee exposure at or above the action level or whose contents could possibly cause employee exposure above the excursion limit. The labels must comply with the requirements of 29 CFR 1910.1200, except prior to June 1, 2015, alternate labels from 1910.1047(j)(2)(ii)(B) may be used.

Formaldehyde

§1910.1048(e)(1); (h)(2)(ii); (m)

Regulated areas must be established where the concentration of airborne formaldehyde exceeds either the TWA or the STEL and post all entrances and accessways with signs that read:

DANGER
FORMALDEHYDE
MAY CAUSE CANCER
CAUSES SKIN, EYE, AND RESPIRATORY
IRRITATION
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1048(e)(1)(ii).

Storage areas for contaminated clothing and equipment have to have labels and signs that contain the following information:

DANGER
FORMALDEHYDE-CONTAMINATED
(CLOTHING) EQUIPMENT
MAY CAUSE CANCER
CAUSES SKIN, EYE AND RESPIRATORY
IRRITATION
DO NOT BREATHE VAPOR
DO NOT GET ON SKIN

Note: Prior to June 1, 2016, employer may use alternate wording from 1910.1048(h)(2)(ii)(C).

Containers of contaminated clothing and equipment must be labeled in accordance with 1910.1200 and contain at a minimum the following:

DANGER
FORMALDEHYDE-CONTAMINATED
(CLOTHING) EQUIPMENT
MAY CAUSE CANCER
CAUSES SKIN, EYE, AND RESPIRATORY
IRRITATION
DO NOT BREATH VAPOR
DO NOT GET ON SKIN

Note: Prior to June 1, 2015, employers may use alternate wording from 1910.1048(h)(2)(ii)(D).

Formaldehyde-contaminated waste and debris from spills or leaks must be placed for disposal in sealed containers bearing a label warning of formaldehyde's presence and of the hazards.

Formaldehyde must be labeled in accordance with 1910.1048(m), which has differing requirements depending on the type of formaldehyde and the potential for release into the air.

Methylenedianiline

§1910.1050(f)(2), (h)(4)(i), (i)(2)(v), (i)(3)(vi), and (k)(1)(i)–(ii)

The employer must establish as regulated areas any areas where the airborne concentration of methylenedianiline (MDA) exceeds, or may be expected to exceed, the permissible exposure limits or any areas where employees have dermal exposure to MDA. These regulated areas must be marked in a manner that minimizes the number of persons potentially exposed.

When air-purifying respirators are used, the cartridges of the respirators must be dated at the beginning of use.

Labels warning of the hazards of MDA must be placed on any containers of MDA-contaminated clothing or equipment taken out of change rooms or the workplace for cleaning, maintenance, or disposal.

Clothing contaminated with MDA must be transported in labeled, sealed, impermeable bags or containers.

Signs marking regulated areas and entrances or accessways to regulated areas must read as follows:

DANGER
MDA
MAY CAUSE CANCER
CAUSES DAMAGE TO THE LIVER
RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING MAY BE
REQUIRED IN THIS AREA
AUTHORIZED PERSONNEL ONLY

Note: Prior to June 1, 2016, employers may use alternate wording from 1910.1050(k)(2)(i)(B).

Containers of MDA within the workplace must have labels or other appropriate forms of warning. The labels must meet the requirements of 29 CFR 1910.1200, EXCEPT prior to June 1, 2015, employers may use alternate wording from 1910.1050(k)(2)(ii).

1,3-butadiene

§1910.1051(e)(1)–(4), (h)(2)(iv), (l)

A regulated area must be established wherever exposures to airborne BD exceeds or could exceed the PEL, either the 8-hour TWA or the STEL.

Only authorized persons can access regulated areas.

Regulated areas must be demarcated from the rest of the workplace in any manner that minimizes the number of workers exposed.

An employer at a multi-employer worksite that establishes a regulated area must communicate the access restrictions and locations of these areas to other employers with work operations at that worksite whose employees may have access to these areas.

Employers must include BD in the hazard communication program per 1910.1200.

Respirator program

A label must be attached to each filter element to indicate the date and time it is first installed on the respirator.

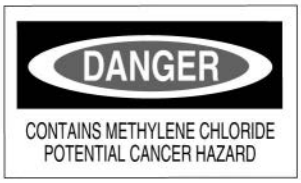
Methylene chloride

§1910.1052(e)(1)–(2) and (6)

A regulated area must be established wherever exposures to airborne MC exceeds or could exceed the PEL, either the 8-hour TWA or STEL.

Only authorized persons can access regulated areas.

The employer must demarcate regulated areas from the rest of the workplace in any manner that adequately establishes and alerts employees to the boundaries of the area and minimizes the number of authorized employees exposed to MC within the regulated area.



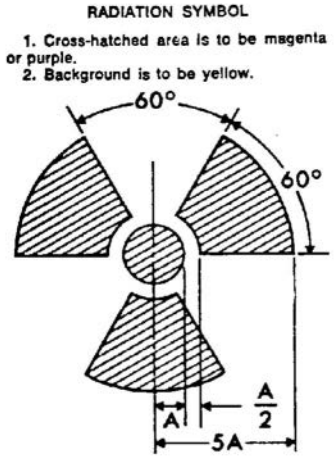
Employers must include MC in the hazard communication program per 1910.1200.

Ionizing radiation

§1910.1096(e)(1)–(6)

Caution signs and labels

Symbols given in Subpart G §1910.1096(e) must use the conventional radiation caution colors: magenta or purple on yellow background.



Radiation area

Each radiation area must be posted with a sign or signs bearing the caution symbol described above and the words:

High radiation area

Each high radiation area must be posted with a sign or signs bearing the radiation caution symbol and the words:

Airborne radioactivity area

Each airborne radioactivity area must be posted with a sign or signs bearing the radiation caution symbol and the words:

Additional requirements

A sign or signs bearing the radiation caution symbol and the words: "CAUTION RADIOACTIVE MATERIALS" must be posted in the following areas:

- Each area or room in which radioactive material is used or stored and which contains any radioactive material (other than natural uranium or thorium) in any amount exceeding 10 times the quantity of such material specified in Appendix C to 10 CFR Part 20.

- Each area or room in which natural uranium or thorium is used or stored in an amount exceeding 100 times the quantity of such material specified in Appendix C to 10 CFR Part 20.

A durable, clearly visible label bearing the radiation caution symbol and the words: "CAUTION RADIOACTIVE MATERIALS" must be put on containers in which:

- A quantity of any radioactive material (other than natural uranium or thorium) greater than the quantity specified in Appendix C to 10 CFR Part 20, is transported, stored, or used.
- A quantity of natural uranium or thorium greater than 10 times the quantity specified in Appendix C to 10 CFR Part 20 is transported, stored, or used.

Hazard communication

§1910.1200(f)(1)–(10)

The Hazard Communication Standard contains specific labeling requirements. Labeling must be done on all hazardous chemicals that are shipped and that are used in the workplace. The regulations dealing with labeling can be found in 29 CFR 1910.1200(f).

See the Hazard Communication chapter of this manual for more information.

Retention of DOT markings, placards, and labels

§1910.1201(a)–(e)

Employers who receive a package, transport vehicle, freight container, motor vehicle or rail freight car containing a hazardous material which is required to be marked, placarded, or labeled according to DOT Hazardous Materials Regulations (49 CFR Parts 171 through 180) must retain such markings on the containers/packaging.

These markings, placards, or labels must be retained on packages until the packaging/container is cleaned of residue and purged of vapors to remove any potential hazards. These markings must also be retained on transport vehicles, freight containers, motor vehicles or rail freight cars until hazardous material which requires the marking or placarding is removed. Markings, placards and labels must be maintained in a manner which ensures that the legend is readily visible.

The rule applies primarily to bulk packages but also applies to non-bulk receptacles that are repackaged and reshipped. Other non-bulk containers, such as 55 gallon drums, and inner packagings of combination packages that will not be reshipped but will remain at the worksite must be labeled according to §1910.1200.

Consequently, the hazard communication warning labels, tags, or markings do not appear on the outer packagings of combination packagings (e.g. bottles in a box). The inner packagings are required to be labeled according to OSHA guidelines, while the outside packaging is marked or labeled according to DOT guidelines.

This requirement applies to the employer who receives the hazardous material and not to the person responsible for transporting it unless the materials are still controlled by the transporter at the final destination when it is out of transport.

Non-bulk packagings

"Non-bulk packaging" is defined in the DOT hazardous materials regulations as a packaging that has:

- A maximum capacity of 450 L (119 gallons) or less as a receptacle for a liquid;
- A maximum net mass of 400 kg (882 pounds) or less and a maximum capacity of 450 L (119 gallons) or less as a receptacle for a solid; or
- A water capacity of 454 kg (1000 pounds) or less as a receptacle for a gas as defined in Section 173.115 of the hazardous materials regulations.

Related regulations — posting requirements

Inspections, citations and proposed penalties

Posting of notice

§1903.2(a)

It's the Law posters — OSHA form 3165

Each employer must post a notice or notices, furnished by the Occupational Safety and Health Administration, U.S. Department of Labor, informing employees of the protections and obligations of the OSH Act of 1970 and that additional assistance and information is available by contacting the nearest Department of Labor office. Notices must be posted in a conspicuous place in each establishment where notices to employees are customarily posted. Reproductions or facsimiles of the poster are acceptable for posting as long as the poster is at least 8½ by 14 inches and is printed in at least 10 pt. type.

In August 2000 and again in December 2006, OSHA revised the Form 3165 poster for informing workers of their rights to a safe workplace. Redesigned as part of the "plain language initiative," it gives workers and employers information they need to make sure their workplace is safe. It also tells workers how they can file a compliant, report an emergency, seek OSHA advice, and that they have the right to confidentiality.

OSHA has instituted a policy not to issue citations for failure to have Form 3165 posted, but if the inspector provides a poster, you are expected to post it. You may use the new OSHA Form 3165, which was published in December 2006, or the version published in 2000. See the FORMS chapter for copies of both versions of the OSHA 3165 poster.

Posting citations

§1903.16

Upon completing an inspection at your work site, the inspector may issue citation(s) which will set a reasonable length of time for correcting the violation(s). When you receive a citation, you must immediately post it at or near the place where the violation occurred. The citation must remain posted for three working days or until the unsafe situation has been corrected (abated).

Recording and reporting of occupational injuries and illnesses

Annual summary

§1904.32

The OSHA 300A Summary of Work-Related Injuries and Illnesses is a new form for posting the annual summary of injuries and illnesses. For the calendar year 2002 and thereafter, transfer your totals from the 300 Log to the OSHA 300A summary and post in from February 1 through April 30 (three months).

At the end of each calendar year:

- **Review** your 300 Log to verify that the entries are complete and accurate, and correct any deficiencies identified.

- **Create** an annual summary by totaling the columns on the 300 Log. If you had no recordable cases, enter zeros for each column total. Using the OSHA Form 300A (or an equivalent), enter the calendar year covered, the company's name, establishment name, establishment address, annual average number of employees covered by the 300 Log, and the total hours worked by all employees covered by the Log. If you are using an equivalent form, also include the employee access and employer penalty statements found on the OSHA 300A Summary.
- **Certify** that the information is accurate. A company executive must sign the 300A, certifying that he or she has examined the 300 Log and believes that the summary is correct and complete. The company executive may be the owner (only if the company is a sole proprietorship or partnership), an officer in the corporation, the highest ranking official (or immediate supervisor) working at the establishment.
- **Post** a copy of the annual summary in each establishment in a conspicuous place or places where notices to employees are customarily posted. Post it no later than February 1 of the year following the year covered by the records and keep the posting in place until April 30. Ensure that it is always available for viewing by employees.

If no injuries or illnesses occurred during the year, zeros must be entered on the totals line and the form must be posted for the same time period. See the FORMS chapter for samples.

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MATERIALS HANDLING AND STORAGE

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OSHA COMPLIANCE MANUAL

Reserved

Materials handling and storage

Introduction

There are very few workplaces that do not in some way, move, stack, and store everything from raw materials to finished products. The heavy equipment used to move these materials can be dangerous, even deadly, when not used properly. Likewise, materials that are not stacked securely can present a hazard for people in the area.

OSHA regulations covering materials handling and storage are found in Subpart N of Part 1910. Equipment covered in this subpart includes powered industrial trucks, overhead and gantry cranes, crawler locomotive and truck cranes, derricks, helicopters, and slings.

In the following information, you will find plain English summaries of OSHA's requirements for using equipment to safely move and store materials.

General requirements for handling materials §1910.176(a)–(g)

Where mechanical handling equipment is used, sufficient safe clearance has to be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways must be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard. All permanent aisles and passageways have to be appropriately marked.

Stored materials can't create a hazard. Bags, containers, bundles, and other items stored in tiers must be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.

Storage areas must be kept free from the accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Control vegetation growth where necessary.

Provide clearance signs to warn of clearance limits.

Use derail and/or bumper blocks on spur railroad tracks where a rolling car could contact other cars being worked, enter a building, work, or traffic area.

Provide covers and/or guardrails to protect personnel from the hazards of open pits, tanks, vats, ditches, and similar dangers.

Powered industrial trucks

It's hard to imagine any tool more important to materials handling than the powered industrial truck — the forklift. Industries of all types rely on these versatile vehicles to load, unload, and move stock and other materials.

OSHA's Powered Industrial Truck standard covers a whole range of materials moving vehicles powered by electric motors or internal combustion engines. This standard contains safety requirements relating to fire protection, design, maintenance, and the safe use of fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks. It also sets the requirements for operator training.

Equipment that is not covered by the 1910.178 standard includes compressed air or nonflammable compressed gas-operated industrial trucks, farm vehicles, and vehicles intended primarily for earth moving or over-the-road hauling.

Overview

The following summary highlights the requirements in OSHA's Powered Industrial Truck standard. For details, please see the §1910.178 standard.

Modifications and additions to powered industrial trucks which could affect capacity or safe operations must not be made without prior written approval of the manufacturer.

There are 11 different designations of powered industrial trucks, covering diesel powered, electric powered, and gasoline units. The atmosphere or location has to be classified as hazardous or non-hazardous prior to determining which type of unit may be safely operated in the area.

Truck operations and safe traveling practices include not allowing unauthorized personnel to ride on the vehicles, using an overhead guard to protect against falling objects, and requiring the operator to travel in reverse when the load being carried obstructs the forward view.

Forklifts must be removed from service when repairs are needed or defects noted. Only authorized personnel may repair a vehicle. Forklifts must be examined before being placed into service, at least daily. When used around-the-clock, examination must be done at each shift.

Battery charging

§1910.178(g)

OSHA requires employers to charge batteries only in a properly equipped location. A properly equipped battery charging area will have:

- No smoking.
- Warning signs posted.
- Adequate fire protection.
- Ample and readily available water supply for flushing and neutralizing spilled electrolyte.
- An eyewash able to provide a 15 minute flow, and for large installations a drench shower and an eyewash. **Note**: OSHA has said that where batteries are simply being plugged in for charging—there is no maintenance performed, no removal of batteries from the trucks, and no electrolyte is present in the area—there usually isn't a need for an eyewash/shower.
- A phone or other means of communication in the event of an emergency.
- Adequate ventilation to avoid the build up of hydrogen gas during battery charging.
- Soda ash or other neutralization materials in the immediate area.
- A dry chemical, CO2 or foam fire extinguisher.
- Means to protect charging apparatus from damage from trucks.

Only trained personnel should charge and change batteries in electric forklifts. In addition to training in battery changing and charging procedures, these employees should be trained on emergency procedures in the event of an acid splash, including how to use eyewash and shower facilities.

Best practices and requirements

In addition to having a properly equipped charging area, it is important to follow safe procedures when charging. OSHA has requirements covering some portions of the charging operation, and in an eTool offers best practices. Both are provided below.

- Follow the recharger manufacturer's recommendations for attaching and removing cables and for proper operation of your equipment.
- Properly position trucks and apply brakes before attempting to change or charge batteries. §1910.178(g)(8)
- Use a lifting beam or equivalent material handling equipment when lifting the battery. Do not use a chain with two hooks. This may cause distortion and internal damage. §1910.178(g)(4)
- Charge batteries in the designated battery charging area. §1910.178(g)(1)
- When charging batteries, pour acid into water. Never pour water into acid. §1910.178(g)(7)

- Care shall be taken to assure that vent caps are functioning. The battery (or compartment) cover(s) shall be open to dissipate heat. §1910.178(g)(9)
- Prohibit smoking in the charging area. §1910.178(g)(10)
- Take precautions to prevent open flames, sparks, or electric arcs in battery charging areas. §1910.178(g)(11)
- Remove all metallic jewelry before recharging. Tools and other metallic objects shall be kept away from the top of uncovered batteries. § 1910.178(g)(12)
- Wear personal protective equipment (face shield, safety goggles, neoprene or rubber gloves and apron). §1910.132
- Check the electrolyte level before recharging. Record the specific gravity with the hydrometer in the service log. Check the pilot cell.
- Check the water level. Do not add water prior to recharging. Record in service log.
- Check the voltage. If the battery has sealed vents, do not recharge with a current greater than 25 amperes.
- Unplug and turn off the charger before connecting or disconnecting the clamp connections.
- Attach the positive clamp (+, usually colored red) to the positive terminal first and then the negative clamp (-, usually colored black) to the negative terminal, keeping the proper polarity.
- Turn off the charger if the battery becomes hot or the electrolyte fluid comes out of the vents. Restart charging at a lower charging rate.
- Check water level after charging. Add distilled water or de-ionized water if water level is below level indicator. Record in service log.
- Return battery to forklift with lifting beam and secure in place after charging. §1910.178(g)(4) and (g)(5)
- Check the indicator on the hour meter to see that battery is fully charged.

Loading

§1910.178(o)

Prior to handling, all loads must be stable or safely arranged. Use caution when handling off-center loads which cannot be centered. Only loads within the rated capacity of the truck may be handled.

Adjust long or high (including multiple-tiered) loads which may affect capacity. Operate trucks that are equipped with attachments as partially loaded trucks when not handling a load.

Place the load engaging means under the load as far as possible. Tilt the mast backward carefully to stabilize the load.

Use extreme care when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated is prohibited except to pick up a load. An elevated load must not be tilted forward except when the load is in a deposit position over a rack or stack. When stacking or tiering, use only enough backward tilt to stabilize the load.

Operator training

§1910.178(l)

Forklift drivers must be trained on the type of vehicle they will be operating before they are allowed to drive the vehicle independently. The training has to include instruction (both classroom and practical training) in:

- Proper vehicle operation,
- The hazards of operating the vehicle in the workplace, and
- The requirements of the Powered Industrial Truck standard.

Refresher training has to be done whenever an accident or near-miss occurs, when the operator is driving unsafely, conditions in the workplace change, or if assigned to operate a different type of vehicle.

An evaluation of driver performance must be conducted at least once every three years. Written certification of the training and evaluation is required to verify that the driver is competent to perform the duties safely.

See the TRAINING chapter for more details about forklift operator training.

Clarifications and interpretations

The following information, taken from OSHA interpretations and guidance directives, provides clarification on numerous forklift-related issues.

Pre-operational inspections

OSHA requires that forklifts be inspected prior to being placed in service and, when used around-the-clock, after each shift. Although OSHA requires that these inspections be conducted, there is no requirement that the inspection be recorded in writing, such as on a daily checklist. However, recording these inspections and maintaining copies of the inspection logs is a good way to document that the required inspections are occurring — both for your company records and for OSHA inspectors.

Set a specific period of time to keep inspection logs and document the length of time in your written safety and health program, forklift program, or company policy, whichever you use (e.g. "We retain daily forklift inspection logs for three months"). This will prove to OSHA that forklift operators perform the daily inspections as required in §1910.178(q)(7).

Alarms and lights

The Powered Industrial Truck standard does not require backup alarms, tail/brake lights, mirrors, or strobe lights on lift trucks. However, if the vehicle is equipped with this equipment, OSHA expects the employer to use and maintain it.

While the forklift standard does not specifically mention head lights on lift trucks, it does address facility lighting by stating that controlled lighting of adequate intensity should be provided in operating areas.

Chocking highway truck wheels

OSHA's regulations relating to chocking the wheels of highway trucks prior to forklift vehicles driving onto them to load/unload materials are located at §1910.178 (k)(1) and (m)(7). These paragraphs state that before a forklift is driven onto the trailer, the brakes of the vehicle must be set and the rear wheels chocked to prevent the trailer from moving.

However, in most cases, commercial motor vehicles are no longer required to chock trailer wheels when parking at loading docks. In an agreement between the Federal Motor Carrier Safety Administration (FMCSA) and OSHA, authority over commercial motor vehicle parking issues belongs to the FMCSA. Consequently, OSHA's wheel chocking requirements no longer apply to any commercial motor vehicle that:

- Has a gross vehicle weight rating or gross vehicle weight of at least 10,001 pounds, whichever is greater, or
- Is designed or used to transport more than eight passengers (including the driver) for compensation, or
- Is designed or used to transport more than 15 passengers, including the driver, and is not used to transport passengers for compensation, or
- Is used in transporting hazardous material in an amount requiring placarding under DOT regulations.

The FMCSA's parking brake standard, 49 CFR 393.41(a), requires that every commercial motor vehicle manufactured since March 1990 be equipped with a parking brake system adequate to hold the vehicle or combination under any condition of loading. Agricultural commodity trailers, converter dolly, heavy hauler, and pulpwood trailers are exempted and must carry and use chocking blocks to prevent movement when parked.

OSHA has instructed its regional offices that enforcement personnel are not to cite the forklift standard's wheel chocking requirements with regard to any commercial motor vehicle.

Seatbelt use

The Powered Industrial Truck standard does not have a requirement addressing the use of seatbelts. Consequently, until a few years ago, there was no nation-wide uniformity in how compliance officers enforced seatbelt usage for forklift operators. In October 1996, OSHA corrected this situation by issuing the following enforcement directive stating the parameters of seatbelt enforcement to all regional offices.

> *Enforcement of the use of seatbelts on powered industrial trucks in General Industry From John B. Miles, Jr., Directorate of Compliance Programs*
>
> It has come to my attention that clarification is needed to ensure that a uniform approach is taken by all OSHA offices with respect to the enforcement of the use of seatbelts on powered industrial trucks in general industry.
>
> American National Standards Institute (ANSI) B56.1-1969 *Safety Standard for Powered Industrial Trucks*, was adopted by OSHA under the procedures described in Section 6(a) of the Occupational Safety and Health Act (OSH Act). ANSI B56.1-1969 does not have provisions for the use of seat-belts. Therefore, 29 CFR 1910.178 does not contain requirements for the use of seatbelts. However, Section 5(a)(1) of the OSH Act require employers to protect employees from serious and recognized hazards.
>
> Recognition of the hazard of powered industrial truck tipover and the need for the use of an operator restraint system is evidenced by certain requirements in the more current versions of ANSI B56.1 consensus standard for powered industrial trucks; ASME/ANSI B56.1a-1989 Addenda to ASME/ANSI B56.1-1988, and ASME B56.1-1993 *Safety Standard for Low Lift and High Lift Trucks*. In addition, seatbelts have been supplied by many manufacturers of counterbalanced, center control, high lift trucks which have a sit-down nonelevating operator position. Also, some manufacturers have instituted retrofit programs for the installation of operator restraint systems to older powered industrial trucks.
>
> OSHA's enforcement policy relative to the use of seatbelts on powered industrial trucks is that employers are obligated to require operators of powered industrial trucks which are equipped with operator restraint devices or seatbelts to use the devices. OSHA should enforce the use of such devices under Section 5(a)(1) of the OSH Act.
>
> After consultation with the Regional Solicitor, OSHA may also cite Section 5(a)(1) of the OSH Act if an employer has not taken advantage of a manufacturer operator restraint system or seatbelt retrofit program.

Fall protection: Body belts vs. harnesses

Fall protection requirements on forklifts used to lift personnel are not specifically addressed in the Powered Industrial Truck standard. However, OSHA's newer regulations, which address fall hazards in the construction industry, require the use of body harnesses rather than body belts for as a personal fall arrest system. The physical hazards associated with body belts are greatly reduced through the use of full body harnesses.

Although there are no similar requirements in General Industry regulations, OSHA has stated that body harnesses rather than body belts are the appropriate form of fall protection for employees working on elevated order picker platforms without guardrails. A body belt could be used, however, as a restraint device when used in conjunction with a lanyard short enough that the employee cannot fall from the platform.

Cranes and derricks

Moving large, heavy loads is crucial to many manufacturing processes. While forklifts are excellent for moving materials around a facility — for stacking, loading, or unloading — there are many operations where the best piece of equipment to move heavy or oversized objects is a crane or hoist.

A crane is designed to lift and lower a load and move it horizontally. Whether fixed or mobile, cranes are driven manually or by a power source. Cranes come in all sizes, so the task of manipulating materials is made safer and easier. The safe use of a crane depends on several factors, including:

- Site evaluation — Evaluating the terrain, what is around and overhead, what is the load bearing capacity of the site, and what the hazards are in the area.
- Operator training — Operators must be trained in the operation, limitations, and emergency procedures for the cranes they operate. They also need to understand the load ratings and how to safely lift loads.
- Proper equipment selection for the job — Choosing the proper equipment is a factor in operating cranes safely. The crane should be matched to the job. Review the manufacturer's specifications and recommendations to determine if a crane can be used in a particular application.
- Inspection — Inspections ensure that the equipment is functioning correctly.
- Good maintenance — Besides repairing the equipment, a crane program should include preventive maintenance. Well-maintained equipment will aid in preventing accidents involving mechanical failure.

Overhead and gantry cranes

Introduction

Overhead and gantry cranes have a horizontal bridge across which a trolley and hoist travels. A gantry crane has one or more legs running on fixed ground rails, wheels, or other runway systems. Gantry cranes can be portable, with load capacities generally ranging from one to 30 tons, width spanning from eight to 100 feet, and heights from six to 60 feet. These qualities make them ideal for use in warehouses, loading docks, and vehicle maintenance facilities. This type of crane, having trolleys and similar travel characteristics, also include semigantry, cantilever gantry, wall cranes, and storage bridge cranes.

Materials being moved by these cranes are attached to a hoisting mechanism on the trolley. These cranes are useful in general machine shops, fabricating assemblies, printing operations, and warehousing. They can be purchased "as is" or custom-built by the manufacturer. A variation, the jib crane, is useful for moving smaller, localized loads.

OSHA's general requirements

OSHA's Overhead and Gantry Crane rule, §1910.179, requires that cranes constructed after August 31, 1971 have to meet the design specifications of the ANSI/ASME standard *Safety Code for Overhead and Gantry Cranes*, ANSI B30.2.0-1967. The most recent revision of this standard is the 2001 edition.

The OSHA rule covers the safe operation of overhead- and gantry-type cranes by setting down manufacturer's design criteria, as well as the safe procedures employers must follow pertaining to crane and rope inspections, equipment maintenance, load handling, and operator training. The following information summarizes the OSHA requirements, as well as safety points from the ANSI B30.2 standard and from crane manufacturers and users. For details, you should obtain a copy of the rule and/or the consensus standard, and the crane manufacturer's operational manual.

Crane components

Cabs

The general arrangement of the cab and the location of control and protective equipment must be such that all operating handles are within the operator's convenient reach when facing the area to be served by the load hook, or while facing the direction of travel of the cab. The arrangement needs to allow the operator a full view

of the load hook in all positions. If there are positions where the view is blocked, other methods such as closed-circuit television, mirrors, radio, or a signal person may be used.

The cab needs to have sufficient light, either natural or artificial, so that the operator can see clearly. A portable fire extinguisher with a basic minimum rating of 10 BC must be kept in or near the cab area. Carbon tetrachloride fire extinguishers are prohibited in crane cabs. There should be an emergency exit method, such as two exits remote from each other, in cab-operated cranes.

The crane should have a fixed ladder, stairs, or platform allowing access to the cab and/or bridge walkway. If sufficient headroom is available on cab-operated cranes, there will be a service platform (footwalk) with an anti-slip surface on the drive side along the entire length of the bridge.

Personal items must be stored safely so they won't interfere with crane operation. Items related to operations such as tools, oil cans, waste, extra fuses, and other necessary articles must be stored in the tool box and not permitted to lie loose in the cab.

Bumpers and brakes

The bumper, which is attached to the bridge, trolley, or runway stop, reduces the force of impact when a moving crane reaches the end of its permitted travel distance. Cranes and trolleys, with few exceptions, must have bumpers or other automatic means to stop the bridge when traveling in either direction with power off at a speed of at least 40 percent of the rated load speed.

The bumper has to be designed and installed to minimize parts falling from the crane or trolley in case of breakage. When more than one trolley is operated on the same bridge, each must be equipped with bumpers or equivalents.

Rail sweeps

Crane bridges must be equipped with rail sweeps to clear the travel path. The rail sweep, a device located in front of the crane's leading wheels, removes obstructions from the runway. If obstructions are not removed, they could damage the wheel or cause it to derail.

Guards

All exposed moving parts such as gears, set screws, projecting keys, chains, chain sprockets, and reciprocating components, which might constitute a hazard under normal operating conditions, must be guarded. The guard must be capable of supporting (without permanent distortion) the weight of a 200-pound person — unless the guard is located where it is impossible for someone to step on it.

Hoisting ropes that run too close to other parts need to be guarded. Also, to prevent contact between bridge conductors and hoisting ropes, a guard may be needed.

Brakes

Brakes for trolleys and bridges may be applied by mechanical, electrical, pneumatic, hydraulic, or gravity methods. Foot-brake pedals must have a non-slip surface and automatically release when the operator releases pressure from the pedal.

Each independent hoisting unit needs to be equipped with at least one self-setting holding brake, and with the exception of worm-geared hoists, a braking method to control the load during lowering and prevent overspeeding. Holding brakes on hoists must be applied automatically when power is removed.

Electrical equipment

Electrical equipment must be located or enclosed so that live parts will not be exposed to accidental contact under normal operating conditions. Clearly marked control boxes must be installed to prevent electrical shock and display warnings such as "Lockout disconnecting means before removing cover or servicing equipment" or "Do not operate without cover in place." Protect electrical equipment from dirt, grease, oil, and moisture.

The controls for the bridge and trolley travel must be located so that the operator can generally face the direction of travel and be within easy reach. Controls must automatically return to the "off" position when released by the operator and all master switches have to be appropriately labeled.

If a service receptacle is provided in the cab or on the bridge of cab-operated cranes, it has to be a grounded three-prong type permanent receptacle, not exceeding 300 volts.

Markings and warnings

The rated load of the crane must be plainly marked on each side. If the crane has more than one hoisting unit, the rated load will be marked on each hoist or its load block. The markings have to be large enough so they are clearly legible from the ground level.

The rated load marking must contain at least the following information:

- Name and address of the manufacturer;
- Manufacturer's model or serial number; and
- Voltage of AC or DC power supply and phase and frequency of AC power supply.

Floor- and remote-operated cranes

Floor-operated and remote-operated cranes must have safety labels that include precautionary warnings such as:

- Do not lift more than the crane's rated load;
- Do not operate the hoist with kinked or damaged chain or rope; and
- Never lift loads over pedestrians.

Cab-operated cranes

Cab-operated cranes must also have safety labels that caution against operations such as:

- Operating the hoist when the load is not centered;
- Lifting personnel; and
- Operating a rope hoist when the rope is not properly seated in the groove.

Manufacturer's precautions

Most manufacturers prepare warning labels for their equipment. If the labels and other markings are not on the crane, they may be shipped with it and the purchaser will be instructed to apply the labels when the equipment is assembled.

A manufacturer's warning labels may include statements such as "Caution: Lock wheels when in use" or "Caution: Do not move gantry while loaded." If warning labels are missing, contact the manufacturer for replacements.

Loading components

Proper loading is essential to crane safety. Never use a crane and/or its accessories to lift more than their rated load capacity. A crane's load rate capacity is based on new equipment. When rating a load to be lifted, consider the age of the crane and daily wear, both of which reduce the operating capacity of the crane.

Never use two pieces of equipment to lift a load greater than the rated capacity of a single piece of equipment. If a gantry crane is used with an electric hoist or other electrical accessories, make sure the electrical ground wires are installed according to the National Electrical Code and all wires are connected when the equipment is used. You may want to consult your local electrical code for requirements concerning connecting and operating electrical equipment.

According to OSHA, the minimum clearance for obstructions must be three inches overhead and two inches laterally between the crane and all obstructions.

Running sheaves

Maintain sheave grooves on hoisting equipment so they are smooth and free from surface defects which could cause rope damage. All running sheaves must be lubricated. Permanently lubricated, sealed and/or shielded bearings meet this requirement.

Ropes

Follow the crane manufacturer's recommendation when using hoisting ropes. The rated load, divided by the number of parts of rope, may not exceed 20 percent of the nominal breaking strength of the rope.

Rope must be secured to the drum with no less than two wraps of rope remaining on the drum when the hook is in its extreme low position. The rope end has to be anchored by a clamp securely attached to the drum, or by a socket arrangement approved by the crane or rope manufacturer.

Replacement rope should be the same size, grade, and construction as the original rope, unless otherwise recommended by a wire rope manufacturer, due to actual working condition requirements. If a load is supported by more than one part of rope, the tension in the parts must be equalized.

Hooks

Hooks must meet the manufacturer's recommendations and not be overloaded. Swivel-type hooks should rotate freely.

Warning alarms

Except for floor-operated cranes, a manually-operated gong; power-operated bell, siren, or horn; rotating beacon; or strobe light must be used for each crane equipped with a power traveling mechanism.

Outdoor storage bridges need to have a wind-indicating device which gives a visible or audible alarm to the bridge operator at a predetermined wind velocity.

Load handling

Never load a crane beyond its rated capacity. When attaching the load, be sure the hoist chain or hoist rope is free from kinks or twists and does not wrap around the load.

The load should be moved from one point to another by moving the trolley back and forth along the bridge, while the crane itself is stationary. When moving the load, be sure that it is well secured and properly balanced before it is lifted more than a few inches. Before starting to hoist, inspect for the following conditions:

- Hoist rope is not kinked.
- Multiple-part lines are not twisted around each other.

- The hook is positioned above the center of gravity of the load in such a way as to minimize swinging when the load is lifted.
- If there is a slack-rope condition, be sure that the rope is properly seated on the drum and in the sheaves.
- All personnel, including the qualified rigger, must be clear of the load.

The only purpose of the hoist is to move the load straight up and down and to suspend the load. Do not operate the hoist to move in any direction other than straight up and down. During hoisting, ensure that:

- The load is lifted slowly until it clears the ground or other support to minimize swinging.
- There is no sudden acceleration or deceleration of the moving load.
- The load does not contact any obstructions. Conduct a dry run in areas where clearance is limited.

Loading precautions

While any employee is on the load or hook, do not allow hoisting, lowering, or traveling. The operator should never carry loads over people nor leave the control position while the load is suspended. When starting the bridge and when the load or hook approaches near or over personnel, the warning signal must be sounded.

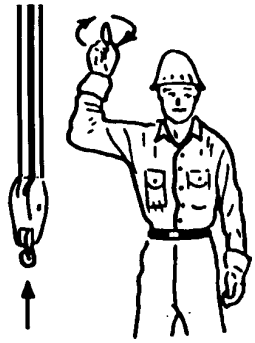
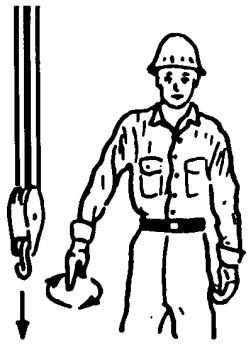
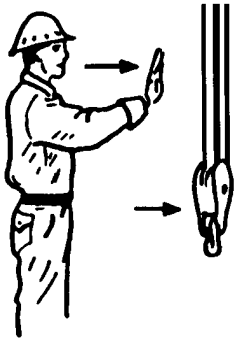
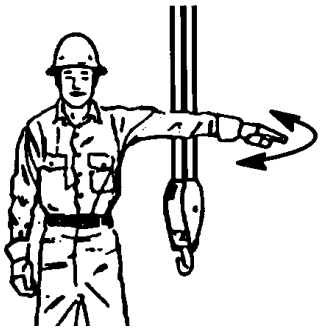
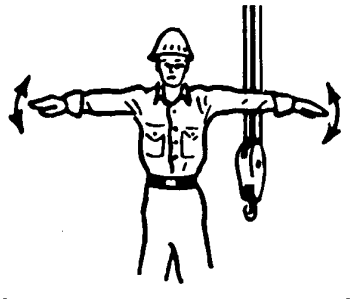
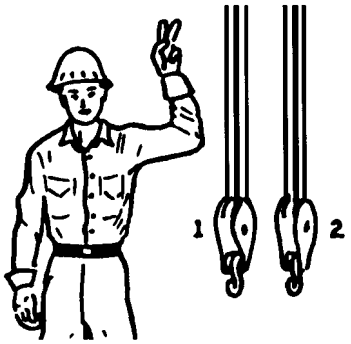
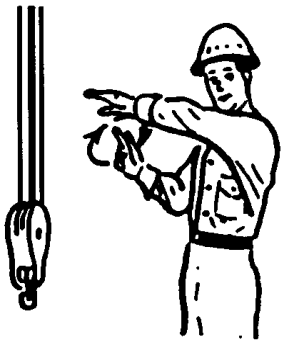
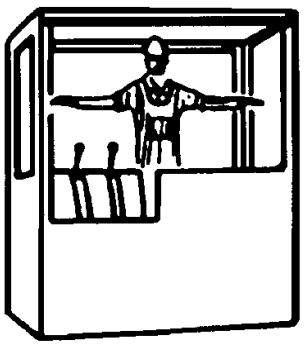
The operator must test the brakes each time a load approaching the rated load is handled. Test the brakes by raising the load a few inches and applying the brakes. Do not lower the load below the point where less than two full wraps of rope remain on the hoisting drum.

When two or more cranes are used to lift a load, one qualified responsible person must be in charge of the operation. This person will analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

Pre-start-up testing

At the beginning of each operator's shift, test the upper limit switch of each hoist under no load conditions. Practice extreme care — the block should be "inched" into the limit or run in at slow speed. If the switch does not operate properly, immediately notify the appropriate person.

Never use the hoist limit switch, which controls the upper limit of travel of the load block, as an operating control.

 HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.	 LOWER. Extend arm downward, forefinger pointing down, and move hand in small horizontal circles.	 BRIDGE. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.
 TROLLEY TRAVEL. Palm up, finger closed, thumb pointing in direction of motion, jerk hand horizontally.	 STOP. Extend arm, palm down, hold position rigidly.	 EMERGENCY STOP. Extend arm, palm down, moving hand rapidly right and left.
 MULTIPLE TROLLEYS. Hold up one finger for block marked “1” and two fingers for block marked “2.” Regular signals follow.	 MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless above hand giving the motion signal. (Hoist slowly shown as example.)	 MAGNET IS DISCONNECTED. Crane operator spreads both hands apart, palms up.

Standard hand signals for controlling overhead crane operation from DOE-STD-1090-99

Crane inspections

Initial inspection

All new and altered cranes must be inspected prior to initial use. Inspection procedures for cranes in regular service are divided into two general classifications, based on the intervals at which inspection should be performed. The intervals — frequent and periodic — depend on the nature of the crane's critical components and the degree of their exposure to wear, deterioration, or malfunction.

- Frequent inspection — daily to monthly intervals.
- Periodic inspection — one to 12 month intervals.

In-service inspection criteria

The Department of Energy's Hoisting and Rigging Standard DOE-STD-1090-2001 defines crane service as:

- *Normal service* — operating at less than 85 percent of rated load and not more than 10 lift cycles/hr. except for isolated instances.
- *Heavy service* — operating at 85 to 100 percent of rated load or in excess of 10 lift cycles/hr. as a regular specified procedure.
- *Severe service* — operating at normal or heavy service under abnormal operating conditions (i.e., extreme temperatures or corrosive atmospheres).

Inspections should be based on the following criteria:

- *Frequent inspections*:

  Normal service — monthly

  Heavy service — weekly to monthly

  Severe service — daily to weekly

- *Periodic inspections*:

  Normal service — yearly

  Heavy service — semi-annually

  Severe service — quarterly

Frequent inspections

The following items must be inspected for defects in the "frequent" range, or as specifically indicated, including observation during operation for any defects which might appear between regular inspections. Carefully examine all deficiencies, including the following, and decide if they constitute a safety hazard.

Daily

- ❑ All controls and operating mechanisms for proper operation.
- ❑ Deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems.

Visual inspection daily
Monthly inspection with documentation

- ❑ Hooks with deformation or cracks.

  Written certification must include the date of inspection; the signature of the person who performed the inspection; and the serial number, or other identifier of the hook inspected.

  Note: For hooks with cracks or having more than 15 percent in excess of normal throat opening or more than 10º twist from the plane of the unbent hook, refer to §1910.179(l)(3)(iii)(a).
- ❑ Hoist chains, including end connections, for excessive wear, twisted, distorted links interfering with proper function, or stretched beyond manufacturer's recommendations.

  Written certification must include the date of inspection, the signature of the person who performed the inspection, and an identifier of the chain which was inspected.
- ❑ All functional operating mechanisms for excessive wear of components.
- ❑ Rope reeving for noncompliance with manufacturer's recommendations.

Periodic inspections

The following items must be inspected for defects in the "periodic" range, depending on the crane's activity, severity of service, and environment. "Periodic" is defined as one to 12 month intervals. These inspections are in addition to those required by the "frequent" section. Any listed deficiencies must be carefully examined as to whether they constitute a safety hazard.

- ❑ Deformed, cracked, or corroded members.
- ❑ Loose bolts or rivets.
- ❑ Cracked or worn sheaves and drums.
- ❑ Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers, locking and clamping devices.
- ❑ Excessive wear on brake system parts, linings, pawls, and ratchets.
- ❑ Load, wind, and other indicators over their full range, for any significant inaccuracies.
- ❑ Gasoline, diesel, electric, or other power plants for improper performance or noncompliance with applicable safety requirements.
- ❑ Excessive wear of chain drive sprockets and excessive chain stretch.
- ❑ Electrical apparatus, for signs of pitting or any deterioration of controller contactors, limit switches and push button stations.

Cranes not in regular use

One through five months

A crane which has been idle for one or more months, but less than six months, due to shutdown or storage, must have a frequent inspection plus a rope inspection before it can be put in service.

Appoint someone to inspect the rope for all types of deterioration. This person must approve and verify the condition of the rope prior to use by a certification that includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected.

Over six months

A crane which has been idle for over six months must be given a complete inspection covering the requirements for both frequent and periodic inspections plus a rope inspection before it can be put in service.

Appoint someone to inspect the rope for all types of deterioration. This person must approve and verify the condition of the rope prior to use by a certification that includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected.

Standby cranes

Standby cranes must be inspected at least semi-annually. The crane must have a frequent inspection plus a rope inspection before it can be put in service.

Appoint someone to inspect the rope for all types of deterioration. This person must approve and verify the condition of the rope prior to use by a certification that includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected.

Operational tests

Prior to initial use, all new, reinstalled, repaired, or modified cranes must be tested by a designated person on the following functions:

- Hoisting and lowering,
- Trolley travel,
- Bridge travel, and
- Limit switches, locking, and safety devices.

Determine the trip setting of hoist switches by tests with an empty hook traveling in increasing speeds up to the maximum speed. The actuating mechanism of the limit switch must be located so that it will trip the switch, under all conditions, in sufficient time to prevent contact of the hook or hook block with any part of the trolley.

Test loads may not be more than 125 percent of the rated load unless otherwise recommended by the manufacturer. Maintain the test reports on file where readily available to appointed personnel.

Rope inspections

Running ropes

A thorough inspection of all ropes must be made at least once a month. A certification record which includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the ropes which were inspected must be kept on file where readily available to appointed personnel.

Any deterioration that results in appreciable loss of original strength must be carefully observed and determination made as to whether further use of the rope would constitute a safety hazard. Some of the conditions that could result in an “appreciable” loss of strength include:

- Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires;
- A number of broken outside wires and the degree of distribution or concentration of such broken wires;
- Worn outside wires;
- Corroded or broken wires at end connections;
- Corroded, cracked, bent, worn, or improperly applied end connections; and
- Severe kinking, crushing, cutting, or unstranding.

When an inspection determines that the rope has met one of the removal criteria, it must be replaced. Based on the judgment of a qualified person, it may be replaced at the end of a workshift, end of the work day, or prior to it being used again.

Other ropes

All rope which has been idle for a month or more due to crane shutdown or storage must be given a thorough inspection before it is used. Inspect for all types of deterioration. The inspection will be performed by an appointed person whose approval is required before the rope may be used.

A record certifying the inspection must be available which includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected.

Maintenance

Keeping a crane in good operating condition requires preventive maintenance as well as timely repairs. Establish a preventive maintenance program based on the crane manufacturer's recommendations. A qualified person can be helpful in setting up this program. Be sure to record maintenance procedures, the date, and file them for future reference. Retain your maintenance history throughout the life cycle of the crane.

Your maintenance program should also include a lockout/tagout policy and procedures for worker safety when work is being done on a crane.

What is considered a "normal" operating condition?

Whenever a crane is used in its regular production activities such as materials handling and loading, and is under the control of its operator rather than under the control of a maintenance worker, it is considered to be used in a normal operating condition. However, normal operating conditions do not cover when a crane is taken out of production for maintenance work and is under the control of the maintenance person.

Routine maintenance procedures

Prior to maintenance work — Before adjustments and repairs are started on a crane, take the following lockout precautions:

- Move the crane to be repaired to a location where it will cause the least interference with other cranes and operations in the area.
- Place all controllers in the "off" position.
- Open and lock the emergency switch (or main switch) in the "open" position.
- Place "Warning" or "Out of order" signs on the crane, and also on the floor beneath — or on the hook — where visible from the floor. Where other cranes are in operation on the same runway, provide rail stops or other suitable methods to prevent interference with the idle crane.

Following maintenance work — After adjustments and repairs have been made, do not operate the crane until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed.

Adjustments and repairs

Any unsafe conditions discovered during the inspection must be corrected before crane op-eration is resumed. Adjustments and repairs may be done only by designated personnel.

Adjustments — Examples of adjustments that must be maintained to assure correct functioning of crane components include:

- All functional operating mechanisms,
- Limit switches,
- Control systems,
- Brakes, and
- Power plants.

Repairs — For safe operation, make all repairs or replacements promptly. Include the following crane components in the repair process:

- Defective crane hooks. Generally, do not attempt to repair crane hooks by welding or re-shaping. The best procedure is to discard defective hooks. If repairs are attempted, they may only be done under competent supervision. Following a repair, test the hook according to the load requirements of not more than 125 percent of the rated load, unless otherwise recommended by the manufacturer before further use.
- Load attachment chains and rope slings showing defects, including hoist chains and end connections, for excessive wear, twist, distorted links interfering with proper function, or stretch beyond manufacturer's recommendations.
- All critical parts which are cracked, broken, bent, or excessively worn.
- Pendant control stations need to be kept clean and function labels kept legible.

Lubrication

Follow the manufacturer's recommendation for routinely lubricating the crane's moving parts. The manufacturer will recommend the points of lubrication, frequency, and the type of lubricant to use. Unless equipped for automatic lubrication, cranes must be stationary when lubricants are applied.

Operator training

OSHA requires that only thoroughly trained and competent personnel be permitted to operate overhead and gantry cranes. It also requires that operators and maintenance personnel are familiar with the operation and care of fire extinguishers provided in the cab.

For safety sake, train employees who are using ladders to avoid carrying objects that could cause them to loose their grip on the ladder. Articles that are too large to be carried in pockets or belts should be lifted and lowered by hand line.

ASME B30.2 physical criteria

The ASME B30.2 *Safety Code for Overhead and Gantry Cranes* contains specific criteria for operators' physical fitness as well as training criteria. It requires that potential operators pass a written or oral exam and practical operating examination.

Some additional physical criteria includes:

- The ability to distinguish colors and to hear with or without a hearing aid;
- To have strength, endurance, agility, coordination, and reaction speed to meet the rigors of crane operation; and
- To have normal depth perception and vision field.

A potential operator may be disqualified based on certain physical conditions. For a complete list of physical requirements, see the B30.2 standard.

Operational requirements

Workers who are physically capable of performing the job must, among other things, understand hand signals and the appropriate responses; be responsible for their lifts; activate warning devices when necessary; know procedures to take when leaving the cab; understand their equipment and its care; and obey stop signals, no matter who gives them. Be sure training covers:

- Handling the load;
- Attaching the load;
- Moving the load;
- Hoist-limit devices; and
- Hand and special signals.

Crane operator training tips
To reduce the chance of an injury, include training on the following precautions: 1. Require workers to always check the crane's load chart to ensure that the crane will not be overloaded by operating conditions. 2. Instruct workers to plan lifts before starting them to ensure that they are safe. 3. Tell workers to take additional precautions and exercise extra care when operating around power lines. 4. Direct workers to always keep hoisting chains and ropes free of kinks or twists and never wrapped around a load. 5. Train workers to attach loads to the load hook by slings, fixtures, and other devices that have the capacity to support the load on the hook. 6. Instruct workers to pad sharp edges of loads to prevent cutting slings. 7. Teach workers to maintain proper sling angles so that slings are not loaded in excess of their capacity.

Manufacturer's guidelines

The crane manufacturer is required to furnish a user's manual containing general and specific operating instructions and information about installation, inspection, testing, lubrication, and maintenance of the crane. Employees with crane responsibilities should be familiar with the information in the manual.

Glossary of terms for overhead and gantry cranes

A **crane** is a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine. Cranes whether fixed or mobile are driven manually or by power.

An **automatic crane** is a crane which when activated operates through a preset cycle or cycles.

A **cab-operated crane** is a crane controlled by an operator in a cab located on the bridge or trolley.

Cantilever gantry crane means a gantry or semigantry crane in which the bridge girders or trusses extend transversely beyond the crane runway on one or both sides.

Floor-operated crane means a crane which is pendant or nonconductive rope controlled by an operator on the floor or an independent platform.

Gantry crane means a crane similar to an overhead crane except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or other runway.

Hot metal handling crane means an overhead crane used for transporting or pouring molten material.

Overhead crane means a crane with a movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway structure.

Power-operated crane means a crane whose mechanism is driven by electric, air, hydraulic, or internal combustion means.

A **pulpit-operated crane** is a crane operated from a fixed operator station not attached to the crane.

A **remote-operated crane** is a crane controlled by an operator not in a pulpit or in the cab attached to the crane, by any method other than pendant or rope control.

A **semigantry crane** is a gantry crane with one end of the bridge rigidly supported on one or more legs that run on a fixed rail or runway, the other end of the bridge being supported by a truck running on an elevated rail or runway.

Storage bridge crane means a gantry type crane of long span usually used for bulk storage of material; the bridge girders or trusses are rigidly or nonrigidly supported on one or more legs. It may have one or more fixed or hinged cantilever ends.

Wall crane means a crane having a jib with or without trolley and supported from a side wall or line of columns of a building. It is a traveling type and operates on a runway attached to the side wall or columns.

An **auxiliary hoist** is a supplemental hoisting unit of lighter capacity and usually higher speed than provided for the main hoist.

A **brake** is a device used for retarding or stopping motion by friction or power means.

A **drag brake** is a brake which provides retarding force without external control.

A **holding brake** is a brake that automatically prevents motion when power is off.

Bridge means that part of a crane consisting of girders, trucks, end ties, footwalks, and drive mechanism which carries the trolley or trolleys.

Bridge travel means the crane movement in a direction parallel to the crane runway.

A **bumper** (buffer) is an energy absorbing device for reducing impact when a moving crane or trolley reaches the end of its permitted travel; or when two moving cranes or trolleys come in contact.

The **cab** is the operator's compartment on a crane.

Conductors, bridge are the electrical conductors located along the bridge structure of a crane to provide power to the trolley.

Conductors, runway (main) are the electrical conductors located along a crane runway to provide power to the crane.

The **control braking** means is a method of controlling crane motor speed when in an overhauling condition.

Countertorque means a method of control by which the power to the motor is reversed to develop torque in the opposite direction.

Dynamic means a method of controlling crane motor speeds when in the overhauling condition to provide a retarding force.

Regenerative means a form of dynamic braking in which the electrical energy generated is fed back into the power system.

Mechanical means a method of control by friction.

Controller, spring return means a controller which when released will return automatically to a neutral position.

Designated means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

A **drift point** means a point on a travel motion controller which releases the brake while the motor is not energized. This allows for coasting before the brake is set.

The **drum** is the cylindrical member around which the ropes are wound for raising or lowering the load.

An **equalizer** is a device which compensates for unequal length or stretch of a rope.

Fail-safe means a provision designed to automatically stop or safely control any motion in which a malfunction occurs.

Footwalk means the walkway with handrail, attached to the bridge or trolley for access purposes.

A **hoist** is an apparatus which may be a part of a crane, exerting a force for lifting or lowering.

Hoist chain means the load bearing chain in a hoist.

Hoist motion means that motion of a crane which raises and lowers a load.

Load means the total superimposed weight on the load block or hook.

The **load block** is the assembly of hook or shackle, swivel, bearing, sheaves, pins, and frame suspended by the hoisting rope.

Main hoist means the hoist mechanism provided for lifting the maximum rated load.

A **man trolley** is a trolley having an operator's cab attached thereto.

Rated load means the maximum load for which a crane or individual hoist is designed and built by the manufacturer and shown on the equipment nameplate(s).

Rope refers to wire rope, unless otherwise specified.

Running sheave means a sheave which rotates as the load block is raised or lowered.

Crawler, locomotive, and truck cranes

Introduction

Crawler cranes, locomotive cranes, both truck and self-propelled wheel-mounted cranes, and any variations which have the same basic characteristics are covered by OSHA's §1910.180 crane standard. These types of cranes are powered by internal combustion engines or electric motors and utilize drums and ropes. Simple definitions of these cranes follow.

Crawler crane

A crawler crane consists of a rotating superstructure with power plant, operating machinery, and boom, mounted on a base, equipped with crawler treads for travel. Its function is to hoist, swing, and lower loads at various radii.

Locomotive crane

A locomotive crane consists of a rotating superstructure with power plant, operating machinery and boom, mounted on a base or car equipped for travel on railroad track. It may be self-propelled or propelled by an outside source. Its function is to hoist, swing, and lower loads at various radii.

Truck crane

A truck crane consists of a rotating superstructure with power plant, operating machinery and boom, one or more operator's stations mounted on an automotive truck equipped with a power plant for travel. Its function is to hoist, swing, and lower loads at various radii.

Wheel-mounted crane

A wheel-mounted crane (wagon crane) consists of a rotating superstructure with power plant, operating machinery, boom, and operator's station mounted on a base or platform equipped with axles and rubber-tired wheels for travel. The base is usually propelled by the engine in the superstructure, but it may be equipped with a separate engine controlled from the superstructure. Its function is to hoist, swing, and lower loads at various radii.

Only machines used as lifting cranes are covered by both the OSHA standard and the ASME B30.5 standard for mobile and locomotive cranes. Neither standard applies to cranes designed for railway and automobile wreck clearances.

OSHA's general requirements

OSHA regulations require that all crawler, locomotive, and truck cranes constructed after August 31, 1971 have to meet the design specifications of the ANSI/ASME B30.5-1968, *Safety Code for Crawler, Locomotive, and Truck Cranes*.

The OSHA rule covers the safe operation of crawler, locomotive, and truck type cranes by setting down the safe procedures employers must follow pertaining to crane and rope inspections, equipment testing and maintenance, load handling, and operator training. The following information summarizes the OSHA requirements, as well as safety points from the ANSI B30.5 standard and from crane manufacturers and users. For details, you should obtain a copy of the rule and/or the consensus standard, and the crane manufacturer's operational manual.

Crane cabs

Crane cabs have windows on the front and sides for easy viewing. The front window should have a windshield wiper to ensure the operator's visibility. The cab door adjacent to the operator either swings outward or slides to the rear for easy exit. If the cab has a platform, the platform will have a guardrail or handholds and a slip-resistant walking surface. Single-control station wheel-mounted cranes are required to be equipped with seat belts for use during travel.

Cab controls

The basic controls for operating the crane are located within the operator's easy reach. Remote-operated cranes have an emergency stop in case there is a malfunction. Controls include the means to start and stop the equipment, control engine speed, emergency stop, and select transmissions.

Cab storage

The crane operator's extra clothing and personal belongings have to be stored so that they won't interfere with the crane's operation. Store tools, oil cans, waste, extra fuses, and other necessary articles in the toolbox which is attached directly to the crane. Items lying loose in or about the cab create a safety hazard.

Fire extinguishers

A carbon dioxide, dry chemical, or equivalent fire extinguisher must be kept in the cab or vicinity of the crane. Crane operators and maintenance personnel need to be trained in the use and care of the fire extinguishers.

Fueling

Refueling with small portable containers may be done using an approved safety can equipped with an automatic closing cap and flame arrester. Never refuel when the engine is running. Never allow smoking or open flames in a refueling area.

The fuel tank filler pipe should be protected to prevent fuel from spilling or overflowing onto the engine, exhaust, or electrical equipment.

Engine exhaust gases must be pumped to the outside and away from the operator. For safety, exhaust pipes need to be guarded or insulated to prevent contact.

Markings and warnings

Load rating chart

A substantial and durable rating chart with clearly legible letters and figures must be provided by the manufacturer with each crane. The chart needs to be securely fixed to the crane cab in a location easily visible to the operator while seated at the control station.

The rated load of the crane must be plainly marked on each side. If the crane has more than one hoisting unit, the rated load will be marked on each hoist or its load block. The markings have to be large enough so they are clearly legible from the ground level. The rated load marking must contain at least the following information:

- Crane load ratings at all operating radii, boom angles, work areas, jib lengths, and alternate ratings for optional equipment;
- Work area chart for specific listed capacities;
- Limitations such as structural or hydraulic;
- Areas where no load is to be handled; and
- Recommended reeving for hoist lines.

In addition, the following information, where applicable for a particular crane, must be in-cluded either on the rating chart or in the user's manual:

- Recommended parts of hoist reeving, size and type of rope;
- Boom hoist reeving diagram;
- Tire pressure;
- Precautions for equipment and operating limitations;
- Gantry positioning and boom suspension;
- Instructions for boom erection, boom/jib raising and lowering;

- Specific hoist-holding mechanism details;
- Specific details regarding telescopic booms; and
- Hydraulic relief valve settings.

Audible warning

All cranes have to be equipped with an audible signal device that is controlled by the operator. Audible travel signals that an operator may use equate to:

- One blast = stop,
- Two blasts = go ahead, and
- Three blasts = back up.

Communication

Crane operators may use standard hand signals to communicate during operations, unless reliable voice equipment such as telephones, radios, or similar equipment is used.

Electrical warning

A sign warning about electrocution or serious injury has to be installed in a location clearly visible from the operator's station. The sign will specify that a minimum clearance of 10 feet must be maintained between the crane or load and energized power lines up to 50 kV, and that greater clearances are required for higher voltages.

Traveling

On all single-control station cranes, the travel controls are located in the operator's station. Wheel-mounted multiple control station cranes will have these controls located in the carrier cab. When an operator is in a traveling crane, communication between cabs is required.

Guarding moving parts

Moving parts on cranes are usually guarded when the equipment is manufactured. Employers must ensure that guards cover all moving parts which may present a hazard and remain in place, such as on gears, set screws, projecting keys, chains and sprockets, and reciprocating or rotating parts.

Protect dry friction brakes and clutches against rain and other liquids such as oil and lubricants. Further, provide protection for hydraulic and pneumatic lines as practical.

Lifting personnel

OSHA's §1910.180(h)(3)(v) covers the use of suspended personnel platforms in general in-dustry. The standard prohibits hoisting, lowering, swinging, or traveling while anyone is on the load or hook. When the use of a conventional means of access to any elevated worksite would be impossible or more hazardous, however, OSHA will treat a violation of §1910.180(h)(3)(v) as de minimis — in effect, disregarded — if the employer has complied with the provisions in the construction industry regulations at §1926.550(g)(3-8).

Because using cranes or derricks to hoist personnel poses a serious risk to the employees being lifted, any cranes and derricks that hoist personnel must conform to the following:

- Be placed on a firm foundation;
- Be uniformly level within one percent of level grade;
- Have a minimum safety factor of seven for the load line (wire rope) of the crane or derrick (this means it must be capable of supporting seven times the maximum intended load);

- Move the personnel platform slowly and cautiously without any sudden jerking of the crane, derrick, or platform;
- Have rotation-resistant rope with a minimum safety factor of 10; and
- Have all brakes and locking devices on the crane or derrick set when the occupied personnel platform is in a stationary working position.

In addition, the combined weight of the loaded personnel platform and its rigging must not exceed 50 percent of the rated capacity of the crane or derrick for the radius and configuration of the crane or derrick.

Note: The crane operator must always be at the controls when the crane engine is running and the personnel platform is occupied. The crane operator also must have full control over the movement of the personnel platform. For more information, see the construction industry requirements.

Loading/unloading

Proper loading is essential for all types of cranes. Never use a crane and/or its accessories to lift more than the rated load capacity. A crane's load rate capacity is based on new equipment. When rating a load to be lifted, consider the age of the crane and daily wear, both of which reduce the operating capacity of the crane.

When loading or unloading with a locomotive crane, take precautions to ensure that it is not swung into a position where railway cars on an adjacent track might strike it. Be certain that cars are not being moved on the adjacent track and proper flag protection has been established prior to swinging the load.

Load ratings

Where stability governs lifting performance

The margin of stability for determining load ratings, with booms of stipulated lengths at stipulated working radii for the various types of crane mountings, is established by taking a percentage of the loads which will produce a condition of tipping or balance with the boom in the least stable direction, relative to the mounting.

The load ratings cannot exceed the following percents with the indicated types of mounting under conditions stipulated in §1910.180(c)(1)(ii) and (iii):

Type of crane mounting	Maximum load ratings (percent of tipping loads)
Locomotive, without outriggers:	
Booms 60 feet or less	[1]85
Booms over 60 feet	[1]85
Locomotive, using outriggers fully extended	80
Crawler, without outriggers	75
Crawler, using outriggers fully extended	85
Truck and wheel mounted without outriggers or using outriggers fully extended	85

[1]Unless this results in less than 30,000 pound-feet net stabilizing moment about the rail, which shall be minimum with such booms.

Locomotive cranes

Use the following stipulations when applying the load values for locomotive cranes:

- Tipping with or without the use of outriggers occurs when half of the wheels farthest from the load leave the rail.
- The crane must be standing on track which is level within one percent grade.

- Radius of the load is the horizontal distance from a projection of the axis of rotation to the rail support surface, before loading, to the center of vertical hoist line or tackle with load applied.
- Tipping loads from which ratings are determined must be applied under static conditions only, (i.e., without dynamic effect of hoisting, lowering, or swinging).
- The weight of all auxiliary handling devices such as hoist blocks, hooks, and slings must be considered a part of the load rating.

Crawler, truck, and wheel-mounted cranes

Stipulations for applying the values for crawler, truck, and wheel-mounted cranes must comply with ANSI/SAE J765 *Crane Load-Stability Test Code, Society of Automotive Engineers*. The effectiveness of stability will also be influenced by other factors. Be sure to take the following additional factors into consideration:

- Freely suspended loads,
- Track,
- Wind,
- Ground conditions,
- Condition and inflation of rubber tires,
- Boom lengths,
- Proper operating speeds for existing conditions, and
- Careful and competent operation.

Also take into account the effect of lights, pile lead adaptors, and other nonstandard attachments to the boom such as jibs and whip lines.

Where structural competence governs lifting performance

While some load ratings are limited by a crane's stability, other factors may also play a role in a crane's operating range. Some additional factors to consider include unstable loads that may increase tipping and loads that are nonsymmetrical. Ratings for these loads may be governed by structural competence of the equipment rather than stability.

Load handling

A crane's load hoist mechanism generally consists of a drum or hydraulic cylinder with the necessary rope reeving sufficient to safely lift and lower a load. When a load is in the lowest position, there must be at least two full wraps of rope remaining on the drum.

All cranes have some type of braking system that will control and stop the load from falling. Always take extreme caution when operating a crane near electric power lines.

Stability

During work operations, brakes or other locking devices must be applied to hold the crane sta-tionary. Rail clamps may not be used as a method for restraining tipping locomotive cranes.

Never operate a crane without the full amount of any ballast or counterweight in place, as specified by the manufacturer. Exceptions to this requirement are truck cranes that have dropped the ballast or counterweight. They may be operated temporarily with special care and only for light loads without the full ballast or counterweight in place. The ballast or counterweight specified by the manufacturer may not be exceeded.

Load size

Do not load a crane beyond its rated load capacity. When loads which are limited by structural competence rather than by stability are to be handled, ensure that the weight of the load has been determined within plus or minus 10 percent before it is lifted.

Attaching the load

Never wrap the hoist rope around the load. The load must be attached to the hook by a sling or other device having adequate capacity.

Holding the load

Most importantly, the operator must never leave the controls when the load is lifted, nor may anyone be allowed to walk under or stand by a suspended load.

Prior to lifting a load, ensure that:

- The crane is level and where necessary blocked properly.
- The load is well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.

Before starting to hoist, ensure that:

- Hoist rope is not kinked.
- Multiple part lines are not twisted around each other.
- The hook is brought over the load in such a manner as to prevent swinging.

During the hoist, ensure that:

- There is no sudden acceleration or deceleration of the moving load.
- The load does not contact any obstructions.

Moving the load

Before beginning a lift, be sure to consider the effects of the wind on the crane's stability. Then ensure that the load is secure and balanced before it is lifted more than a few inches.

Check all ropes for kinking prior to the lift. Slowly and smoothly raise and move the load. Test the brakes each time a load approaching the rated load is handled by raising it a few inches and applying the brakes.

Side loading of booms must be limited to freely suspended loads. Cranes can never be used for dragging loads sideways. On truck-mounted cranes, no loads may be lifted over the front area except as approved by the crane manufacturer.

The operator should avoid carrying loads over people. No hoisting, lowering, swinging, or traveling may be done while anyone is on the load or hook (see exception when construction industry requirements are met).

Use outriggers when the load to be handled at that particular radius exceeds the rated load without outriggers as given by the manufacturer for that crane. Where floats are used, they must be securely attached to the outriggers.

Wood blocks used to support outriggers must:

- Be strong enough to prevent crushing,
- Be free from defects, and
- Be of sufficient width and length to prevent shifting or toppling under load.

When two or more cranes are used to lift one load, one designated person must be responsible for the operation. This person has to analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

When rotating the crane, avoid sudden starts and stops. Maintain rotational speed at a rate where the load does not swing out beyond the radii at which it can be controlled. Use a tag or restraint line when load rotation is hazardous. If a crane is to be operated at a fixed radius, engage the boom-hoist pawl or other positive locking device.

Never lower the load or the boom below the point where less than two full wraps of rope remain on their respective drums. Ropes must not be handled on a winch head without the knowledge of the operator. While a winch head is being used, the operator must remain within convenient reach of the power unit control lever.

Before lifting loads with locomotive cranes without using outriggers, apply a method to prevent the load from being carried by the truck springs.

Traveling with a load

Before traveling a loaded crane, designate a person to be responsible for determining and controlling safety. This designated person will decide the position of load, boom location, ground support, travel route, and speed of movement. When in transit, take the following additional precautions:

- Carry the boom in line with the direction of motion.
- Secure the superstructure against rotation, except when negotiating turns when there is an operator in the cab or the boom is supported on a dolly.
- Lash or restrain an empty hook so that it cannot swing freely.

A crane with or without load cannot be traveled with the boom so high that it may bounce back over the cab.

Crane inspections

Initial inspections

Prior to initial use, all new and altered cranes have to be inspected by a qualified person. In-spection procedures for cranes in regular service are divided into two general classifications based on the intervals at which inspections should be performed. The intervals, frequent and periodic, are dependent on the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction.

- Frequent inspection — daily to monthly intervals.
- Periodic inspection — one to 12 month intervals, or as specifically recommended by the manufacturer.

In-service inspection criteria

The Department of Energy's *Hoisting and Rigging Standard* DOE-STD-1090-2001 defines crane service as:

- *Normal service* — operating at less than 85 percent of rated load and not more than 10 lift cycles/hr. except for isolated instances.

- *Heavy service* — operating at 85 to 100 percent of rated load or in excess of 10 lift cycles/hr. as a regular specified procedure.
- *Severe service* — operating at normal or heavy service under abnormal operating conditions (i.e., extreme temperatures or corrosive atmospheres).

Inspections should be based on the following criteria:

- *Frequent inspections*:

  Normal service — monthly

  Heavy service — weekly to monthly

  Severe service — daily to weekly

- *Periodic inspections*:

  Normal service — yearly

  Heavy service — semi-annually

  Severe service — quarterly

Frequent inspections

The following items must be inspected for defects at "frequent" intervals, or as indicated, including observation during operation for any defects which might appear between regular inspections. Carefully examine any deficiencies, such as those listed below, and decide if they present a safety hazard.

Daily

- ❑ All control mechanisms for maladjustment interfering with proper operation.
- ❑ Deterioration or leakage in air or hydraulic systems.

Daily to monthly

- ❑ All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
- ❑ All safety devices for malfunction.
- ❑ Crane hooks with deformations or cracks. For hooks with cracks or having more than 15 percent in excess of normal throat opening or more than 10º twist from the plane of the unbent hook.
- ❑ Rope reeving for noncompliance with manufacturer's recommendations
- ❑ Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
- ❑ Tires for recommended inflation pressure.

Periodic inspections
Perform a complete crane inspection periodically, that is, between a one to 12 month interval, or as recommended by the manufacturer. The interval is dependent on the crane's activity, severity of service, and environment, or as specifically indicated below. These items to be inspected on the following list are in addition to those required on the "frequent" list. Any deficiencies discovered must be carefully examined and a determination made as to whether they constitute a safety hazard. ❑ Deformed, cracked, or corroded members in the crane structure and boom. ❑ Loose bolts or rivets. ❑ Cracked or worn sheaves and drums. ❑ Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers, and locking devices. ❑ Excessive wear on brake and clutch system parts, linings, pawls, and ratchets. ❑ Load, boom angle and other indicators over their full range, for any significant inaccuracies. ❑ Gasoline, diesel, electric, or other power plants for improper performance or noncompliance with safety requirements. ❑ Excessive wear of chain-drive sprockets and excessive chain stretch. ❑ Crane hooks for cracking. ❑ Travel steering, braking, and locking devices for malfunction. ❑ Excessively worn or damaged tires. ❑ Hydraulic and pneumatic hose, fittings, tubing, pumps, motors, cylinders, and filters.

Cranes not in regular use

One through five months

A crane which has been idle for one month or more, but less than six months, must have an inspection covering at least the items listed for a "frequent" inspection plus a rope inspection before it can be put in service.

All rope which has been idle for a period of a month or more due to shutdown or storage of the crane must have a thorough inspection before it is used. An appointed or authorized person whose approval is required for further use of the rope must inspect for all types of deterioration.

A certificate which includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected must be prepared and kept readily available.

Over six months

A crane which has been idle for six months must be given a complete inspection covering the requirements for both frequent and periodic inspections plus a rope inspection before it can be put into service.

All rope which has been idle for a period of a month or more due to crane shutdown or storage must have a thorough inspection before it is used. An appointed or authorized person whose approval is required for further use of the rope must inspect for all types of deterioration.

A certificate which includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected must be prepared and kept readily available.

Standby cranes

Standby cranes must be inspected at least semi-annually. The inspection must cover the items listed for a frequent inspection and a rope inspection. Cranes which are exposed to adverse environment should be inspected more frequently.

All rope which has been idle for a period of a month or more due to crane shutdown or storage must have a thorough inspection before it is used. An appointed or authorized person whose approval is required for further use of the rope must inspect for all types of deterioration.

A certificate which includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected must be prepared and kept readily available.

Inspection records

Inspection of critical items such as brakes, crane hooks, ropes, hydraulic and pneumatic cylinders, and relief pressure valves must be made monthly. Certification records must include:

- Date of inspection,
- Signature of the person who performed the inspection,
- Serial number or other identifier.

Keep this certification record on file and readily available.

Testing

Manufacturer's tests

All newly-produced cranes must be tested by the manufacturer for proper operation of:

- Load hoisting and lowering mechanisms,
- Boom hoisting and lowering mechanisms,
- Swinging mechanism,
- Travel mechanism, and
- Safety devices.

When the complete crane is not supplied by one manufacturer, the tests have to be conducted at final assembly and the certified results made available.

On-the-job operational tests

Prior to daily use on the job, the crane's accessories that facilitate operation must be checked following the crane manufacturer's recommended procedures to ensure proper functioning. If any accessories are not functioning correctly, follow the manufacturer's directions until the problems are corrected.

If the crane or one of its elements is not functioning properly, first try to find a solution in the operating manual. If the manual does not contain a recommendation, consult the manufacturer.

Rated load tests

Prior to initial use, cranes that have had load sustaining parts altered, replaced, or repaired (except ropes) should be loaded-tested by a qualified person. A functional test made using a normal operating load should be made prior to putting the crane back in service. Written reports must be available showing test procedures and confirming that repairs or alterations are adequate.

Test loads may not exceed 110 percent of the rated load at any selected working radius. Where rerating is necessary:

- Test crawler, truck, and wheel-mounted cranes according to SAE *Recommended Practice, Crane Load Stability Test Code J765* (April 1961).
- Test locomotive cranes according to §1910.180(c)(1) (i) and (ii).
- Make rerating test report readily available.

No cranes may be rerated in excess of the original load ratings, unless the rating changes are approved by the crane manufacturer or final assembler.

Rope inspections

The ropes used on cranes must be of a type recommended by either the crane manufacturer or by a qualified person. Never use rotation resistant ropes or fiber core ropes for boom hoisting reeving. Ropes that are exposed to temperatures greater than 180°F must have an independent wire-rope, wire-strand core, or similar temperature damage-resistant core.

Sheave grooves must be kept free from surface defects that could damage the rope. Be sure that sheave bearings are adequately lubricated. Hook and ball assemblies and load blocks must be marked with their rated capacity and weight. Hooks must have latches, unless impractical.

Running ropes

Setting up a long-range inspection program for crane ropes will ensure that damaged or deteriorating ropes will be spotted and replaced and a potentially serious incident avoided. After several years of recording inspection results, you will begin to see a pattern of wear and rope conditions associated with use. This will enable you to judge when replacements are necessary.

OSHA requires that a thorough inspection of all running ropes in use be made at least once a month, and the ANSI B30.5 standard recommends that all running ropes be visually inspected frequently, that is once each working day. Both OSHA and ASME require that the inspections be performed by qualified/authorized personnel.

When ropes are inspected, OSHA further requires documentation of the inspection which includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the ropes. Keep the inspection report on file where it is readily available.

Any deterioration resulting in appreciable loss of original strength must be carefully observed and determination made as to whether further use of the rope would constitute a safety hazard. Some of the conditions that could result in an “appreciable” loss of strength include:

- Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.
- A number of broken outside wires and the degree of distribution of concentration of broken wires.
- Worn outside wires.
- Corroded or broken wires at end connections.
- Corroded, cracked, bent, worn, or improperly applied end connections.
- Severe kinking, crushing, cutting, or unstranding.

When an inspection determines that the rope has met one of the removal criteria, it must be replaced. Based on the judgment of a qualified person, it may be replaced at the end of a workshift, end of the work day, or prior to it being used again.

Other ropes

Heavy wear and/or broken wires may occur in sections in contact with equalizer sheaves or other sheaves where rope travel is limited, or with saddles. Particular care has to be taken to inspect rope at these locations, as well as nonrotating rope in any location.

All rope which has been idle for a month or more due to shutdown or storage of a crane on which it is installed must be given a thorough inspection for all types of deterioration before it is used. The inspection must be performed by an appointed or authorized person whose approval is required for further use of the rope. A certification record which includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected must be prepared and kept readily available.

Maintenance

It's a good idea to implement a preventive maintenance program based on the manufacturer's recommendations and to keep detailed records of maintenance done to the equipment. Use replacement parts from the crane's manufacturer whenever possible.

All moving parts that require lubrication should be lubricated on a routine basis. In most instances, the crane must be stationary while lubricants are being applied. Check lubricating systems to ensure the lubricant is being properly delivered.

Routine maintenance procedures

Prior to any maintenance procedure, take the following precautionary steps to lockout the equipment and render it inoperable:

- Move the crane to a place where it will not interfere with other equipment or operations;
- Set all controls in the "off" position and secure all operating features;
- Secure the starting control to make it inoperative;
- Stop or disconnect the power plant;
- Lower the boom and load block to the ground or secure them from dropping; and
- Relieve hydraulic oil pressure.

After these steps have been taken and before maintenance work begins, post "Warning" or "Out of order" signs on the crane controls. For locomotive cranes, follow the "blue flag pro-tection" procedure. Only authorized persons may remove the postings and/or flags when the work is completed.

After adjustments and repairs have been made, the crane may not be operated until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed.

Adjustments and repairs

When an inspection uncovers a hazard, it must be corrected before the crane may be operated. Adjustments and repairs, done only by designated personnel, must be made within the manufacturer's specified tolerances.

Replacement parts must have at least the original design factor.

Adjustments — Examples of adjustments that must be maintained to assure correct functioning of crane components include:

- All functional operating mechanisms,
- Accessories and limit switches,
- Control systems,

- Brakes, and
- Power plants.

Repairs — Following are examples of repairs and replacements:

- Operating mechanism's critical parts that are cracked, bent or broken, corroded, or worn;
- Structural parts that are cracked, bent, broken, or corroded; and
- Damaged or worn hooks (repair by welding or reshaping is not recommended).

After adjustments and repairs have been made, the crane may not be operated until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed.

Rope maintenance procedures

Rope should be stored in a way that prevents damage or deterioration. When rope is uncoiled, use care to avoid kinking or twisting. Avoid dragging rope through dirt or in material that may scrape, crush, or bend the strands. Lubrication reduces internal friction and prevents corrosion. Lubricate ropes routinely, as part of your overall maintenance program.

Operator training

Crane operators have to be trained before initial assignment and regularly thereafter. However, they are not the only personnel involved in crane operations that should receive training. Include the signal and ground persons, lift directors, and riggers in any training. That way, the whole crew will understand all crane operations and how their role relates to the other members of the crew.

When operating any type of equipment, it is essential for the operator to remain focused on the task at hand and not take unnecessary risks or short cuts. Because of the potential hazards inherent to heavy equipment such as cranes, this is particularly true for crane operators. These workers must be both emotionally stable and physically fit to conduct themselves responsibly on the job.

OSHA requires that only designated personnel be permitted to operate locomotive and truck cranes. It goes no further to explain what "designated" encompasses. However, the ASME B30.5 standard has quite specific criteria, some of which is covered in the following section. For the full list of criteria, see the ANSI/ASME B30.5 standard.

Operational requirements

As specified in the ASME B30.5 *Safety Code for Crawler, Locomotive, and Truck Cranes*, operators have to be trained for the type of crane they will be operating. Only qualified, designated persons, trainees having direct supervision, and maintenance and test personnel may enter the crane cab. Potential operators must pass a written or oral exam and practical operating examination.

Operators who are physically capable of performing the job must, among other things, demonstrate proficiency in handling the specific type of crane, including:

- Pre-start and post-start inspections,
- Maneuvering skills,
- Shutdown, and
- Securing procedures.

Requalification may be done if deemed necessary by a supervisor.

Physical requirements

According to ASME B30.5, potential operators must be physically fit, including having the:

- Ability to distinguish colors;
- Ability to hear with or without a hearing aid;
- Strength, endurance, agility, coordination, and reaction speed to meet the rigors of crane operation; and
- Having normal depth perception and field of vision.

Crane operators must have a physical examination at least every three years. A potential operator may be disqualified based on certain physical conditions or failing a drug test. For a complete list of physical requirements, see the B30.5 standard.

Crane operator's basic safety rules
1. Know the equipment you're working with.
2. Know the load and the radius.
3. Understand and interpret load charts.
4. Use proper rigging practices.
5. Inspect and monitor all critical equipment regularly.
6. Stay clear of electrical power lines.
7. Be aware of all surrounding hazards and obstructions.
8. Never walk under a raised load.
9. Secure and restrict access to the lift area.
10. When you're unsure or just don't know, stop and ask.

Manufacturer's guidelines

The crane manufacturer is required to furnish a user's manual containing general and specific operating instructions and information about installation, inspection, testing, lubrication, and maintenance of the crane. Employees with crane responsibilities should be familiar with the information in the manual.

Fire extinguishers

Because a carbon dioxide, dry chemical, or equivalent fire extinguisher must be kept in the cab or vicinity of the crane, operators and maintenance personnel have to be trained in the use and care of the extinguishers.

Safety measures

Only thoroughly trained and competent workers should operate cranes. Operators need to know what they are lifting and what it weighs.

For example, the rated capacity of mobile cranes varies with the length of the boom and the boom radius. When a crane has a telescoping boom, a load may be safe to lift at a short boom length or a short boom radius, but may overload the crane when the boom is extended and the radius increases.

Glossary of terms for crawler, locomotive, and truck cranes

An **accessory** is a secondary part or assembly of parts which contributes to the overall function and usefulness of a machine.

An **angle indicator** (boom) is an accessory which measures the angle of the boom to the horizontal.

The **axis of rotation** is the vertical axis around which the crane superstructure rotates.

Axle means the shaft or spindle with which or about which a wheel rotates. On truck- and wheel- mounted cranes it refers to an automotive type of axle assembly including housings, gearing, differential, bearings, and mounting appurtenances.

Axle (bogie) means two or more automotive-type axles mounted in tandem in a frame so as to divide the load between the axles and permit vertical oscillation of the wheels.

The **base** (mounting) is the traveling base or carrier on which the rotating superstructure is mounted such as a car, truck, crawlers, or wheel platform.

The **boom** (crane) is a member hinged to the front of the rotating superstructure with the outer end supported by ropes leading to a gantry or A-frame and used for supporting the hoisting tackle.

The **boom angle** is the angle between the longitudinal centerline of the boom and the horizontal. The boom longitudinal centerline is a straight line between the boom foot pin (heel pin) centerline and boom point sheave pin centerline.

The **boom hoist** is a hoist drum and rope reeving system used to raise and lower the boom. The rope system may be all live reeving or a combination of live reeving and pendants.

The **boom stop** is a device used to limit the angle of the boom at the highest position.

A **brake** is a device used for retarding or stopping motion by friction or power means.

A **cab** is a housing which covers the rotating superstructure machinery and/or operator's station. On truck-crane trucks a separate cab covers the driver's station.

The **clutch** is a friction, electromagnetic, hydraulic, pneumatic, or positive mechanical device for engagement or disengagement of power.

The **counterweight** is a weight used to supplement the weight of the machine in providing stability for lifting working loads.

Designated means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

The **drum** is the cylindrical members around which ropes are wound for raising and lowering the load or boom.

Dynamic (loading) means loads introduced into the machine or its components by forces in motion.

The **gantry** (A-frame) is a structural frame, extending above the superstructure, to which the boom support ropes are reeved.

A **jib** is an extension attached to the boom point to provide added boom length for lifting specified loads. The jib may be in line with the boom or offset to various angles.

Load (working) means the external load, in pounds, applied to the crane, including the weight of load-attaching equipment such as load blocks, shackles, and slings.

Load block (upper) means the assembly of hook or shackle, swivel, sheaves, pins, and frame sus-pended from the boom point.

Load block (lower) means the assembly of hook or shackle, swivel, sheaves, pins, and frame suspended by the hoisting ropes.

A **load hoist** is a hoist drum and rope reeving system used for hoisting and lowering loads.

Load ratings are crane ratings in pounds established by the manufacturer in accordance with paragraph (c) of this section.

Outriggers are extendable or fixed metal arms, attached to the mounting base, which rest on supports at the outer ends.

Rail clamp means a tong-like metal device, mounted on a locomotive crane car, which can be connected to the track.

Reeving means a rope system in which the rope travels around drums and sheaves.

Side loading means a load applied at an angle to the vertical plane of the boom.

A **standby crane** is a crane which is not in regular service but which is used occasionally or intermittently as required.

A **standing** (guy) **rope** is a supporting rope which maintains a constant distance between the points of attachment to the two components connected by the rope.

Structural competence means the ability of the machine and its components to withstand the stresses imposed by applied loads.

Superstructure means the rotating upper frame structure of the machine and the operating ma-chinery mounted thereon.

Swing means the rotation of the superstructure for movement of loads in a horizontal direction about the axis of rotation.

Swing mechanism means the machinery involved in providing rotation of the superstructure.

Tackle is an assembly of ropes and sheaves arranged for hoisting and pulling.

Transit means the moving or transporting of a crane from one jobsite to another.

The **travel mechanism** is the machinery involved in providing travel.

Wheelbase means the distance between centers of front and rear axles. For a multiple axle assembly the axle center for wheelbase measurement is taken as the midpoint of the assembly.

The **whipline** (auxiliary hoist) is a separate hoist rope system of lighter load capacity and higher speed than provided by the main hoist.

A **winch head** is a power driven spool for handling of loads by means of friction between fiber or wire rope and spool.

Derricks

Introduction

A derrick is a lifting apparatus consisting of a mast held at the head by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes. Derricks may be installed for temporary use, as in construction work.

Different types of derricks covered by OSHA's Derrick standard at §1910.181 include guy, stiffleg, basket, breast, gin pole, Chicago boom, and A-frame derricks of the stationary type. These derricks are capable of handling loads at variable reaches and powered by hoists through systems of rope reeving. They are used to perform lifting hook work, single or multiple line bucket work, grab, grapple, and magnet work. The OSHA standard also applies to any modification of these types which retain their fundamental features, except for floating derricks.

All new derricks constructed and installed after August 31, 1971, have to meet the design specifications of the ANSI standard for derricks, ANSI B30.6-1969.

Derrick cabs or operating enclosures

Storage

Necessary clothing and personal belongings must be stored so they don't interfere with access or operation. Tools, oil cans, waste, extra fuses, and other articles must be stored in the toolbox. Never leave these articles loose in the cab or operating enclosure.

Fire extinguishers

A carbon dioxide, dry chemical, or equivalent fire extinguisher must be kept in the immediate vicinity of the derrick. Operating and maintenance personnel must be trained in the use and care of the fire extinguishers provided.

Refueling

Refueling using portable containers may be done with approved safety type cans equipped with an automatic closing cap and a flame arrester. Machines may not be refueled with the engine running.

Markings and warnings

Load ratings for permanent installations

For permanently installed derricks with fixed lengths of boom, guy, and mast, a substantial, durable, and clearly legible rating chart must be provided. The rating chart has to be securely mounted where it is visible to personnel responsible for the safe operation of the equipment. The chart must include the following data:

- Manufacturer's approved load ratings at corresponding ranges of boom angle or operating radii;
- Specific lengths of components on which the load ratings are based; and
- Required parts for hoist reeving. Rope size and construction may be shown either on the rating chart or in the operating manual.

Load ratings for temporary installations

For nonpermanent installations, the manufacturer must provide sufficient information from which capacity charts can be prepared for the particular installation. The capacity charts have to be kept at the derricks or the jobsite office.

Guarding moving parts

Exposed moving parts, such as gears, ropes, setscrews, projecting keys, chains, chain sprockets, and reciprocating components which constitute a hazard under normal operating conditions, must be guarded. Ensure that the guards are securely fastened.

Each guard must be capable of supporting (without permanent distortion) the weight of a 200-pound person, unless the guard is located where it is impossible for a person to step on it.

Load handling

Derrick operations may be directed only by the individual specifically designated for that purpose. Never load a derrick beyond the rated capacity. When loads approach the maximum rating of the derrick, be sure that the weight of the load has been determined within plus or minus 10 percent before it is lifted.

Hooks

Hooks must meet the manufacturer's recommendations and may not be overloaded. Use safety latch type hooks wherever possible.

Attaching the load

Attach the load to the hook by means of slings or other suitable devices. Prior to the move, be sure that the hoist rope is not wrapped around the load.

Moving the load

Secure and balance the load in the sling or lifting device before it is lifted more than a few inches.

Before starting to hoist, ensure that:

- Hoist rope is not kinked.
- Multiple part lines are not twisted around each other.
- The hook is brought over the load in such a way as to prevent swinging.

During hoisting, ensure that:

- There is no sudden acceleration or deceleration of the moving load, and
- The load does not contact any obstructions.

Do not use a derrick for side loading, except when specifically authorized by a responsible person who has determined that the structural components will not be overstressed.

Never hoist, lower, or swing the load while anyone is on the load or hook and avoid carrying loads over people. Ensure that the boom and hoisting rope systems are not twisted.

The derrick operator must test the brakes each time a load approaching the rated load is handled by raising it a few inches and applying the brakes. Neither the load nor boom may be lowered below the point where less than two full wraps of rope remain on their respective drums.

When rotating a derrick, avoid sudden starts and stops. Maintain a rotational speed which ensures that the load will not swing out beyond the radius at which it can be controlled.

Holding the load

The operator may not leave his or her position at the controls while the load is suspended. Also, while the load is suspended, do not allow personnel to stand or pass under the load. If the load has to remain suspended for any considerable length of time, a dog, or pawl and ratchet, or other equivalent means (rather than the brake alone) must be used to hold the load.

Winch heads

Ropes must not be handled on a winch head without the knowledge of the operator. While a winch head is being used, the operator has to remain within convenient reach of the power unit control lever.

Securing boom

Engage dogs, pawls, or other positive holding mechanism on the hoist. When not in use, the derrick boom has to be:

- Laid down;

- Secured to a stationary member, as nearly under the head as possible, by attachment of a sling to the load block; or
- Hoisted to a vertical position and secured to the mast.

Derrick inspections

Initial inspection

All new and altered derricks must be inspected prior to initial use. Inspection procedures for derricks in regular service are divided into two general classifications, based on the intervals at which inspection should be performed. The intervals — frequent and periodic — depend on the nature of the crane's critical components and the degree of their exposure to wear, deterioration, or malfunction.

- Frequent inspection — daily to monthly intervals.
- Periodic inspection — one to 12 month intervals.

Frequent inspections

Items such as the following must be inspected for defects as indicated, including observation during operation for any defects which might appear between regular inspections. Deficiencies must be carefully examined for any safety hazard.

Daily

- ❑ All control mechanisms for adjustment, wear, and lubrication; tension in guys; deterioration or leakage in air or hydraulic systems.
- ❑ Hoist brakes, clutches, and operating levers — check for proper functioning before beginning operations.
- ❑ Plumb of the mast.
- ❑ Derrick hooks for deformations or cracks; hooks with cracks or having more than 15 percent in excess of normal throat opening, or more than 10º twist from the plane of the unbent hook.
- ❑ Electrical apparatus for malfunctioning; signs of excessive deterioration, dirt, and moisture accumulation.

Daily, visually

- ❑ All chords and lacing; rope reeving — visual inspection for noncompliance with derrick manufacturer's recommendations.

Periodic inspections
Complete derrick inspections must be performed at one to 12 month intervals, depending on the activity, severity of service, and environment. Be sure to include foundation or supports in the inspection to ensure their continued ability to sustain the imposed loads. Examine any deficiencies found during the inspection to determine if they constitute a safety hazard. Derrick inspections must include the items listed for "frequent" inspections in addition to the following: ❑ Structural members for deformations, cracks, and corrosion. ❑ Bolts or rivets for tightness. ❑ Parts such as pins, bearings, shafts, gears, sheaves, drums, rollers, locking and clamping devices, for wear, cracks, and distortion. ❑ Gudgeon pin for cracks, wear, and distortion each time the derrick is to be erected. ❑ Power plants for proper performance and compliance with applicable safety requirements. ❑ Hooks.

Derricks not in regular use

One through six months — A derrick which has been idle for one month or more, but less than six months, must be given an inspection covering the items listed for frequent and periodic inspections before being placed into service.

Over six months — A derrick which has been idle for over six months must be given a complete inspection covering the items listed for frequent and periodic inspections. Additionally, all rope which has been idle for a month or more due to shutdown or storage of a derrick on which it is installed must be given a thorough inspection before it is used. Inspect for all types of deterioration. Document the inspection and keep it readily available. The certification must include:

- Date of inspection,
- Signature of the person who performed the inspection, and
- An identifier for the ropes which were inspected.

Standby derricks — Standby derricks must be inspected at least semi-annually covering the items listed for frequent and periodic inspections. Additionally, all rope which has been idle for a month or more due to shutdown or storage of a derrick on which it is installed must be given a thorough inspection before it is used. Inspect for all types of deterioration. Document the inspection and keep it readily available. The certification must include:

- Date of inspection,
- Signature of the person who performed the inspection, and
- An identifier for the ropes which were inspected.

Operational tests

Prior to initial use, test all new and altered derricks for at least the following functions:

- Load hoisting and lowering,
- Boom up and down,
- Swing, and
- Operation of clutches and brakes of hoist.

Also, all anchorages must be approved by the appointed person. Rock and hairpin anchorages may require special testing.

Rope inspections

Running ropes

A thorough inspection of all ropes in use must be made at least once a month. Prepare a certification record and keep it on file where readily available. This certification must include:

- Date of inspection,
- Signature of the person who performed the inspection, and
- An identifier for the ropes which were inspected.

Inspect for any deterioration resulting in appreciable loss of original strength and decide whether further use of the rope would constitute a safety hazard. Some of the conditions that could result in an appreciable loss of strength include:

- Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.
- A number of broken outside wires and the degree of distribution or concentration of such broken wires.
- Worn outside wires.
- Corroded or broken wires at end connections.
- Corroded, cracked, bent, worn, or improperly applied end connections.
- Severe kinking, crushing, cutting, or unstranding.

Limited travel ropes

Heavy wear and/or broken wires may occur at sections in contact with equalizer sheaves or other sheaves where rope travel is limited, or with saddles. Take particular care when inspecting ropes at these locations.

Idle ropes

All rope which has been idle for a month or more due to shutdown or storage of a derrick on which it is installed must be given a thorough inspection before it is used. Inspect for all types of deterioration. Prepare a certification record and kept readily available. The certificate must include:

- Date of inspection,
- Signature of the person who performed the inspection, and
- An identifier for the ropes which were inspected.

Nonrotating ropes

Take particular care in the inspection of nonrotating rope.

Maintenance and repairs

Keeping a derrick in safe operating condition requires preventive maintenance as well as timely repairs. Establish a preventive maintenance program based on the derrick manufacturer's recommendations.

Maintenance procedures

Before adjustments and repairs are started on a derrick, take the following precautions:

- Place the derrick to be repaired in a location where it will cause the least interference with other equipment and operations in the area.
- Engage all hoist drum dogs.
- If an electric hoist is used, lock the main or emergency switch in the open position.
- Place "Warning" or "Out of order" signs on the derrick and hoist.
- Make boom repairs when the booms are lowered and adequately supported or safely tied off.
- Set up a good communication system between the hoist operator and the appointed individual in charge of derrick operations before any work on the equipment is started.

After adjustments and repairs have been made, the derrick may not be operated until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed.

Adjustments and repairs

Correct any unsafe conditions disclosed by inspection before operation is resumed. Maintain all adjustments to assure correct functioning of components. Repairs or replacements must be provided promptly as needed for safe operation. The following conditions require prompt repair or replacement:

- Hooks showing defects must be discarded.
- All critical parts which are cracked, broken, bent, or excessively worn.
- All replacement and repaired parts must have at least the original safety factor.

Glossary of terms for derricks

A-frame derrick means a derrick in which the boom is hinged from a cross member between the bottom ends of two upright members spread apart at the lower ends and joined at the top; the boom point secured to the junction of the side members, and the side members are braced or guyed from this junction point.

A **basket derrick** is a derrick without a boom, similar to a gin pole, with its base supported by ropes attached to corner posts or other parts of the structure. The base is at a lower elevation than its supports. The location of the base of a basket derrick can be changed by varying the length of the rope supports. The top of the pole is secured with multiple reeved guys to position the top of the pole to the desired location by varying the length of the upper guy lines. The load is raised and lowered by ropes through a sheave or block secured to the top of the pole.

Breast derrick means a derrick without boom. The mast consists of two side members spread farther apart at the base than at the top and tied together at top and bottom by rigid members. The mast is prevented from tipping forward by guys connected to its top. The load is raised and lowered by ropes through a sheave or block secured to the top crosspiece.

Chicago boom derrick means a boom which is attached to a structure, an outside upright member of the structure serving as the mast, and the boom being stepped in a fixed socket clamped to the upright. The derrick is complete with load, boom, and boom point swing line falls.

A **gin pole derrick** is a derrick without a boom. Its guys are so arranged from its top as to permit leaning the mast in any direction. The load is raised and lowered by ropes reeved through sheaves or blocks at the top of the mast.

Guy derrick means a fixed derrick consisting of a mast capable of being rotated, supported in a vertical position by guys, and a boom whose bottom end is hinged or pivoted to move in a vertical plane with a reeved

rope between the head of the mast and the boom point for raising and lowering the boom, and a reeved rope from the boom point for raising and lowering the load.

Shearleg derrick means a derrick without a boom and similar to a breast derrick. The mast, wide at the bottom and narrow at the top, is hinged at the bottom and has its top secured by a multiple reeved guy to permit handling loads at various radii by means of load tackle suspended from the mast top.

A **stiffleg derrick** is a derrick similar to a guy derrick except that the mast is supported or held in place by two or more stiff members, called stifflegs, which are capable of resisting either tensile or compressive forces. Sills are generally provided to connect the lower ends of the stifflegs to the foot of the mast.

Appointed means assigned specific responsibilities by the employer or the employer's rep-resentative.

A **boom** is a timber or metal section or strut, pivoted or hinged at the heel (lower end) at a location fixed in height on a frame or mast or vertical member, and with its point (upper end) supported by chains, ropes, or rods to the upper end of the frame, mast, or vertical member. A rope for raising and lowering the load is reeved through sheaves or a block at the boom point. The length of the boom shall be taken as the straight line distance between the axis of the foot pin and the axis of the boom point sheave pin, or where used, the axis of the upper load block attachment pin.

Boom harness means the block and sheave arrangement on the boom point to which the topping lift cable is reeved for lowering and raising the boom.

The **boom point** is the outward end of the top section of the boom.

Derrick bullwheel means a horizontal ring or wheel, fastened to the foot of a derrick, for the purpose of turning the derrick by means of ropes leading from this wheel to a powered drum.

Designated means selected or assigned by the employer or employer's representative as being qualified to perform specific duties.

Eye means a loop formed at the end of a rope by securing the dead end to the live end at the base of the loop.

A **fiddle block** is a block consisting of two sheaves in the same plane held in place by the same cheek plates.

The **foot bearing** or *foot block* (sill block) is the lower support on which the mast rotates.

A **gudgeon pin** is a pin connecting the mast cap to the mast allowing rotation of the mast.

A **guy** is a rope used to steady or secure the mast or other member in the desired position.

Load, working means the external load, in pounds, applied to the derrick, including the weight of load attaching equipment such as load blocks, shackles, and slings.

Load block, lower means the assembly of sheaves, pins, and frame suspended by the hoisting rope.

Load block, upper means the assembly of sheaves, pins, and frame suspended from the boom.

Mast means the upright member of the derrick.

Mast cap (spider) means the fitting at the top of the mast to which the guys are connected.

Reeving means a rope system in which the rope travels around drums and sheaves.

Rope refers to wire rope unless otherwise specified.

Safety hook means a hook with a latch to prevent slings or load from accidentally slipping off the hook.

Side loading is a load applied at an angle to the vertical plane of the boom.

The **sill** is a member connecting the foot block and stiffleg or a member connecting the lower ends of a double member mast.

A **standby derrick** is a derrick not in regular service which is used occasionally or intermittently as required.

Stiffleg means a rigid member supporting the mast at the head.

Swing means rotation of the mast and/or boom for movements of loads in a horizontal direction about the axis of rotation.

Pulp, paper, and paperboard mills

OSHA's Pulp, Paper, and Paperboard Mills standard at §1910.261 applies to those facilities where pulp, paper, and paperboard are manufactured and converted. It does not apply to logging and the transportation of logs to pulp, paper, and paperboard mills. For logging operations, see §1910.267.

Handling and storage of pulpwood and pulp chips
§1910.261(c)(1)–(7)

Handling pulpwood with forklift trucks

Where large forklift trucks or lift trucks with clamjaws are used in the yard, the operator's enclosed cab must have an escape hatch whenever the hydraulic arm blocks escape through the side doors.

Handling pulpwood with cranes or stackers

Where locomotive cranes are used for loading or unloading pulpwood, the pulpwood has to be piled to allow a clearance of not less than 24 inches between the pile and the end of the cab of any locomotive crane in use, when the cab is turned in any working position.

The minimum distance of the pulpwood pile from the centerline of a standard-gage track must be maintained at not less than 8½ feet. Logs have to be piled in an orderly and stable manner, with no projection into walkways or roadways.

Railroad cars may not be spotted on tracks adjacent to the locomotive cranes unless a 24-inch clearance is maintained.

The handling and storage of other materials must conform to §1910.261(c)(2)(i) and (ii) with respect to clearance.

Personal protective equipment for workers such as foot, head, and eye protection is required on a job basis.

No person is permitted to walk beneath a suspended load, bucket, or hook.

Handling pulpwood from ships

Ladders and gangplanks with railings to boat docks must be securely fastened in place.

The hatch tender may signal the hoisting engineer to move the load only after the men working in the hold are in the clear.

The air in the ship's hold, tanks, or closed vessels must be tested for oxygen deficiency and for both toxic and explosive gases and vapors.

Handling pulpwood from flatcars and all other railway cars

Railroad flatcars for the conveying pulpwood loaded parallel to the length of the car must be equipped with safety-stake pockets. Where pulpwood is loaded crosswise on a flatcar, sufficient stakes of sizes not smaller than 4 by 4 inches must be used to prevent the load from shifting.

When it is necessary to cut stakes, those on the unloading side should be partially cut through first, and then the binder wires cut on the opposite side. Wire cutters equipped with long extension handles must be used. No person is permitted along the dumping side of the car after the stakes have been cut.

When steel straps without stakes are used, the steel straps have to be cut from a safe area to prevent employees from being struck by the falling logs.

Flatcars and all other cars must be chocked during unloading. Where equipment is not provided with hand brakes, use rail clamping chocks. A derail may be used to prevent movement of other rail equipment into cars where persons are working.

Handling pulpwood from trucks

Cutting stakes and binder wires must be done following §1910.261(c)(4)(iii).

Where binder chains and steel stakes are used, the binder chains must be released and the stakes tripped from the opposite side of the load spillage.

Where binder chains and crane slings are used, the crane slings must be attached and taut before the binder chains are released. The hooker must see that the helper is clear before signaling to move the load.

Handling pulp chips from railway cars

All cars have to be securely fastened in place and all employees in the clear before dumping is started.

Personal protective equipment used for foot, head, and eye protection must be provided. Employees have to wear the equipment when working in the woodyard. Ear protection must be provided when the noise level may be harmful.

Handling pulp chips from trucks and trailers

All trucks and trailers must be securely fastened in place and all employees in the clear before dumping is started. Appropriate personal protective equipment meeting the requirements of §1910.261(c)(6)(ii) has to be provided.

Handling and storing raw materials other than pulpwood or pulp chips
§1910.261(d)(1)–(4)

Personal protective equipment

Whenever possible, all dust, fumes, and gases incidental to handling materials must be controlled at the source. Where control at the source is not possible, respirators with goggles or protective masks must be provided. Employees have to ear them when handling:

- Alum, clay, soda, ash,
- Lime, bleach powder, sulfur,
- Chlorine and similar materials, and
- When opening rag bales.

When handling liquid acid or alkali, workers must be provided with approved eye and face protection and protective clothing.

Clearance

When materials are being piled inside a building and on platforms, provide an aisle clearance at least 3 feet greater than the widest truck in use. Baled paper and rags stored inside a building may not be piled closer than 18 inches to walls, partitions, or sprinkler heads.

Piling and unpiling pulp

Piles of wet lap pulp (unless palletized) must be stepped back one-half the width of the sheet for each 8 feet of pile height. Sheets of pulp must be interlapped to make the pile secure. Pulp may not be piled over pipelines to jeopardize pipes, or so as to cause overloading of floors, or to within 18 inches below sprinkler heads. Piles of pulp must not be undermined when being unpiled.

Floor capacities must be clearly marked on all floors.

Where rolls are pyramided two or more high, chocks must be installed between each roll on the floor and at every row. Where pulp and paper rolls are stored on smooth floors in processing areas, use rubber chocks with wooden cores. When rolls are decked two or more high, the bottom rolls must be chocked on each side to prevent shifting in either direction.

Materials handling
§1910.261(m)(1)–(5)

Hand trucks

No person is allowed to ride on a powered hand truck unless it is designed by the manufacturer to be ridden on. A limit switch must be on the operating handle — 30 degrees each way from a 45-degree angle up and down.

Power trucks

Power trucks must comply with ANSI B56.1-1969. Provide adequate ventilation and properly maintain the trucks, so that dangerous concentrations of carbon monoxide cannot be generated, especially in warehouses or other isolated areas of a plant.

Cartons

The carton-stitching machine must be guarded to prevent the operator from coming in contact with the stitching head. Banders and helpers have to wear eye protection equipment as specified in §1910.261(b)(2).

Unloading cars or trucks

Where steel bands or wires are used in boxcars or trucks, all loaders and helpers must wear eye protection as specified in §1910.261(b)(2).

The construction and use of bridge or dock plates has to conform to the requirements of ANSI B56.1-1969.

Flag signals, derails, or other protective devices must be used to protect men during switching operations. The blue flag policy has to be invoked according to §1910.261(c)(9)(i).

Stacking and storing materials

Stacking materials can be dangerous when employees either don't know or don't practice safe stacking procedures. Falling materials and collapsing loads can crush or pin employees. Stored materials should never create a hazard for employees.

Before stacking any material, those involved need to be aware of the material's height and weight; how accessible the stored materials are to the user; and when stacking and piling, the condition of the containers. To help prevent injuries when stacking and storing materials, consider the following tips:

- Ensure that stacks are stable and self-supporting.
- Separate noncompatible materials.
- Stack bags and bundles in interlocking rows to keep them secure.
- Stack bagged material by stepping back the layers and cross-keying the bags at least every ten layers (to remove bags from the stack, tart from the top row first).
- Do not store pipes and bars in racks that face main aisles to avoid creating a hazard to pedestrians.
- Stack and level lumber on solidly supported bracing.
- Remove all nails from used lumber before stacking.
- Paint walls or posts with stripes to indicate the maximum stacking heights for a quick reference.

Materials handling equipment operators should have some basic knowledge about safe and secure stacking, including:

- Store baled paper and rags inside a building no closer than 18 inches to the walls, partitions, or sprinkler heads.
- Band boxed materials or secure them with cross-ties or shrink plastic fiber.
- Stack drums, barrels, and kegs symmetrically.
- Block the bottom tiers of drums, barrels, and kegs to keep them from rolling if stored on their sides.
- Place planks, sheets of plywood dunnage, or pallets between each tier of drums, barrels, and kegs to make a firm, flat, stacking surface when stacking on end.
- Chock the bottom tier of drums, barrels, and kegs on each side to prevent shifting in either direction when stacking two or more tiers high.
- Stack and block poles as well as structural steel, bar stock, and other cylindrical materials to prevent spreading or tilting unless they are in racks.
- Observe height limitations when stacking all materials.

Storage racks

Industrial storage racks must be installed and maintained to avoid potential hazardous situations. And, while there is no detailed OSHA standard covering storage racks, OSHA has used the General Duty Clause (GDC) to hold employers responsible for rack safety. A search of GDC citations reveals the following expectations from OSHA:

- Load capacity ratings plaques should be installed according to ANSI MH 16.1-*Specification for the Design, Testing, and Utilization of Industrial Steel Storage Racks*, which is an industry standard available from the Rack Manufacturers Institute, Inc.
- Home-made racking should conform to MH 16.1. (OSHA says to have the design certified by a professional engineer.)
- The foot plates of every pallet rack column should be anchored per the manufacturer's instructions. (Also, the ANSI/RMI specification requires this.)
- Employers should follow rack manufacturer recommendations regarding proper storage, maintenance, and use.

Material-specific storing requirements

The following pages cover OSHA's General Industry requirements for stacking and storing specific materials. If you need more information, please see the regulation referenced with the topic.

Compressed gases - General requirements

§1910.101(b)

The in-plant handling, storage, and use of all compressed gases in cylinders, portable tanks, rail tank-cars, or motor vehicles cargo tanks must be done according to the Compressed Gas Association Pamphlet P-1-1965.

Flammable liquids

Flammable liquids
§1910.106(d), (e)

The General Industry standard at 1910.106 covers flammable liquids. It is a complex standard and covers many work environments and situations. The following cover basic storage requirements. Rules for heavier industrial applications, underground storage facilities; and for building tanks, containers, and other specialized items are not covered below; please see 1910.106 for additional information.

Definitions

Flammable liquid means any liquid having a flashpoint at or below 199.4 °F (93 °C). Flammable liquids are divided into "categories" (they used to be divided into "classes," but OSHA revised the standard in May 2012). The categories are:

- Category 1 include liquids having flashpoints below 73.4 °F (23 °C) and having a boiling point at or below 95 °F (35 °C).
- Category 2 include liquids having flashpoints below 73.4 °F (23 °C) and having a boiling point above 95 °F (35 °C).
- Category 3 include liquids having flashpoints at or above 73.4 °F (23 °C) and at or below 140 °F (60 °C). When a Category 3 liquid with a flashpoint at or above 100 °F (37.8 °C) is heated for use to within 30 °F (16.7 °C) of its flashpoint, it must be handled in accordance with the requirements for a Category 3 liquid with a flashpoint below 100 °F (37.8 °C).
- Category 4 include liquids having flashpoints above 140 °F (60 °C) and at or below 199.4 °F (93 °C). When a Category 4 flammable liquid is heated for use to within 30 °F (16.7 °C) of its flashpoint, it must be handled in accordance with the requirements for a Category 3 liquid with a flashpoint at or above 100 °F (37.8 °C).
- When liquid with a flashpoint greater than 199.4 °F (93 °C) is heated for use to within 30 °F (16.7 °C) of its flashpoint, it must be handled in accordance with the requirements for a Category 4 flammable liquid.

Storage

Table H-12 in 1910.106 specifies maximum allowable sizes for various types of containers. Section 1910.106(d)(2)(iii) has provisions for glass or plastic containers of up to one-gallon capacity for a category 1 or category 2 flammable liquid under specified conditions.

TABLE H-12 - Maximum allowable size of containers and portable tanks for flammable liquids				
Container type	**Category 1**	**Category 2**	**Category 3**	**Category 4**
Glass or approved plastic	1 pt	1 qt	1 gal	1 gal.
Metal (other than DOT drums)	1 gal	5 gal	5 gal	5 gal.
Safety cans	2 gal	5 gal	5 gal	5 gal.
Metal drums (DOT specifications)	60 gal	60 gal	60 gal	60 gal.
Approved portable tanks	660 gal	660 gal	660 gal	660 gal.

Storage cans

Storage cans, either plastic or metal, should be approved by the Department of Transportation (DOT) or a nationally recognized testing laboratory—they can be used for storage of five gallons or less.

Cabinets

Not more than 60 gallons of Category 1, 2, or 3 flammable liquids, nor more than 120 gallons of Category 4 flammable liquids may be stored in a storage cabinet. See additional requirements in 1910.106(d)(3). Label cabinets “Flammable, Keep Fire Away.” **Note:** Your state or local fire authority may limit the number of cabinets in each fire area. (A fire area is an area of a building separated from the remainder of the building by construction having a fire resistance of at least 1 hour and having all communicating openings properly protected by an assembly having a fire resistance rating of at least 1 hour.)

Inside buildings

Rules for storage of flammable liquids inside buildings vary depending on many factors, including category of the liquid, type of building, type of occupancy, protection in place (e.g., sprinklers), and types of containers. See 1910.106(d)(5) for more information.

Incidental inside storage

If you store or use flammable or combustible liquids that are incidental to the work or process (for example, automobile assembly, construction of electronic equipment, furniture manufacturing, or other similar activities) the following quantities apply when the material (opened or unopened) is not in a specially built storage room or cabinet. See 1910.106(e)(2).

- Category 1 — 25 gallons in containers
- Category 2, 3, or 4 — 120 gallons in containers
- Category 2, 3, or 4 — 660 gallons in a single portable tank.

Inside storage rooms

An inside storage room permits the storage of larger quantities of flammable and combustible liquids than other methods. See 1910.106(d)(4) for specific requirements for the design and construction of inside storage rooms. **Note**: The standard references NFPA standards that you must follow and cover wiring, ventilation, and the ways to configure stored containers.

Outdoor storage

Rules for storage of flammables and combustibles outside of buildings vary depending on the cateory of liquid, types of containers, amount stored, distance from streets and other property, and other factors. See 1910.106(d)(6).

Spray finishing

Spray finishing using flammable and combustible materials
§1910.107(g)(4)

Clothing storage

Spray finishing employees' clothing must not be left on the premises overnight, unless kept in metal lockers.

Explosives

The storage of explosives, §1910.109(c) does not apply to:

- Stocks of small arms ammunition, propellant-actuated power cartridges, small arms ammunition primers in quantities of less than 750,000, or of smokeless propellants in quantities less than 750 pounds;
- Explosive-actuated power devices when in quantities less than 50 pounds net weight of explosives;
- Fuse lighters and fuse igniters; and
- Safety fuses other than cordeau detonant fuses.

Explosives and blasting agents
§1910.109(c)(1) & (5); (g)(5); (i)(1)–(5)

General hazard

No person may store, handle, or transport explosives or blasting agents when such storage, handling, and transportation of explosives or blasting agents constitutes an undue hazard to life.

Storage of explosives

All Class A, Class B, Class C explosives, and special industrial expolosives, and any newly developed and unclassified explosives, must be kept in magazines which meet the requirements of §1910.109(c)(2)–(4).

Blasting caps, electric blasting caps, detonating primers, and primed cartidges may not be stored in the same magazine with other explosives. Ground around magazines must slope away for drainage. The land surrounding magazines has to be kept clear of brush, dried grass, leaves, and other materials for a distance of at least 25 feet.

Magazines must be of two classes:

1. Class I magazines and
2. Class II magazines.

Class I magazines are required where the quantity of explosives stored is more than 50 pounds. Class II magazines may be used where the quantity of explosives stored is 50 pounds or less.

Class I magazines must be located away from inhabited buildings, passenger railways, public highways, and from other magazines following the distances specified in Table H-21.

Table H-21—American table of distances for storage of explosives [1–5]

[As revised and approved by the Institute of Makers of Explosives, June 5, 1964]

Explosives		Distances in feet when storage is barricaded: Separation of magazines
Pounds over	Pounds not over	
2	5	6
5	10	8
10	20	10
20	30	11
30	40	12
40	50	14
50	75	15
75	100	16
100	125	18
125	150	19
150	200	21
200	250	23
250	300	24
300	400	27
400	500	29
500	600	31
600	700	32
700	800	33
800	900	35
900	1,000	36
1,000	1,200	39
1,200	1,400	41
1,400	1,600	43
1,600	1,800	44
1,800	2,000	45
2,000	2,500	49
2,500	3,000	52
3,000	4,000	58
4,000	5,000	61
5,000	6,000	65
6,000	7,000	68
7,000	8,000	72
8,000	9,000	75
9,000	10,000	78
10,000	12,000	82
12,000	14,000	87
14,000	16,000	90
16,000	18,000	94
18,000	20,000	98
20,000	25,000	105
25,000	30,000	112
30,000	35,000	119
35,000	40,000	124
40,000	45,000	129
45,000	50,000	135
50,000	55,000	140
55,000	60,000	145
60,000	65,000	150
65,000	70,000	155
70,000	75,000	160
75,000	80,000	165

Explosives		Distances in feet when storage is barricaded: Separation of magazines
Pounds over	Pounds not over	
80,000	85,000	170
85,000	90,000	175
90,000	95,000	180
95,000	100,000	185
100,000	110,000	195
110,000	120,000	205
120,000	130,000	215
130,000	140,000	225
140,000	150,000	235
150,000	160,000	245
160,000	170,000	255
170,000	180,000	265
180,000	190,000	275
190,000	200,000	285
200,000	210,000	295
210,000	230,000	315
230,000	250,000	335
250,000	275,000	360
275,000	300,000	385

[1]"Natural barricade" means natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the magazine when the trees are bare of leaves.

[2]"Artificial barricade" means an artificial mound or revetted wall of earth of a minimum thickness of three feet.

[3]"Barricaded" means that a building containing explosives is effectually screened from a magazine, building, railway, or highway, either by a natural barricade, or by an artificial barricade of such height that a straight line from the top of any side-wall of the building containing explosives to the eave line of any magazine, or building, or to a point 12 feet above the center of a railway or highway, will pass through such intervening natural or artificial barricade.

[4]When two or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways, and highways, and in addition, they should be separated from each other by not less than the distances shown for "Separation of Magazines," except that the quantity of explosives contained in cap magazines shall govern in regard to the spacing of said cap

magazines from magazines containing other explosives. If any two or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such two or more magazines, as a group, must be considered as one magazine, and the total quantity of explosives stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum of distances specified from other magazines, inhabited buildings, railways, and highways.

[5]This table applies only to the manufacture and permanent storage of commercial explosives. It is not applicable to transportation of explosives, or any handling or temporary storage necessary or incident thereto. It is not intended to apply to bombs, projectiles, or other heavily encased explosives.

Except as in §1910.109(c)(1)(viii), Class II magazines must be located according to Table H-21; but may be permitted in warehouses and in wholesale and retail establishments when located on a floor which has an entrance at outside grade level and the magazine is located not more than 10 feet from such an entrance.

Two Class II magazines may be located in the same building when one is used only for blasting caps in quantities not in excess of 5,000 caps and a distance of 10 feet is maintained between magazines.

When used for temporary storage at a site for blasting operations, Class II magazines must be located away from other magazines. A distance of at least one hundred and fifty (150) feet has to be maintained between Class II magazines and the work in progress when the quantity of explosives kept therein is in excess of 25 pounds, and at least 50 feet when the quantity of explosives is 25 pounds, or less.

Storage within magazines

- Packages of explosives must be laid flat with topside up.
- When stored in magazines with other explosives, black powder must be stored separately. Black powder stored in kegs must be stored on ends, bungs down, or on side, seams down.
- Corresponding grades and brands must be stored together in such a manner that brands and grade marks show. All stocks has to be stored so as to be easily counted and checked. Packages of explosives must be piled in a stable manner.
- When any kind of explosive is removed from a magazine for use, always take the oldest explosive of that particular kind first.

Packing and repacking explosives

- Packages of explosives must not be unpacked or repacked in a magazine nor within 50 feet of a magazine or in close proximity to other explosives.
- Tools used for opening packages of explosives must be constructed of nonsparking materials, except that metal slitters may be used for opening fiberboard boxes.
- A wood wedge and a fiber, rubber, or wood mallet must be used for opening or closing wood packages of explosives.
- Opened packages of explosives must be securely closed before being returned to a magazine.

Use of magazines

Magazines may not be used for the storage of any metal tools nor any commodity *except* explosives, but this restriction does not apply to the storage of blasting agents and blasting supplies.

Housekeeping

- Magazine floors must be regularly swept, kept clean, dry, free of grit, paper, empty used packages, and rubbish.
- Brooms and other cleaning utensils may not have any spark-producing metal parts. Sweepings from floors of magazines must be properly disposed of.
- Magazine floors stained with nitroglycerin must be cleaned according to instructions by the manufacturer.

Disposing explosives

When any explosive has deteriorated to an extent that it is in an unstable or dangerous condition, or if nitroglycerin leaks from any explosives, then the person in possession of such explosive must immediately proceed to destroy such explosive according to the instructions of the manufacturer. Only experienced persons are allowed to do the work of destroying explosives.

Repairs

When magazines need inside repairs, all explosives have to be removed and the floors cleaned. In making outside repairs, if there is a possibility of causing sparks or fire, the explosives must be removed from the magazine.

Explosives removed from a magazine under repair must either be placed in another magazine or placed a safe distance from the magazine where they are properly guarded and protected until repairs have been completed. Then they must be returned to the magazine.

Smoking

Smoking, matches, open flames, spark-producing devices, and firearms (except firearms carried by guards) must not be permitted inside of or within 50 feet of magazines. The land surrounding a magazine must be kept clear of all combustible materials for a distance of at least 25 feet. Combustible materials can not be stored within 50 feet of magazines.

Training

A competent person must be in charge of the magazines at all times. This person will be held responsible for the enforcement of all safety precautions.

Blasting misfires

Explosives recovered from blasting misfires shall be placed in a separate magazine until competent personnel has determined from the manufacturer the method of disposal. Caps recovered from blasting misfires shall not be reused. Such explosives and caps shall then be disposed of in the manner recommended by the manufacturer.

Storage of blasting agents and supplies

Blasting agents, excluding water gels, must be transported, stored, and used in the same manner as explosives, except as otherwise specified in §1910.109(g)(5)(i) - (vii). Water gels are covered in §1910.109(h).

Storage of ammonium nitrate

Except for the storage of ammonium nitrate and ammonium nitrate mixtures that are more sensitive than allowed by the “Definition of Test Procedures for Ammonium Nitrate Fertilizer,” §1910.109(i) applies to the storage of ammonium nitrate in the form of: crystals, flakes, grains, or prills including fertilizer grade, dynamite grade, nitrous oxide grade, technical grade, and other mixtures containing 60 percent or more ammonium nitrate by weight but does not apply to blasting agents.

Section 1910.109(i) does not apply to the transportation of ammonium nitrate or to storage under the jurisdiction of and in compliance with the regulations of the U.S. Coast Guard (see 46 CFR Parts 146–149).

The storage of ammonium nitrate and ammonium nitrate mixtures that are more sensitive than allowed by the “Definition of Test Procedures for Ammonium Nitrate Fertilizer” is prohibited.

The standards for ammonium nitrate (nitrous oxide grade) are those found in the "Specifictions, Properties, and Recommendations for Packaging, Transportation, Storage, and Use of Ammonium Nitrate," available from the Compressed Gas Association.

Section 1910.109(i) applies to all persons storing, having, or keeping ammonium nitrate, and to the owner or lessee of any building, premises, or structure in which ammonium nitrate is stored in quantities of 1,000 pounds or more. Approval of large quantity storage is subject to due consideration of the fire and explosion hazards, including exposure to toxic vapors from burning or decomposing ammonium nitrate.

Storage buildings must not have basements unless the basements are open on at least one side or be over one story in height. Storage buildings must have adequate ventilation or be of a construction that will be self-ventilating in the event of a fire.

The wall on the exposed side of a storage building within 50 feet of a combustible building, forest, piles of combustible materials and similar exposure hazards must be of fire-resistive construction. In lieu of the fire-resistive wall, other suitable means of exposure protection such as a free standing wall may be used. The roof coverings must be Class C or better.

All flooring in storage and handling areas must be of non-combustible material or protected against impregnation by ammonium nitrate. The floor must not have open drains, traps, tunnels, pits, or pockets into which any molten ammonium nitrate could flow and be confined in the event of fire.

The continued use of an existing storage building or structure not in strict conformity with §1910.109(i) may be approved in cases where continued use will not constitute a hazard to life. Buildings and structures must be dry and free from water seepage through the roof, walls, and floors.

Ammonium nitrate stored in bags, drums, or other containers

Bags and containers used for ammonium nitrate must comply with specifications and standards required for use in interstate commerce (see 49 CFR Chapter 1).

Containers used on the premises in the actual manufacturing or processing need not comply with provisions of §1910.109(i)(3)(i)(*a*).

Containers of ammonium nitrate must not be accepted for storage when the temperature of the ammonium nitrate exceeds 130°F. Bags of ammonium nitrate must not be stored within 30 inches of the storage building walls and partitions.

The height of piles can not exceed 20 feet. The width of piles can not exceed 20 feet and the length 50 feet; except that where the building is of noncombustible construction or is protected by automatic sprinklers, the length of piles will not be limited. In no case, can the ammonium nitrate be stacked closer than 36 inches below the roof or supporting and spreader beams overhead.

Aisles must be provided to separate piles by a clear space of not less than 3 feet in width. At least one service or main aisle in the storage area has to be not less than 4 feet in width.

Bulk ammonium nitrate storage

Warehouses must have adequate ventilation or be capable of adequate ventilation in case of fire. Unless constructed of noncombustible material or unless adequate facilities for fighting a roof fire are available, bulk storage structures must not exceed a height of 40 feet.

Bins must be clean and free of materials which may contaminate ammonium nitrate.

Due to the corrosive and reative properties of ammonium nitrate, and to avoid contamination, galvanized iron, copper, lead, and zinc must not be used in a bin construction unless suitably protected. Aluminum bins and wooden bins protected against impregnation by ammonium nitrate are permissible.

The partitions dividing the ammonium nitrate storage from other products which would contaminate the ammonium nitrate must be of tight construction. The ammonium nitrate storage bins or piles must be clearly identified by signs reading “Ammonium Nitrate” with letters at least 2 inches high.

Piles or bins must be so sized and arranged that all material in the pile is moved out periodically to minimize possible caking of the stored ammonium nitrate.

Height or depth of piles is limited by the pressure-setting tendency of the product. In no case can the ammonium nitrate be piled higher at any point than 36 inches below the roof or supporting spreader beams overhead.

Ammonium nitrate must not be accepted for storage when the temperature of the product exceeds 130°F. Dynamite, other explosives, and blasting agents must not be used to break up or loosen caked ammonium nitrate.

Contaminants

Ammonium nitrate must be in a separate building or be separated by approved firewalls of not less than 1 hour fire-resistance rating from storage of:

- Organic chemicals, acids, or other corrosive materials,
- Materials that may require blasting during processing or handling,
- Compressed flammable gases,
- Flammable and combustible materials or other contaminating substances, including but not limited to:
  - animal fats, baled cotton, baled rags, baled scrap paper, bleaching powder, burlap or cotton bags,
  - caustic soda, coal, coke, charcoal, cork, champhor, excelsior, fibers of any kind,
  - fish oils, fish meal, foam rubber, hay, lubricating oil, linseed oil, or other oxidizable or drying oils,
  - naphthalene, oakum, oiled clothing, oiled paper, oiled textiles,
  - paint, straw, sawdust, wood shavings, or vegetable oils.

Walls referred to in §1910.109(i)(5)(i)(*a*) need extend only to the underside of the roof. In lieu of separation walls, ammonium nitrate may be separated from the materials referred to in §1910.109(a) by a space of at least 30 feet.

Flammable liquids such as gasoline, kerosene, solvents, and light fuel oils must not be stored on the premises except when the storage conforms to §1910.106, and when walls and sills or curbs that meet the criteria of §1910.109(i)(5)(i) (*a*) or (*b*) are provided.

LP-Gas must not be stored on the premises except when the storage conforms to §1910.110. Sulfur and finely divided metals must not be stored in the same building with ammonium nitrate except when the storage conforms to §1910.109 (a) through (h).

Explosives and blasting agents must not be stored in the same building with ammonium nitrate except on the premises of makers, distributors, and user-compounders of explosives or blasting agents.

Where explosives or blasting agents are stored in separate buildings, other than on the premises of makers, distributors, and user-compounders of explosives or blasting agents, they must be separated from the ammonium nitrate by the distances and/or barricades specified in Table H-22 of §1910.109(g), but not less than 50 feet.

Storage and/or operations on the premises of makers, distributors, and user-compounders of explosives or blasting agents must conform with §1910.109 (a) through (h).

Liquified petroleum gases

Storage and handling of liquefied petroleum gases

§1910.110(b)(6); (f)(1)–(7)

Location of containers and regulating equipment

Containers and first stage regulating equipment, if used, must be located outside of buildings, except under one or more of the following:

- In buildings used exclusively for container charging, vaporization pressure reduction, gas mixing, gas manufacturing, or distribution.
- When portable use is necessary and according to §1910.110(c)(5).
- LP-Gas fueled stationary or portable engines according to §1910.110(e)(1) or (12).
- LP-Gas fueled industrial trucks used according to §1910.110(e)(13).
- LP-Gas fueled vehicles garaged according to §1910.110(e)(14).
- Containers awaiting use or resale when stored.

Individual containers must be located with respect to the nearest important building or group of buildings according to Table H-23.

Table H-23

Water capacity per container	Minimum distances		
	Containers		Between above ground containers
	Underground	Aboveground	
Less than 125 gals[1]	10 feet	None	None
125 to 250 gals	10 feet	10 feet	None
251 to 500 gals	10 feet	10 feet	3 feet
501 to 2,000 gals	25 feet[2]	25 feet[2]	3 feet
2,001 to 30,000 gals	50 feet	50 feet	5 feet
30,001 to 70,000 gals	50 feet	75 feet[3]	
70,001 to 90,000 gals	50 feet	100 feet[3]	

[1]If the aggregate water capacity of a multi-container installation at a consumer site is 501 gallons or greater, the minimum distance shall comply with the appropriate portion of this table, applying the aggregate capacity rather than the capacity per container. If more than one installation is made, each installation shall be separated from another installation by at least 25 feet. Do not apply the MINIMUM DISTANCES BETWEEN ABOVE-GROUND CONTAINERS to such installations.

[2]The above distance requirements may be reduced to not less than 10 feet for a single container of 1,200 gallons water capacity or less, providing such a container is at least 25 feet from any other LP-Gas container of more than 125 gallons

[3]1/4 water capacity. of sum of diameters of adjacent containers.

Containers installed for use must not be stacked one above the other. Readily ignitible material such as weeds and long dry grass must be removed within 10 feet of any container.

In the case of buildings devoted exclusively to gas manufacturing and distributing operations, the distances required by Table H-23 may be reduced provided that in no case must containers of water capacity exceeding 500 gallons be located closer than 10 feet to gas manufacturing and distributing buildings.

The minimum separation between liquefied petroleum gas containers and flammable liquid tanks must be 20 feet. The minimum separation between a container and the centerline of the dike must be 10 feet. This

provision does not apply when LP-Gas containers of 125 gallons or less capacity are installed adjacent to Class III flammable liquid tanks of 275 gallons or less capacity.

Suitable means must be taken to prevent the accumulation of flammable liquids under adjacent liquified petroleum gas containers, such as by diking, diversion curbs, or grading. When dikes are used with flammable liquid tanks, no liquified petroleum gas containers may be located within the diked area.

Storage of containers awaiting use or resale

Section 1910.110(f) applies to the storage of portable containers not in excess of 1,000 pounds water capacity, filled or partially filled, at user location but not connected for use, or in storage for resale by dealers or resellers. It does not apply to containers stored at charging plants or at plants devoted primarily to the storage and distribution of LP-Gas or other petroleum products.

Containers in storage must be located so as to minimize exposure to excessive temperature rise, physical damage, or tampering by unauthorized persons.

When stored inside, containers must not be located near exits, stairways, or in areas normally used or intended for the safe exit of people.

Container valves must be protected while in storage:

- By setting into the container recess to prevent the possibility of their being struck if the container is dropped upon a flat surface, or
- By ventilated cap or collar, fastened to container capable of withstanding a blow from any direction equivalent to that of a 30-pound weight dropped 4 feet. Construction must be such that a blow will not be transmitted to a valve or other connection.
- The outlet valves of containers in storage must be closed.
- Empty containers which have been in LP-Gas service when stored inside, have to be considered ″full containers″ for the purpose of determining the maximum quantity of LP-Gas permitted by §1910.110(f).

Storage within buildings not frequented by the public (such as industrial buildings)

The quantity of LP-Gas stored must not exceed 300 pounds (approximately 2,550 cubic feet in vapor form) except as provided in §1910.110(f)(5).

Containers carried as a part of service equipment on highway mobile vehicles are not to be considered in the total storage capacity in §1910.110(f)(4)(i) provided such vehicles are stored in private garages, and are limited to one container per vehicle with an LP-Gas capacity of not more than 100 pounds. All container valves must be closed.

Storage within special buildings or rooms

The quantity of LP-Gas stored in special buildings or rooms must not exceed 10,000 pounds.

The walls, floors, and ceilings of container storage rooms that are within or adjacent to other parts of the building have to be constructed of material having at least a 2-hour fire resistance rating. A portion of the exterior walls or roof having an area not less than 10 percent of that of the combined area of the enclosing walls and roof must be of explosion relieving construction.

Each opening from such storage rooms to other parts of the building must be protected by a 1½ hour fire door listed by a nationally recognized testing laboratory. Fixed electrical equipment must comply with §1910.110(b)(18).

Storage rooms must contain no open flames for heating or lighting. The rooms must be adequately ventilated both top and bottom to the outside only. The openings from the vents must be at least 5 feet away from any other opening into any building.

The floors of storage rooms must not be below ground level. Any space below the floor has to be of solid fill or properly ventilated to the open air. Storage rooms must not be located adjoining the line of property occupied by schools, churches, hospitals, athletic fields or other points of public gathering.

Storage outside of buildings

Containers must be in a suitable enclosure and protected against tampering. For containers awaiting use or resale, storage outside of buildings must be located according to Table H-33 with respect to:

- The nearest important building or group of buildings, and
- Busy thoroughfares.

Table H-33

Quantity of LP-Gas Stored	Distance
500 pounds or less	0
501 to 2,500 pounds	0[1]
2,501 to 6,000 pounds	10 feet
6,001 to 10,000 pounds	20 feet
Over 10,000 pounds	25 feet

[1]Container or containers shall be at least 10 feet from any building on adjoining property, any sidewalk, or any of the exposures described in §1910.110(f)(6)(i) (c) or (d) of this paragraph.

Fire protection

Storage locations other than supply depots separated and located apart from dealer, reseller, or user establishments must be provided with at least one approved portable fire extinguisher having a minimum rating of 8-B, C.

Dipping and coating operations

Special dipping and coating operations

§1910.126(g)(6)

Use fences, rails, or guards made of conducting material and adequately grounded to separate paint-detearing operations from storage areas and from personnel.

Handling materials

General requirements

§1910.176(a)–(c)

Where mechanical handling equipment is used, sufficient safe clearances must be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways must be kept clear and in good repair, with no obstructions across or in aisles that could create a hazard. Mark permanent aisles and passageways.

Stored materials should not create a hazard. Bags, containers, and bundles stored in tiers must be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.

Keep storage areas free from accumulated materials that would present hazards from tripping, fire, explosion, or harboring pests. Control vegetation when necessary.

Sawmills

Sawmills

§1910.265(c)(27); (d)(2)

Lumber piling and storage

When stacking units of lumber, pile foundations must be designed and arranged to support maximum loads without sinking, sagging, or permitting the piles to topple. In unit package piles, place substantial bolsters or unit separators between each package directly over the stickers.

Long units of lumber must not be stacked on shorter packages, except where a stable pile can be made with the use of package separators. Unstable piles of lumber must immediately be made safe, or the area into which they might fall must be fenced or barricaded and employees prohibited from entering it.

Unit packages of lumber must be provided with stickers as necessary to insure stability under ordinary operating conditions. The stickers must extend the full width of the package, be uniformly spaced, and aligned one above the other. Stickers may be lapped with a minimum overlapping of 12 inches. They can not protrude more than 2 inches beyond the sides of the package.

The height of unit package piles is dependent on the dimensions of the packages and provides stability under normal operating conditions. Adjacent lumber piles may be tied together with separators to increase stability.

Log unloading and storage areas

Log dumps, booms, ponds, or storage areas used at night must be illuminated according to the requirements of ANSI A11.1-1965 (R-1970), Standard Practice for Industrial Lighting.

Log unloading areas must be arranged and maintained to provide a safe working area. Where skids are used, space adequate to clear a worker's body has to be maintained between the top of the skids and the ground.

Post signs prohibiting unauthorized foot or vehicle traffic in log unloading and storage areas.

Logging operations

Tree harvesting

§1910.266(h)(6); (7) & (8)

Loading and unloading

Transport vehicles must be positioned to provide working clearance between the vehicle and the deck. Only the machine operator and other essential personnel can be in the loading or unloading work area during this operation.

No transport vehicle operator can remain in the cab during the loading/unloading operations when logs are carried or moved over the truck cab, unless the employer can demonstrate that it is necessary. If the operator remains in the truck cab, the cab must be reinforced or some other means of protection must be provided.

Each log must be placed on the transport vehicle in an orderly manner and tightly secured. Position the load to prevent slippage or loss during handling and transport.

Each stake and chock which is used to trip loads must be constructed so that the tripping mechanism is activated on the side opposite the load release.

Tie downs must be left in place over the peak log to secure all logs until the unloading lines or other equivalent protection has been put in place. A stake of sufficient strength to withstand the forces of shifting or moving logs would be considered equivalent protection provided that the logs are not loaded higher than the stake.

Each tie down can be released only from the side on which the unloading machine operates, except:

- When the tie down is released by a remote control device, and
- When the employee making the release is protected by racks, stanchions, or similar devices.

Transport

The transport vehicle operator must assure that each tie down is tight before transporting the load. While enroute, the operator has to check and tighten the tie downs whenever there is reason to believe that the tie downs have loosened or the load has shifted.

Storage

Each deck must be constructed and located so that it is stable and provides each employee with enough room to safely move and work in the area.

Reserved

OSHA COMPLIANCE MANUAL

PERSONAL PROTECTIVE EQUIPMENT

OSHA COMPLIANCE MANUAL

Reserved

Personal protective equipment

Introduction

While personal protective equipment is part of the job in some industries — such as face shields for welding — as a rule, it is considered a last-resort, temporary type of protection. For normal operations, first choice will always be given to eliminating the hazard in the environment rather than using PPE. This is called implementing engineering controls.

No single combination of protective equipment and clothing is capable of protecting against all hazards. Thus, PPE should be used 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, mobility, and communication.

In general, the greater the level of PPE protection, the greater are the associated risks. For any given situation, equipment and clothing should be selected that provide an adequate level of protection. Over-protection as well as under-protection can be hazardous and should be avoided.

Using PPE improperly or in a manner unsuited to its design and purpose is worse than using no protection at all. Without any protection, the worker knows he is vulnerable and perhaps, takes precautions. With some protection, the worker may rashly blunder into severe difficulty, thinking he is safe.

Develop a PPE program

Management dedicated to the safety and health of employees should use that evaluation to set a standard operating procedure for personnel, then train those employees to use, maintain, and clean the equipment to protect themselves against those hazards.

A written PPE program should be established for the workplace. The two basic objectives of any PPE program should be to protect the wearer from safety and health hazards, and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE.

To accomplish these goals, a comprehensive PPE program should include:

- Hazard assessment of the workplace,
- Medical monitoring,
- Environmental surveillance,
- Selection, use, maintenance, and decontamination of PPE, and
- Employee training.

Program review and evaluation

Review your PPE program at least annually. Elements to review include:

- The number of person-hours that workers wear various protective ensembles,
- Accidents and illness experience,
- Levels of exposure,
- Adequacy of equipment selection,
- Adequacy of the operational guidelines,
- Adequacy and effectiveness of training and fitting elements,
- Coordination with overall safety and health program,

- The adequacy of program records,
- Program costs, and
- Recommendation for program improvement and modification.

The results of the program evaluation should be made available to employees and presented to top management so that program adaptations may be implemented.

Exactly what is PPE?

Personal protective equipment includes all clothing and accessories designed to create a barrier against workplace hazards. The basic element of any personal protective equipment management program is an in-depth evaluation of the equipment needed to protect against the job hazards.

Much of the personal protective equipment information in this chapter is framed in general terms and is intended to complement relevant regulations and manufacturers' requirements. For more specific information, refer to the OSHA standards, industry consensus standards and best practices cited.

Employees need to understand at the outset that their lives may well depend upon the proper use of the equipment.

Wearing personal protective equipment requires hazard awareness and training on the part of the user. Employees must be aware that the equipment does not eliminate the hazard. If the equipment fails, exposure will occur. To reduce the possibility of failure, equipment has to be properly fitted and maintained in a clean and serviceable condition.

Selection of the proper PPE for the job is important. Employers and employees needs to understand the equipment's purpose and its limitations. The equipment must not be altered or removed even though an employee may find it uncomfortable. (Sometimes equipment may be uncomfortable simply because it does not fit properly.) Work procedures should be instituted making it a violation (resulting in termination) to modify or refuse to wear the equipment.

Hazard assessment and employee training

§1910.132(d), (e), (f)

In April of 1994 OSHA issued a rule updating the PPE standard to reflect current technology and improvements in personal protective equipment and to add provisions requiring employers to assess their workplaces for hazards and train their employees in the use of the protective equipment. OSHA estimated that the new standard will provide improved protection in 1.1 million work establishments covering 11.7 million employees. Upgrades in eye, face, head, foot and new hand requirements became effective July 5, 1994 and hazard assessment and training requirements on October 5, 1994. Guidance in conducting a hazard assessment of the workplace and selecting personal protective equipment is also provided.

The workplace must be assessed to determine if hazards are present which necessitate the use of PPE. The employer has to verify that the assessment has been completed through a written certification:

- Identifing the workplace,
- Identifing the person certifying that the evaluation has been performed,
- Listing the date of the assessment, and
- Containing a statement which identifies the document as certification of hazard assessment.

If it is determined that hazards are present, the employer has to select protective equipment for employees and communicate the selection decisions to them.

Hazard assessment

PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound manufacturing practices.

It is necessary to consider certain general guidelines for assessing the foot, head, eye and face, and hand hazard situations that exist in an occupational or educational operation or process, and to match the protective devices to the particular hazard. It should be the responsibility of the safety officer to exercise common sense and appropriate expertise to accomplish these tasks.

Assessment guidelines

OSHA requires you to conduct a walk-through survey of the areas in question to identify sources of hazards. These dangerous situations may include:

- Sources of motion;
- Sources of high temperatures;
- Types of chemical exposures;
- Sources of harmful dust or light radiation;
- Sources of falling objects or potential for dropping objects;
- Sources of sharp objects which might pierce the feet or cut the hands and rolling or pinching objects which could crush the feet;
- The layout of workplace and location of coworkers; and
- Any electrical hazards.

Following the walk-through survey, organize the data to prepare an analysis of the hazards to enable proper selection of protective equipment. When you analyze the data, be sure to include an estimate of the potential for injuries. Review each of the basic hazards and determine the type, level of risk, and seriousness of potential injury from each of the hazards found in the area. Also consider the possibility of exposure to several hazards simultaneously.

Selection guidelines

After completing the hazard assessment, the general PPE selection involves:

1. Becoming familiar with the potential hazards and the type of protective equipment that is available, and what it can do;
2. Comparing the hazards associated with the environment;
3. Selecting the protective equipment which ensures a level of protection greater than the minimum required to protect employees from the hazards; and
4. Fitting the user with the protective device and give instructions on care and use of the PPE. It is very important that the users be made aware of all warning labels for and limitations of their PPE.

Give careful consideration to comfort and fit. PPE that fits poorly will not provide adequate protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes.

Make adjustments on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Take particular care in fitting devices for eye protection against dust and chemical splashes. In addition, a properly fitted helmet is important to ensure that it will not fall off during work operations.

It is the responsibility of the employer or safety officer to reassess the workplace hazard situation as necessary, to identify and evaluate new equipment and processes, to review accident records, and reevaluate the suitability of previously selected PPE.

Employee training

Provide training for each employee who is required to use personal protective equipment. Training should include:

- When PPE is necessary;
- What PPE is necessary;
- How to wear PPE;
- Its limitations; and
- The proper care, maintenance, useful life, and disposal of the PPE.

Employees have to demonstrate an understanding of the training and the ability to use the PPE properly before being allowed to perform work requiring the use of the equipment.

If you have reason to believe an employee doesn't have the necessary understanding or skill, you have to retrain. Circumstances where retraining may be required include:

- Changes in the workplace,
- Changes in the types of PPE to be used, or
- Inadequacies in an employee's knowledge or use of the assigned PPE which indicates that the employee doesn't have the necessary understanding or skills.

You must certify in writing that each employee has received and understands the training.

Cleaning and maintenance

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection.

It is also important to ensure that contaminated PPE, which cannot be decontaminated, is disposed of in a manner that protects employees from exposure to hazards.

This chapter discusses those types of personal protective equipment most commonly used for protection of the head, including eyes and ears; the torso; arms and hands; and feet. The use of equipment to protect against life-threatening hazards is also discussed.

Employer-paid PPE

§1910.132(h)

In November 2007, OSHA issued its final rule on employer-paid personal protective equipment. Under the rule, all PPE, with few exceptions, must be provided at no cost to employees. According to OSHA, employers currently pay for 95 percent of employee PPE. But, when employees are responsible to pay for their own PPE, they:

- Are likely to purchase the wrong equipment,
- May use the PPE beyond its expected service life, or
- May avoid purchasing the equipment at all.

When employers pay for PPE, they are more likely to select the right PPE for the hazards present in their workplaces. OSHA has also found that when employers pay for PPE, they make sure the equipment is maintained and replaced as necessary, and generally take more responsibility for PPE selection and use.

Who's covered?

The new rule, which OSHA first proposed in March 1999, affects most of the agency's PPE standards, including Parts:

- 1910 General Industry,
- 1926 Construction,
- 1915 Shipyards,
- 1917 Marine terminals, and
- 1918 Longshoring.

The regulatory text is almost the same for each of the industries. There are only small changes from one industry to the next. For example, the exception for logging boots in the general industry standard is not found in the construction or shipyard standards.

What's covered?

The rule adds a new paragraph, §1910.132(h), to the General Requirements section of the Personal Protective Equipment rule. It addresses only the issue of who pays for PPE. It does not require employers to provide PPE where none has been required before, such as payment for uniforms, caps, or other clothing worn solely to identify a person as an employee.

Additionally, it does not require payment for items worn:

- To keep employees clean for purposes unrelated to safety or health such as blue jeans, aprons or other apparel, when worn solely to prevent clothing and/or skin from becoming soiled; and
- For product safety, consumer safety, or patient safety and health, rather than employee safety and health such as requiring food service employees to wear hairnets for food safety purposes.

The following information describes the employer's responsibilities for paying for personal protective equipment used in the workplace.

Pay for required PPE: 1910.132(h)(1)

Payment is required for any PPE used by an employee to comply with any one of the PPE requirements throughout OSHA's standards. If the PPE is not required, then the employer doesn't have to pay for it. When an employer selects a specific type of PPE to be used at the workplace to comply with a standard, the employer is required to pay for it.

Safety shoes and glasses: 1910.132(h)(2)

The employer is not required to pay for non-specialty safety-toe protective footwear (including steel-toe shoes or steel-toe boots) and non-specialty prescription safety eyewear, provided that the employer permits these items to be worn off the worksite.

If the employer requires employees to keep non-specialty safety-toe protective footwear and non-specialty prescription safety eyewear at the workplace, the employer must pay for the items.

In cases where safety-toe protective footwear (including steel-toe shoes or steel-toe boots) and prescription safety eyewear are non-standard "specialty" items, the employer must pay for them. For example, prescription eyeglass inserts for full-facepiece respirators and non-skid shoes for floor strippers are specialty items, so payment will be required.

Metatarsal protection: 1910.132(h)(3)

OSHA allows employers to use metatarsal guards or footwear with built-in metatarsal protection when metatarsal protection is needed in the workplace. If the employer *requires* employees to wear metatarsal shoes or boots, the employer has to pay for the footwear.

However, when the employer provides metatarsal guards and allows the employee, at his or her request, to use shoes or boots with built-in metatarsal protection, the employer is not required to pay for the metatarsal shoes or boots.

Employers may contribute to the cost of metatarsal shoes or boots. Some employers currently offer their employees a choice between using a metatarsal guard provided and paid for by the employer or a metatarsal shoe or boot with some portion of the cost of the shoe or boot paid for by the employer, essentially establishing an allowance system. OSHA believes this to be an acceptable practice.

Logging boots and everyday clothing: 1910.132(h)(4)

OSHA does not require the employer to pay for the logging boots required by §1910.266(d)(1)(v). The logging standard exempts these boots and subparagraph (h)(4) reflects that exemption.

Employers are not required to pay for everyday clothing, such as long-sleeve shirts, long pants, street shoes, and normal work boots. This exception applies even when the employer requires employees to use these items, and the clothing provides protection from a workplace hazard.

Similarly, employers are not required to pay for ordinary clothing, skin creams, or other items used solely for protection from weather, such as:

- Winter coats, jackets, gloves, parkas;
- Rubber boots, hats, raincoats; and
- Ordinary sunglasses and sunscreen.

If ordinary weather gear does not provide sufficient protection and special equipment or extraordinary clothing is needed to protect the employee from unusually severe weather conditions, the employer is required to pay for the protection.

Clothing used to protect employees from artificial heat or cold is not part of this exception. For example, employees working in a freezer warehouse may need heavy coats and the employer is required to pay for this protection.

Replacement PPE: 1910.132(h)(5)

Employers must pay for replacement PPE, except when the employee has lost or intentionally damaged the PPE. The new rule does not address how often PPE is to be replaced. Replacement is determined by each standard that requires the PPE.

Employee-owned equipment: 1910.132(h)(6)

Where an employee provides adequate protective equipment which he or she owns and brings to the worksite, the employer may allow the employee to use it and is not required to reimburse the employee for that equipment. However, the employer may not require an employee to provide or pay for his or her own PPE, unless there is an exception in the rule.

Tools of trade

In some industries, employees traditionally supply their own PPE, especially when the employees frequently move from job to job. This part of the rule recognizes these traditions and does not require employers to pay for PPE in this situation. However:

- The employee's use of his or her own PPE must be completely voluntary.

- The employee can withdraw use of his or her own PPE at any time.
- If the employer allows an employee to use PPE they already own, the employer is still responsible for making sure the PPE is adequate, properly maintained, and sanitary, under the applicable PPE standard.

Enforcement deadline: 1910.132(h)(7)

The last provision in the rule provides an enforcement deadline for employers to change their existing PPE payment policies. The rule went into effect on February 13, 2008 and the PPE payment requirements must be implemented no later than May 15, 2008.

Head protection §1910.135

Head injuries are usually caused by the impact and penetration of falling or flying objects, or by bumping against a fixed object. Injuries also occur when workers' unprotected heads come in contact with exposed electrical conductors. Wearing a protective helmet lessens the chance of a serious head injury when objects such as small tools, pieces of wood, stones, or sparks from overhead work come in contact with the head.

Preventing head injuries is an important factor in every safety program. A survey by the Bureau of Labor Statistics (BLS) of accidents and injuries noted that most workers who suffered impact injuries to the head were not wearing head protection. The majority of those workers were injured while performing their normal jobs at their regular worksites.

The BLS survey showed that most employers of people injured did not require workers to wear head protection. Of those wearing hard hats, all but five percent indicated that they were required by their employers to wear them. It was found that the vast majority who wore them all or most of the time at work felt that hard hats were practical in their jobs.

Identification, then elimination or control of a hazard that could lead to an accident, is the first step to take. However, many accidents that cause head injuries are difficult to anticipate and control. Where hazardous situations exist, the employer must provide head protection to eliminate injury. The best practice to follow is, wherever the potential for dangerous conditions exists, wear head protection.

Types of head protection

Head injuries are caused by falling or flying objects, or by bumping the head against a fixed object. Head protection, in the form of a protective helmet, must do two things — resist penetration and absorb the shock of a blow. This is achieved by making the helmet's shell of a material hard enough to resist the blow, and by using a shock-absorbing lining made up of a headband and crown straps to keep the shell away from the wearer's skull. The outer shell will:

- Absorb the force of impact,
- Deflect falling or flying items,
- Prevent sharp objects from penetrating the skull, and
- Protect the front, sides, and back of the head.

The shock-absorbing lining forms a suspension system consisting of a headband and crown straps that hold the suspension system to the shell. This system spreads the force of impact over a wider area of the head.

All materials that come in contact with the wearer's head must be non-irritating to normal skin. Observe all manufacturer's instructions regarding precautions and limitations of the helmets you choose.

Helmet markings

While OSHA's head protection standard does not spell out the criteria that protective helmets must meet to provide maximum protection, it does require that helmets conform to the performance criteria of the American National Standard, ANSI Z89.1.

This industry consensus standard describes the types and classes, materials, performance requirements, and tests that manufacturers have to meet to ensure that their helmets provide adequate protection. Each helmet must be marked with the following information:

- Name and/or identification mark of the manufacturer;
- Date of manufacture;
- ANSI designation;
- Type and class designation; and
- Appropriate headband size range.

If any of this information is missing or obliterated, the helmet should not be worn.

Head protection must comply with any of the following consensus standards:

- ANSI Z89.1–2009, *American National Standard for Industrial Head Protection*,
- ANSI Z89.1–2003, *American National Standard for Industrial Head Protection*, or
- ANSI Z89.1–1997, *American National Standard for Industrial Head Protection*.

These industry standards should be consulted for details.

Helmet types and classes

The most recent editions of the ANSI head protection standards (1997 and later) classify head protection as Type 1 and Type 2 and use three classes (G, E, and C) based on electrical class. (Earlier editions used Class A, B, and C designations.)

Types and classes-ANSI Z89.1-1997 (and later editions)

Type	Impact
1	Helmets intended to reduce the force of impact resulting from a blow only to the top of the head.
2	Helmets intended to reduce the force of impact resulting from a blow which may be received off center or to the top of the head.

Electrical class	Protective helmet
G (General)	Class G helmets are intended to reduce the danger of contact exposure to low voltage conductors. Test samples are prooftested at 2,200 volts (phase to ground). However, this voltage is not intended as an indication of the voltage at which the helmet protects the wearer.
E (Electrical)	Class E helmets are intended to reduce the danger of exposure to high voltage conductors. Test samples are proof-tested at 20,000 volts (phase to ground). However, this voltage is not intended as an indication of the voltage at which the helmet protects the wearer.
C (Conductive)	Class C helmets are not intended to provide protection against contact with electrical conductors.

Care and maintenance

Clean the shell with hot water and a mild detergent, then rinse with clear water. When the helmet is dry, check for signs of cracks, penetration, or other damage due to rough treatment or wear. It's a good idea to inspect the helmet daily, or prior to each use. If the helmet is damaged, it should not be worn.

Consult the manufacturer before painting a helmet shell or using a solvent to clean it. Some paints and solvents may damage the shell and reduce its protective level.

Holes should never be drilled or punched in a helmet shell for ventilation. This only serves to reduce the helmet's ability to sustain impact. Class E helmets must never have holes drilled in the shell or any added accessory that contains metal.

Do not store a safety helmet on the rear window shelf of a vehicle. Overexposure to ultraviolet light such as sunlight and extreme heat may cause the shell to deteriorate.

A snug fitting helmet liner can be worn to protect the head, ears, and neck in cold weather.

Eye and face protection §1910.133

Employees have to use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. Eye protection with side protectors is required where there is a hazard from flying objects. Workers who wear contact lenses must wear eye protection over the lenses. Eye and face PPE has to be distinctly marked to identify the manufacturer. Filtered lenses should always be the appropriate shade number for the work being performed.

Protective eye and face protection devices must comply with any of the following consensus standards:

- ANSI Z87.1–2003, *American National Standard Practice for Occupational and Educational Eye and Face Protection*,
- ANSI Z87.1–1989 (R–1998), *American National Standard Practice for Occupational and Educational Eye and Face Protection*, or
- ANSI Z87.1–1989, *American National Standard Practice for Occupational and Educational Eye and Face Protection*.

Eye and face protective equipment is required by OSHA where there is a reasonable probability of preventable injury when such equipment is used. Provide a type of protector suitable for work to be performed and ensure that employees use the protectors. This applies to supervisors, management personnel, and should apply to visitors while they are in hazardous areas.

A BLS study found that about 60 percent of workers who suffered eye injuries were not wearing eye protective equipment. When asked why they were not wearing face protection at the time of the accident, workers indicated that face protection was not normally used or practiced in their type of work, or it was not required for the type of work performed at the time of the accident.

Provide suitable eye protectors where machines or operations present the hazard of flying objects, glare, liquids, injurious radiation, or a combination of these hazards. Protectors have to meet the following minimum requirements:

- Provide adequate protection against particular hazards for which they are designed;
- Be reasonably comfortable when worn under the designated conditions;
- Fit snugly without interfering with the movements or vision of the wearer;
- Be durable;
- Be capable of being disinfected;
- Be easily cleanable; and
- Be kept clean and in good repair.

The National Society to Prevent Blindness recommends that emergency eyewashes be placed in all hazardous locations. First aid instructions should be posted close to such potential danger spots since any delay to immediate aid or an early mistake in dealing with an eye injury can result in lasting damage.

Selection

Each eye, face, or face-and-eye protector is designed for a particular hazard. In selecting the protector, consider the kind and degree of hazard. Where there is a choice of protectors and the degree of protection required is not an important issue, worker comfort may be a deciding factor. The BLS survey showed that few workers ever complained about poor vision or discomfort with personal eye equipment.

Persons using corrective spectacles and those who are required by OSHA to wear eye protection must wear face shields, goggles, or spectacles of one of the following types:

- Spectacles with protective lenses providing optical correction;
- Goggles worn over corrective spectacles without disturbing the adjustment of the spectacles; or
- Goggles that incorporate corrective lenses mounted behind the protective lenses.

When limitations or precautions are indicated by the manufacturer, they should be transmitted to the user and strictly observed.

Over the years many types and styles of eye and face-and-eye protective equipment have been developed to meet the demands for protection against a variety of hazards.

Goggles come in a number of different styles:

- Eyecups,
- Flexible or cushioned goggles,
- Plastic eyeshield goggles, and
- Foundrymen's goggles.

Goggles are manufactured in several styles for specific uses such as protecting against dust and splash, and in chipper's, welder's, and cutter's models.

Safety spectacles require special frames. Combinations of normal streetwear frames with safety lenses do not provide adequate protection and are not in compliance.

Many hard hats and nonrigid helmets are designed with face and eye protective equipment.

Face shields versus safety glasses and goggles

Face shields are intended to protect the entire face or portions of it from impact hazards such as flying fragments, objects, large chips, and particles. It is important to note, however, that when worn alone, face shields **do not** protect employees from impact hazards. OSHA says that face shields should only be used in combination with safety spectacles or goggles, even in the absence of dust or potential splashes, for additional protection beyond that offered by spectacles or goggles alone.

Face shield windows are made with different transparent materials and in varying degrees or levels of thickness. These levels should correspond with specific tasks. Window and headgear devices are available in various combinations to enable the worker to select the appropriate equipment

Fitting

Fitting of goggles and safety spectacles should be done by someone skilled in the procedure. Prescription safety spectacles should be fitted only by qualified optical personnel.

Inspection and maintenance

It is essential that the lenses of eye protectors be kept clean. Continuous vision through dirty lenses can cause eye strain — often an excuse for not wearing the eye protectors. Daily inspection and cleaning of the eye protector with soap and hot water, or with a cleaning solution and tissue, is recommended.

Pitted lenses, like dirty lenses, can be a source of reduced vision and should be replaced. Deep scratches or excessively pitted lenses are apt to break more readily.

Slack, worn-out, sweat-soaked, or twisted headbands do not hold the eye protector in proper position. Visual inspection can determine when the headband elasticity is reduced to a point beyond proper function.

Goggles should be kept in a case when not in use. Spectacles, in particular, should be given the same care as one's own glasses, since the frame, nose pads, and temples can be damaged by rough usage.

Personal protective equipment which has been previously used should be disinfected before being issued to another employee. Even when each employee is assigned protective equipment for extended periods, it is recommended that such equipment be cleaned and disinfected regularly.

Several methods for disinfecting eye-protective equipment are acceptable. The most effective method is to disassemble the goggles or spectacles and thoroughly clean all parts with soap and warm water. OSHA recommends that employers:

- Carefully rinse all traces of soap, and replace defective parts with new ones.
- Swab thoroughly or completely immerse all parts for 10 minutes in a solution of germicidal deodorant fungicide.
- Remove parts from solution and suspend in a clean place for air drying at room temperature or with heated air.
- Do not rinse after removing parts from the solution because this will remove the germicidal residue which retains its effectiveness after drying.

The dry parts or items should be placed in a clean, dust-proof container, such as a box, bag, or plastic envelope, to protect them until reissue.

Eye and face protection selection chart

Source	Assessment of hazard	Protection
Impact — Chipping, grinding machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding.	Flying fragments, objects, large chips, particles sand, dirt, etc.	Spectacles with side protection, goggles, face shields. See notes (1), (3), (5), (6), (10). For severe exposure, use faceshield.
Heat — Furnace operations, pouring, casting, hot dipping, and welding.	Hot sparks	Faceshields, goggles, spectacles with side protection. For severe exposure use faceshield. See notes (1), (2), (3).
	Splash from molten metals	Faceshields worn over goggles. See notes (1), (2), (3).
	High temperature exposure	Screen face shields, reflective face shields. See notes (1), (2), (3).
Chemicals — Acid and chemicals handling, degreasing plating.	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield. See notes (3), (11).
	Irritating mists	Special-purpose goggles.
Dust — Woodworking, buffing, general dusty conditions.	Nuisance dust	Goggles, eyecup and cover types. See note (8).

Eye and face protection selection chart, Continued

Source	Assessment of hazard	Protection
Light and/or radiation —		
Welding: Electric arc	Optical radiation	Welding helmets or welding shields. Typical shades: 10–14. See notes (9), (12).
Welding: Gas	Optical radiation	Welding goggles or welding faceshield. Typical shades: gas welding 4–8, cutting 3–6, brazing 3–4. See note (9).
Cutting, torch brazing, torch soldering	Optical radiation	Spectacles or welding faceshield. Typical shades, 1.5–3. See notes (3), (9).
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable. See notes (9), (10).

Notes to eye and face protection selection chart:
(1) Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.
(2) Operations involving heat may also involve light radiation. As required by the standard, protection from both hazards must be provided.
(3) Faceshields should only be worn over primary eye protection (spectacles or goggles).
(4) As required by the standard, filter lenses must meet the requirements for shade designations in §1910.133(a)(5). Tinted and shaded lenses are *not* filter lenses unless they are marked or identified as such.
(5) As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.
(6) Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
(7) Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.
(8) Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.
(9) Welding helmets or faceshields should be used only over primary eye protection (spectacles or goggles).
(10) Non-sideshield spectacles are available for frontal protection only, but are not acceptable eye protection for the sources and operations listed for "impact."
(11) Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.
(12) Protection from light radiation is directly related to filter lens density. See note (4). Select the darkest shade that allows task performance.

Hearing protection

§1910.95

Exposure to high noise levels can cause hearing loss or impairment. It can create physical and psychological stress. There is no cure for noise-induced hearing loss, so the prevention of excessive noise expossure is the only way to avoid hearing damage. Specifically designed protection is required, depending on the type of noise encountered.

Preformed or molded ear plugs should be individually fitted by a professional. Waxed cotton, foam, or fiberglass wool earplugs are self-forming. When properly inserted, they work as well as most molded earplugs.

Some earplugs are disposable, to be used one time and then thrown away. The non-disposable type should be cleaned after each use for proper protection. Plain cotton is ineffective as protection against hazardous noise.

Earmuffs need to make a perfect seal around the ear to be effective. Glasses, long sideburns, long hair, and facial movements, such as chewing, can reduce protection. Special equipment is available for use with glasses or beards.

For extremely noisy situations, earplugs should be worn in addition to earmuffs. When used together ear-plugs and earmuffs change the nature of sounds; all sounds are reduced including one's own voice, but other voices or warning signals are easier to hear.

Maintenance

Disposable and reusable earplugs:

- Wash hands and inspect plugs before insertion;
- Wash reusable plugs daily and store in a clean case;
- Replace plugs that are hard or discolored as soon as possible;
- Make sure the plug fits properly inside the ear canal. If done correctly, the wearer's voice will sound louder to him/her; and
- With headband plugs, do not bend or twist the band.

Earmuffs:

- Check cushions with each use and wash them as needed; and
- Ensure that there is a tight fit as loose muffs will not reduce the noise.

Torso protection

Many hazards can threaten the torso:

- Heat,
- Splashes from hot metals and liquids,
- Impacts and cuts,
- Acids, and
- Radiation.

A variety of protective clothing is available, including vests, jackets, aprons, coveralls, and full body suits.

Selection

Wool and specially treated cotton are two natural fibers which are fire-resistant and comfortable since they adapt well to changing workplace temperatures.

Duck, a closely-woven cotton fabric, is good for light duty protective clothing. It can protect against cuts and bruises on jobs where employees handle heavy, sharp, or rough material.

Heat-reflecting clothing such as leather is often used to guard against dry heat and flame. Rubber and rubberized fabrics, neoprene, and plastics give protection against some acids and chemicals.

Disposable suits of paper-like material are particularly important for protection from dusty materials or materials that can splash. If the substance is extremely toxic, a completely enclosed suit may be necessary. The clothing should be inspected to assure proper fit and function for continued protection.

Hand protection

§1910.138

Select and require employees to use appropriate hand protection when their hands are exposed to hazards such as:

- Skin absorption of harmful substances,
- Severe cuts or lacerations,
- Severe abrasions,
- Punctures,

- Chemical burns,
- Thermal burns, and
- Harmful temperature extremes.

Base your selection of the appropriate hand protection on the performance characteristics of the hand protection relative to the tasks to be performed, conditions present, duration of use, and the hazards and potential hazards identified.

Gloves are often relied on to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. But, there is no one glove that provides protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it's important to select the most appropriate glove for a particular application, determine how long it can be worn, and whether it can be reused.

It is also important to know the performance characteristics of gloves relative to the specific hazard. These performance characteristics should be assessed by using standard test procedures. Before purchasing gloves, request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated.

Other factors to be considered for glove selection include:

- Replacement: As long as the performance characteristics are acceptable, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types.
- Work activities: Study how the employee performs job tasks to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stresses that will be applied.

When selecting gloves for protection against chemical hazards:

- Determine the toxic properties of the chemical(s);
- Generally, any "chemical resistant" glove can be used for dry powders;
- For mixtures and formulated products (unless specific test data is available), select a glove on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials; and
- Be sure employees can remove the gloves in such a way as to prevent skin contamination.

Maintenance

Teach employees to wash hands often to prevent a build-up of sweat and dirt. It's this combination that can cause skin irritation for the glove wearer. Check gloves for cracks and holes, especially at the tips and between the fingers and replace worn or damaged gloves promptly. Keep gloves clean and dry as much as practical and it's a good idean to keep a spare pair of gloves for unexpected damage or loss.

Other types of hand protection

Finger cots that protect a single finger or fingertip.

Mitts with two divisions, one for the thumb and another for the fingers.

Thimbles that protect the thumb or the thumb and first two fingers.

Hand pads that protect the palm of the hand from cuts, friction, and burns from hot objects. These can't be used when manual dexterity is required.

Sleeves or forearm cuffs protect the arms and wrists from heat, splashing liquids, impact, and cuts.

Hand lotions and barrier creams are best used with gloves or finger protection and should not be considered a substitute for gloves.

Protection factors

Type of glove	Protection
Rubber	Acids, bases, caustics, solvents, diluted-water solutions of chemicals, alcohol — high resistance to cuts
Canvas or cloth	Dirt, wood slivers, sharp edges
Metal mesh	High resistance to cuts and scratches
Insulated	Electrical charges
Heat-resistant	Heat and flames
Lead-lined	Radiation
Hypo-allergenic and powder-free	Skin problems in workers with allergies
Cuffed	Liquids trickling down into the glove
Nitrile (synthetic rubber)	Oils, many solvents, esters, grease and animal fat — high resistance to cuts and abrasions
Neoprene	Broad range of chemicals, oils, acids, caustics and solvents — less resistant to cuts, punctures and abrasions than nitrile
Polyvinyl chlorine (PVC)	Acids, caustics, alkalis, bases and alcohol — good abrasion and cut resistance (some types are susceptible to cuts)
Polyvinyl alcohol (PVA)	Aromatics, chlorinated solvents, esters and most ketones — resists cuts, punctures and abrasion (PVA breaks down when exposed to water and light alcohol)
Ethylene vinyl alcohol (EVOH) also called flat film gloves	Highly resistant to chemicals and hazardous materials — little resistance to cuts and tears (usually worn as a liner under PVC or nitrile gloves)
Butyl	Acetone and dimethyl formamide — not useful against cuts, punctures, and abrasions
Vitron	Benzene, methylene chloride and carbon disulfide — little resistance to cuts, punctures, and abrasions

Electrical protective equipment

§1910.137

In January of 1994, OSHA issued a rule revising the electrical protective equipment requirements in its general industry standards. The current standards for design of such equipment adopt several national consensus standards by reference. The revision replaces the incorporation of these out-of-date consensus standards with a set of up-to-date performance-oriented requirements.

Rubber protective equipment for electrical workers must conform to the requirements established by the American Society for Testing and Materials (ASME) as specified in the following list:

Rubber insulating gloves..... ASTM D120-87
Rubber insulating matting..... ASTM D178-93 (or D178-88)
Rubber insulating blankets..... ASTM D1048-93 (or D1048-88a)
Rubber insulating covers..... ASTM D1049-93 (or D1049-88)
Rubber insulating line hose..... ASTM D105-90
Rubber insulating sleeves ..... ASTM D1051-87

Foot protection

§1910.136

Employees have to wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where employees' feet are exposed to electrical hazards. In the foot protection standard, OSHA requires that safety shoes and boots must meet the protective criteria defined in any of the following consensus standards:

- ASTM F–2412–2005, *Standard Test Methods for Foot Protection* and ASTM F–2413–2005, *Standard Specification for Performance Requirements for Protective Footwear*, or
- ANSI Z41–1999, *American National Standard for Personal Protection—Protective Footwear*, or
- ANSI Z41–1991, *American National Standard for Personal Protection—Protective Footwear*.

Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts, or heavy tools which could be dropped, and for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and heavy pipes, all of which could potentially roll over employees' feet. Safety shoes or boots with puncture protection would be required where sharp objects could be stepped on, causing a foot injury.

According to the BLS survey, most of the workers in selected occupations who suffered impact injuries to the feet were not wearing protective footwear. Furthermore, most of their employers did not require them to wear safety shoes. The typical foot injury was caused by objects falling less than four feet and the median weight was about 65 pounds. Again, most workers were injured while performing their normal job activities at their worksites.

For protection of feet and legs from falling or rolling objects, sharp objects, molten metal, hot surfaces, and wet slippery surfaces workers should use appropriate footguards, safety shoes, or boots and leggings.

Aluminum alloy, fiberglass, or galvanized steel footguards can be worn over usual workshoes, although they present the possibility of catching on something and tripping workers. Heat-resistant soled shoes protect against hot surfaces like those found in the roofing, paving, and hot metal industries.

Leggings protect the lower leg and feet from molten metal or welding sparks. Safety snaps permit their rapid removal.

Other foot and leg protection

Other options for protective footwear include:

- Shoes and boots with instep protection;
- Insulated boots for protection against extreme temperatures;
- Boots with built-in ankle protection;
- Rubber or plastic safety boots that are effective against water, oil, acids, corrosives, and chemicals;
- Foundry shoes with elastic gores rather than laces to provide easy removal in case sparks or hot metal get inside; and
- Add-on protections such as metatarsal guards, shoe covers, rubber spats, strap-on cleats, and puncture-proof steel inserts.

Aluminum alloy, fiberglass, or galvanized steel footguards can be worn over usual workshoes, although they present the possibility of catching on something and tripping workers.

Heat-resistant soled shoes protect against hot surfaces like those found in the roofing, paving, and hot metal industries.

Leggings protect the lower leg and feet from molten metal or welding sparks. Safety snaps permit their rapid removal.

General life-threatening hazards

Water protection

A Coast Guard-approved life jacket or buoyant work vest should be used if there is danger of falling into water while working. For emergency rescue operations, boats and ring buoys with at least 90 feet of line must be provided.

Visibility

Night workers and flagmen who might be struck by moving vehicles need suits or vests designed to reflect light.

Lifelines and safety nets

In jobs involving potential fall hazards, lifelines, body harnesses, and/or lanyards must be used. If lifelines are used where they might be cut accidentally, they should be padded or otherwise protected. Rope should have a strength of 5,400 pounds. Lifelines should be inspected regularly to assure their perfect condition.

Lanyards should be of at least ½-inch nylon or the equivalent and should be short enough to allow a fall no greater than six feet. They must be firmly secured above the working surface. Body harnesses are required for personal fall arrest systems.

Nets should be used when a lifeline or a body harness is not practical. Forged steel, safety hooks, or shackles should be used to fasten a net to its supports. The mesh should be no larger than 6″ x 6″ and the nets should extend beyond the edge of the work surface. Safety nets must be tested to ensure that they are tight enough to prevent an employee from making contact with any surface or structure below.

Heat stress

Wearing PPE puts a worker at considerable risk of developing heat stress. This can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker.

Individuals vary in their susceptibility to heat stress. Factors that may predispose someone to heat stress include:

- Lack of physical fitness, lack of acclimatization, age,
- Dehydration, obesity, substance abuse, infection,
- Sunburn, diarrhea, and chronic disease.

Reduced work tolerance and the increased risk of excessive heat stress is directly influenced by the amount and type of PPE worn. PPE adds weight and bulk, severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure.

When selecting PPE, each item's benefit should be carefully evaluated in relation to its potential for increasing the risk of heat stress. Once PPE is selected, the safe duration of work/rest periods should be determined based on the:

- Anticipated work rate,
- Ambient temperature and other environmental factors,
- Type of protective ensemble, and
- Individual worker characteristics and fitness.

Physical condition

Physical fitness is a major factor influencing a person's ability to perform work under heat stress. The more fit someone is, the more work he/she can safely perform.

At a given level of work, a fit person, relative to an unfit person, will have:

- Less physiological strain;
- A lower heart rate;
- A lower body temperature, which indicates less retained body heat (a rise in internal temperature precipitates heat injury);
- A more efficient sweating mechanism;
- Slightly lower oxygen consumption; and
- Slightly lower carbon dioxide production.

Level of acclimatization

The degree to which a worker's body has physiologically adjusted or acclimatized to working under hot conditions affects his or her ability to do work. Acclimatized individuals generally have lower heart rates and body temperatures than unacclimatized individuals, and sweat sooner and more profusely.

This enables them to maintain lower skin and body temperatures at a given level of environmental heat and work loads than unacclimatized workers. Sweat composition also becomes more dilute with acclimatization, which reduces bone loss.

Cold environments

People who work in cold temperatures such as freezer plants, meat-packing houses, cold storage facilities, lumbering, telecommunications, and electric utilities must deal with cold environments. The frequency of worker accidents is higher in cold environments because nerve impulses are inhibited and hands can stiffen and become clumsy. Temperature-related safety problems include ice, snow blindness, reflections from snow, and burns from skin contact with cold metal surfaces.

The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness or metal, inadequate clothing, age, and general health. Contributing physical conditions include allergies, vascular disease, excessive smoking and drinking, sedative drugs, and some medicines. Cold disorders are classified as "generalized" as in hypothermia or "localized" such as frostbite.

Generalized: Hypothermia

Exposure to cold can cause the body's internal temperature to drop to a dangerously low level. This condition is known as hypothermia. It can occur at temperatures above freezing. Cold, wet, windy conditions are ideal for causing hypothermia.

- Uncontrollable shivering;
- Sensation of cold;
- Inability to use the hands;
- Vague, slow, or slurred speech;
- Memory lapses or forgetfulness;
- Frequent stumbling; and
- Incoherence and drowsiness.

Localized: Frostbite

Frostbite occurs when the body extremities do not receive sufficient heat, either because of poor circulation or inadequate insulation. Body tissue which freezes due to exposure to extremely low temperatures results in tissue damage. The most vulnerable body parts include the nose, cheeks, ears, fingers, and toes.

- Sensation of coldness, followed by numbness
- Skin becomes bright red, then small patches of white appear as freezing actually occurs;
- A tingling, stinging, or aching feeling may follow;
- Skin becomes less elastic;
- Initial pain is felt, which subsides; and
- Blisters may appear.

Frostnip occurs when the face or extremities are exposed to a cold wind which causes the skin to turn white.

Evaluating work conditions

The effects of cold temperatures on workers can be reduced through appropriate protective clothing, heating units, and other protective devices such as:

- Heated warming shelter at work site.
- General or spot heating to increase workplace temperature.
- Warm air jets or radiant heaters to warm the hands of employees performing fine hand work.
- Shields for job site protection from wind and drafts.
- Metal tool handles and control bars should be covered with insulating material.
- Appropriate and adequate clothing worn by workers. Dirty or greasy fabric looses much of its insulation value. Clothing should be cotton or wool, denim has poor insulating qualities. Boots, mittens or gloves should be insulated and face and head protection should be worn.
- Chemical-resistant gloves should be available for chemical handling operations.

Evaluating the facility

Buildings should be evaluated for adequate protection from cold weather. Cold weather damage most often occurs in exposed, out-of-the-way areas of a facility during weekends or other shutdown periods. Failure to identify areas likely to be susceptible to cold weather damage and improper maintenance also contribute to cold weather damage.

Personal protective equipment (PPE) program

While OSHA's Personal Protective Equipment standard does not explicitly require a written PPE program, _____ has developed this document to establish our PPE safety plan and specify the protective equipment necessary to protect our employees in instances where the work-related hazards of their jobs cannot be eliminated.

The safety and health manager is the program coordinator, acting as the representative of the plant manager, who has overall responsibility for the program. The safety and health manager will designate appropriate plant supervisors to assist in training employees and monitoring their use of PPE. This written plan is kept in _____. _____ will review and update the program as necessary. Copies of this program may be obtained from _____.

Our company believes it is our obligation to provide a hazard free environment to our employees. Any employee encountering hazardous conditions must be protected against the potential hazards. The purpose of protective clothing and equipment (PPE) is to shield or isolate individuals from chemical, physical, biological, or other hazards that may be present in the workplace. (See separate documents for respiratory protection and hearing conservation programs.)

Establishing an overall written PPE program detailing how employees use PPE makes it easier to ensure that they use PPE properly in the workplace and document our PPE efforts in the event of an OSHA inspection. _____ PPE program covers:

- Purpose,
- Hazard assessment,
- PPE selection,
- Employee training,
- Cleaning and maintenance of PPE, and
- PPE specific information.

We encourage all suggestions to this document because we are committed to the success of our Personal Protective Equipment Program. We strive for clear understanding, safe behavior, and involvement in the program from every level of the company.

Program's purpose

The basic element of any PPE program is an in depth evaluation of the equipment needed to protect against the hazards at the workplace; this is the initial hazard assessment for which written documentation is required. Two basic objectives of any PPE program should be to protect the wearer from incorrect use and/or malfunction of PPE.

The purpose of this Personal Protective Equipment (PPE) Program is to document the hazard assessment, protective measures in place, and PPE in use at this company. PPE devices are not to be relied on as the only means to provide protection against hazards, but are used in conjunction with guards, engineering controls, and sound manufacturing practices. If possible, hazards will be abated first through engineering controls, with PPE to provide protection against hazards that cannot reasonably be abated otherwise.

Hazard assessment

To assess the need for PPE, the following steps are taken:

1. The Safety Manager, _____, with other appropriate employees _____, identifies job classifications where exposures occur or could occur. The following records are used to identify and rank jobs according to exposure hazards:

   - Injury/illness records and workers' compensation claims
   - First aid logs and near-miss records

2. The Safety Manager conducts a walk-through survey of areas where hazards exist or may exist to identify hazard sources. The basic hazard categories assessed are:

   - Impact
   - Heat or extreme cold
   - Penetration
   - Harmful dust
   - Compression (roll over)
   - Light (optical) radiation
   - Chemical
   - Electrical

   During the walk-through, the Safety Manager observes and records the following hazards along with PPE currently in use (type and purpose):

   - Sources of motion; i.e., machinery or processes where any movement of tools, machine elements or particles could exist, or movement of personnel that could result in collision with stationary objects: _____.
   - Sources of high temperatures that could result in burns, eye injury or ignition of protective equipment: _____.
   - Types of chemical exposures: _____.
   - Sources of harmful dust: _____.
   - Sources of light radiation, i.e., welding, brazing, cutting, furnaces, heat treating, high intensity lights: _____.
   - Sources of falling objects or potential for dropping objects: _____.
   - Sources of sharp objects that might pierce the feet or cut the hands: _____.
   - Sources of rolling or pinching objects that could crush the feet: _____.
   - Layout of workplace and location of coworkers: _____.
   - Electrical hazards such as electric shock or burns from electric arcs, blasts, or heat: _____.

3. Following the walk-through survey, the Safety Manager organizes the data and information used in the hazard assessment to enable proper selection of protective equipment.
4. An estimate of the potential for injuries is made. Each of the basic hazards is reviewed and a determination made as to the frequency, type, level of risk, and seriousness of potential injury from each of the hazards found. The existence of any situations where multiple exposures occur or could occur is evaluated.
5. The Safety Manager documents the hazard assessment with a written certification that identifies the workplace areas evaluated, the person certifying that the evaluation has been performed, the date(s) of the hazard assessment, and that the document is a certification of hazard assessment.

Selection guidelines

Once hazards have been identified and evaluated, the general procedure for selecting protective equipment is to:

1. Become familiar with the potential hazards and the type of protective equipment (PPE) that is available.
2. Compare equipment to the hazards associated with the work environment.
3. Select the PPE that meets selection requirements found in the OSHA regulations and ensures a level of protection greater than the minimum required to protect employees from the hazards.
4. Fit the user with proper, comfortable, well fitting protection and instruct employees on care and use of the PPE. It is very important that the users are aware of all warning labels for and limitations of their PPE.

   It is the responsibility of the Safety Manager to repeat the assessment as necessary, to identify and evaluate new equipment and processes, to review accident records, and reevaluate the suitability of previously selected PPE. This reassessment will take place as needed, but at least _____ (i.e., annually).

Elements that should be considered in the reassessment include:

- Adequacy of PPE program;
- Accidents and illness experience;
- Levels of exposure (this implies appropriate exposure monitoring);
- Adequacy of equipment selection;
- Number of person hours that workers wear various protective ensembles;
- Adequacy of training/fitting of PPE;
- Program costs;
- The adequacy of program records;
- Recommendation for program improvement and modification; and
- Coordination with overall safety and health program.

Employee training

The Safety Manager/supervisor provides training for each employee who is required to use personal protective equipment. Training includes:

- When PPE is necessary,
- What PPE is necessary,

- How to wear assigned PPE,
- Limitations of PPE, and
- The proper care, maintenance, useful life, and disposal of assigned PPE.

Employees must demonstrate an understanding of the training and the ability to use the PPE properly before they are allowed to perform work requiring the use of the equipment.

Employees are prohibited from performing work without donning appropriate PPE to protect them from the hazards they will encounter in the course of that work.

If the Safety Manager has reason to believe an employee does not have the understanding or skill required, the employee must be retrained. Since an employee's supervisor is in the best position to observe any problems with PPE use by individual employees, the Safety Manager will seek this person's input when making this decision. Circumstances where retraining may be required include changes in the workplace or changes in the types of PPE to be used, which would render previous training obsolete. Also, inadequacies in an affected employee's knowledge or use of the assigned PPE, which indicates that the employee has not retained the necessary understanding or skills, would require retraining.

The Safety Manager certifies in writing that the employee has received and understands the PPE training.

Because failure to comply with company policy concerning PPE can result in OSHA citations and fines as well as employee injury, an employee who does not comply with this program will be disciplined for noncompliance as follows:

- Verbal warning for the first offense accompanied by retraining;
- Written reprimand for the second offense that goes in the employee's permanent record;
- Suspension without pay for a third offense and documentation in the permanent record; and
- Dismissal as a last resort.

Cleaning and maintenance

It is important that all PPE be kept clean and properly maintained by the employee to whom it is assigned. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. PPE is to be inspected, cleaned, and maintained by employees at regular intervals as part of their normal job duties so that the PPE provides the requisite protection.

Supervisors are responsible for ensuring compliance with cleaning responsibilities by employees. If PPE is for general use, the Safety Manager has responsibility for cleaning and maintenance procedures. If a piece of PPE is in need of repair or replacement it is the responsibility of the employee to bring it to the immediate attention of his or her supervisor or the Safety Manager. It is against work rules to use PPE that is in disrepair or not able to perform its intended function. Contaminated PPE that cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

PPE specific information

Eye and face protection — Goggles and face shields

It is the policy of the company that as a condition of employment, all regular full time, part time, and temporary employees working in designated work areas and/or job assignments are required to wear ANSI-approved goggles/face shields to help prevent eye and face injuries, including those resulting from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or light radiation, for example. Employees in the following designated work areas are required to wear goggles/face shields:

- Work area: _____.

- Hazard: _____.
- Type of goggles/face shield: _____.

Employees from temporary work agencies and contractors are required to wear goggles/face shields if assigned to job tasks in the designated work areas. All supervisors and managers are responsible for ensuring employees under their charge are in compliance with this policy.

All employees who work in designated work areas and/or job assignments are responsible for wearing company provided goggles/face shields to comply with this policy. Failure to comply will result in disciplinary action up to and including discharge.

All employees required to wear goggles/face shields must routinely inspect and properly care for their goggles/face shields.

Foot protection — Safety shoes and foot protectors

It is the policy of this company that as a condition of employment, all regular full time, part time, and temporary employees working in designated work areas and/or job assignments are required to wear safety shoes to help prevent foot injuries, ankle injuries, slips, and falls.

Employees in the following designated work areas are required to wear ANSI or ASTM-approved safety shoes or safety shoes that have been demonstrated to be equally effective:

- Work area: _____.
- Hazard: _____.
- Type of safety shoe/foot protection: _____.

Employees from temporary work agencies and contractors are required to wear foot protection if assigned to job tasks in the designated work areas. It is the responsibility of the agency and/or contractor to ensure the employee reports to his/her temporary assignment at this company wearing approved safety shoes.

Those employees who work in non-designated areas of the company and vendors and visitors will be allowed to walk through the designated work areas without safety shoes as long as they remain in outlined aisles or walkways.

Members of the Emergency Response Team are required to wear safety footwear when responding to fire emergency situations. Safety footwear is provided by the company for those associates who do not work in the designated work areas within the company. All supervisors and managers are responsible for ensuring their associates are in compliance with this policy.

All employees who work in designated work areas and/or job assignments are responsible for purchasing and wearing foot protection to comply with this policy. Failure to comply will result in disciplinary action up to and including discharge. Purchase of foot protection is done by _____.

The Safety Manager is responsible for the selection and implementation of an on site shoe-mobile vendor once each fiscal year. He also coordinates and addresses any shoe/foot protection complaints, returns, or replacements for employees.

Human Resources is responsible for informing new employees who are assigned to the designated work areas of the safety shoe/foot protection policy and the procedures for obtaining the equipment. The new employee is responsible for reporting to his/her first day of work wearing approved shoes/foot protectors.

Hand protection — Gloves

It is the policy of the company that as a condition of employment, all regular full time, part time, and temporary employees working in designated work areas and/or job assignments are required to wear gloves to help prevent hand injuries, from cuts, burns, cold, and chemical exposures.

Employees in the following designated work areas are required to wear protective gloves:

- Work area: _____.
- Hazard: _____.
- Type of glove: _____.

Employees from temporary work agencies and contractors are required to wear protective gloves if assigned to job tasks in the designated work areas. All supervisors and managers are responsible for ensuring employees under their charge are in compliance with this policy.

All employees who work in designated work areas and/or job assignments are responsible for wearing company provided gloves to comply with this policy. Failure to comply will result in disciplinary action up to and including discharge.

All employees required to wear protective gloves must routinely inspect and properly care for their assigned gloves (if the gloves are not disposable).

Head protection — Helmets

It is the policy of the company that as a condition of employment, all regular full time, part time, and temporary employees working in designated work areas and/or job assignments are required to wear ANSI approved hard hats to help prevent head injuries, including those resulting from falling objects, bumping the head against a fixed object, or electrical shock.

Employees in the following designated work areas are required to wear helmets:

- Work area: _____.
- Hazard: _____.
- Type of helmet: _____.

Employees from temporary work agencies and contractors are required to wear helmets if assigned to job tasks in the designated work areas. All supervisors and managers are responsible for ensuring employees under their charge are in compliance with this policy.

All employees who work in designated work areas and/or job assignments are responsible for wearing company provided helmets to comply with this policy. Failure to comply will result in disciplinary action up to and including discharge.

All employees required to wear protective helmets must routinely inspect and properly care for the equipment.

As appendices to this program, we have attached copies of hazard assessments, equipment evaluations, and other documents to support our Personal Protective Equipment Program.

Respiratory protection

Hazards to the lungs are not always easy to detect. Some of the most common hazards are the lack of oxygen and the presence of harmful dust, fogs, smokes, mists, fumes, gases, vapors, or sprays including substances that may cause cancer, lung impairment, other diseases, or death. In these instances, respiratory protection is necessary to prevent these harmful substances from entering the lungs during breathing. Some respirators

contain filters to catch and contain the contaminants while others provide a separate supply of breathable air so work can be performed where there is inadequate oxygen, or where greater protection is needed.

Eliminating or reducing atmospheric hazards through engineering controls is the first step an employer should take, such as enclosing or confining the contaminant-producing operation, exhausting the contaminant, or substituting a chemical with a less toxic material. However, in instances where effective engineering controls are not feasible, while those controls are being installed, or during clean-up operations, appropriate respiratory protection must be provided to exposed employees.

The employer needs to understand that the respirators do have limitations and are not substitutes for effective engineering controls or work practices. Where respirators are necessary for health protection, a specific written plan and procedures are necessary to ensure the effectiveness of the equipment and the safety of the employees using it.

Employers are responsible for establishing an effective respirator program — different hazards require different respirators — and employees are responsible for wearing the respirators and complying with their employer's program.

A program administrator should be responsible for the overall program. This person must know enough about respirators to supervise the program properly. In large companies, the respirator program should be administered through a company department such as industrial hygiene, in-house medical department, or safety engineering. In small companies without specialists, a trained and qualified individual such as an upper-level superintendent or safety engineer should serve as program administrator.

The program should stress thorough training for all participants, especially the users who need to wear the respirators. Employees need to understand that the equipment does not eliminate the hazard. If the equipment fails, overexposure will occur. To reduce the possibility of failure, the equipment has to fit properly and be maintained in a clean and serviceable condition.

It's imperative that employers and employees understand the equipment's purpose and its limitations. Employees wearing respirators must be aware that the protective equipment can't be altered or removed, even for a short time, despite the fact that it may be uncomfortable.

An effective respirator program should include the following elements:

- Procedures for selecting NIOSH-approved respirators;
- Medical evaluations for respirator users;
- Fit testing for tight-fitting respirators;
- Procedures for proper use of respirators in routine and emergency situations;
- Procedures for cleaning, disinfecting, storing, inspecting, repairing, discarding, and maintaining respirators;
- Procedures to ensure adequate air quality and quantity;
- Employee training in the respiratory hazards to which they may be exposed;
- Employee training in respirator use, limitations, and maintenance; and
- Procedures for evaluating the program.

Written operating procedures

In workplaces where respirators are used in potentially hazardous atmospheres, employers are required to have worksite-specific *written* operating procedures to ensure that employees use the respirators safely and properly. Users have to be familiar with these procedures and with the respirators and their limitations.

Voluntary-use dust mask respirators

OSHA considers NIOSH-certified single-use disposable dust masks to be air-purifying respirators (APRs). The Respiratory Protection standard's definition refers to these dust masks as "filtering facepieces" and defines them as negative pressure particulate respirators with a filter that is an integral part of the facepiece or with the entire facepiece composed of the filter medium. An example would be a NIOSH approved N95 dust mask.

In the requirements for a respiratory protection program at 1910.134(c)(2)(ii), OSHA states that employers are not required to include in a written respiratory protection program "those employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks)." When there are no atmospheric hazards that mandate respirator use and employees choose to wear respirators voluntarily, the employer is required to provide them with the information contained in Appendix D of the Respiratory Protection standard, "Information for employees using respirators when not required under the standard." Document that you have provided these voluntary users with the Appendix D information as proof that you have complied with this OSHA requirement.

If an employee chooses to wear a dust mask voluntarily in a worksite environment where there are no atmospheric hazards necessitating the equipment, you are not required to conduct medical evaluations or fit testing.

Voluntary-use elastomeric respirators

Tight-fitting respirators may also be worn on a voluntary basis. If the voluntary-use respirators are elastomeric (tight-fitting) respirators, then the employer needs to:

- Provide the information in Appendix D of the Respiratory Protection Standard;
- Provide a medical evaluation;
- Provide training on procedures for cleaning, disinfecting, storing, repairing, removing from service or discarding, and otherwise maintaining respirators; and
- Set up schedules for these elements, according to the regulation.

Fit testing is not required for any type of voluntary-use respirators because there are no atmospheric hazards to necessitate protection.

Documenting procedures

The exact form of the written procedures can vary widely. The large user who has many workers wearing respirators and, perhaps, several respiratory hazards to consider, may develop separate procedures for selection and use of respirators for each hazard.

For a small user, who has only a few workers to protect from only one or very few hazards, a simplified version may suffice; but it must cover the same subjects. In general, the complexity of the procedures increases as respirator use increases. The procedures also become more extensive as the toxicity of the respiratory hazard(s) increases, demanding better and more reliable protection. It is better to be overly detailed in developing written operating procedures than not detailed enough.

Assigning respirators

When practical, a respirator should be assigned to each worker for exclusive use, and should be permanently marked to indicate to whom it is assigned. Care should be taken to ensure that the marking does not affect the respirator performance. If possible, records should be kept on the issuance and use of each respirator. To do so, each respirator needs to be permanently identified. Include the date of initial issue, the dates of reissue, and a listing of repairs on each respirator record.

Emergency situations

Particularly important are procedures for respirator use during emergencies such as fire, toxic material spills, accidental releases of a potentially lethal substance, or failure of a ventilation system. Consider all possible emergencies and document preparation for them in the written procedure. In the stress of an emergency, memories may be faulty. Furthermore, these emergency procedures should be used in training emergency response teams.

Program evaluation

Evaluate the effectiveness of your company's respirator program as necessary and modify the operating procedures to reflect the evaluation results. Using a labor-management team may be effective for the periodic evaluation.

Selecting the right respirator

Choosing the right equipment involves several steps:

1. Determining the hazard is and its severity,
2. Choosing appropriate equipment that is NIOSH-certified, and
3. Considering user factors that affect respirator performance and reliability.

Chemical and physical properties of the contaminant, as well as the toxicity and concentration of the hazardous material and the amount of oxygen present, need to be considered in selecting the appropriate respirators. Additional selection factors to consider include:

- Nature and extent of the hazard,
- Work rate,
- Area to be covered,
- Mobility,
- Work requirements and conditions, and
- Limitations and characteristics of the available respirators.

Respirator types

There are two basic classes of respirators: air-purifying and air-supplying.

1. *Air-purifying respirators* use filters or sorbents to remove harmful substances from the air. They range from simple disposable masks to sophisticated powered air-purifying respirators. Air-purifying respirators do not supply oxygen and cannot be used in oxygen-deficient atmospheres or in those that are immediately dangerous to life or health (IDLH).
2. *Air-supplying respirators* are designed to provide breathable air from a clean air source other than the surrounding contaminated atmosphere. They range from supplied-air respirators and self-contained breathing apparatus (SCBAs) to complete air-supplied suits.

The time needed to perform a given task, including the time necessary to enter and leave a contaminated area, is one factor that determines the type of respiratory protection needed.

Examples

An SCBA, gas mask, or air-purifying chemical-cartridge respirator provides respiratory protection for relatively short periods; while a type of atmosphere-supplying respirator that supplies breathable air from an air compressor through an air line can provide protection for extended periods of time.

Particulate filter air-purifying respirators can provide protection for long periods without the need of filter replacement only if the total concentration of atmospheric particulates is low. Where there are higher concentrations of contaminants, however, an atmosphere-supplying respirator such as the positive pressure supplied-air respirator (SAR) offers the advantage of better protection and longer duration.

SARs also avoid the need to be concerned about the sensory warning properties of the airborne toxic materials, a factor that has to be considered when using air-purifying respirators. These respirators also cause less discomfort than air-purifying respirators because the wearer need not overcome filter resistance when inhaling.

Air-purifying respirators present minimal interference with the wearer's movement, while atmosphere-supplying respirators may restrict movement and present potential hazards.

Examples

SARs with their trailing hoses can limit the area the wearer can cover and may present a potential hazard where the trailing hose can come into contact with machinery. Similarly, an SCBA — a respirator that includes a back-mounted, compressed-air cylinder — presents both size and weight restrictions. This may inhibit climbing and moving in tight places. Carrying the added weight of an air cylinder also presents an additional physical burden.

Airflow

Another factor to consider when using respirators is the air-supply rates. The wearer's work rate determines the volume of air breathed per minute. The volume of air supplied to meet the breathing requirements is significant when using atmosphere-supplying respirators such as self-contained and air-line respirators that use cylinders because this volume determines their operating life. The useful service life of these respirators under even moderate working conditions may be significantly less than under conditions of rest.

The peak airflow rate is also important in the use of a constant-flow SAR. The air-supply rate should always be greater than the maximum amount of air being inhaled in order to maintain the respiratory enclosure under positive pressure.

Higher breathing resistance of air-purifying respirators under conditions of heavy work may result in distressed breathing. A person working in an area of high temperature or humidity is under stress. Additional stress resulting from respirator use should be minimized by using one with minimal weight and minimal breathing resistance when these can be fitted properly to the wearer.

End-of-service-life

Some type of warning on the remaining service life is available for all SCBAs and for some chemical canister respirators. This may be a pressure gauge or timer with an audible alarm for SCBAs or a color end-of-service-life indicator on the cartridge or canister. The user should understand the operation and limitations of each type of warning device. Most other gas masks and chemical-cartridge respirators have no indicator for remaining service life. It is important that new canisters and cartridges be used at the beginning of each work shift.

Respirator selection

This table presents a simplified version of characteristics and factors used for respirator selection. It does not specify the contaminant concentrations or particle size. Some OSHA substance-specific standards include more detailed information on respirator selection.

Hazard	Respirator
1. Oxygen deficiency	
Immediately dangerous to life or health (IDLH)*	Any positive-pressure SCBA or combination positive-pressure SAR with auxiliary self-contained air supply.
Not immediately dangerous to life or health	Any positive-pressure SCBA or supplied-air respirator.
2. Gas and vapor contaminants	
Immediately dangerous to life or health (IDLH)*	Positive-pressure SCBA or combination positive-pressure SAR with auxiliary self-contained air supply.
Not immediately dangerous to life or health	Any positive-pressure SAR, gas mask, or chemical cartridge respirator.
3. Particulate contaminants	Any positive-pressure SAR including abrasive blasting respirator, or powered air-purifying respirator equipped with high-efficiency filters, or any air-purifying respirator with a specific particulate filter.
4. Gaseous and particulate contaminants	
Immediately dangerous to life or health (IDLH)*	Positive-pressure SCBA or combination positive-pressure SAR with auxiliary self-contained air supply.
Not immediately dangerous to life or health	Any positive-pressure supplied-air respirator, gas mask, or chemical-cartridge respirator.
5. Escape from contaminated atmosphere that may be immediately dangerous to life or health (IDLH)*	Any positive-pressure SCBA, gas mask, or combination positive-pressure SAR with escape SCBA.
6. Fire fighting	Any positive-pressure SCBA.

*Note: "Immediately dangerous to life or health (IDLH)" is any condition that poses either an immediate threat to life or health or an immediate threat of severe exposure to contaminants, such as radioactive materials, which are likely to have adverse delayed effects on health.

Training

Training is essential for correct respirator use. Employers have to teach both supervisors and employees how to properly select, use, and maintain respirators. The training program should be developed based on employees' education level and language background.

All employees required to use respiratory protective equipment have to be trained in the proper use of the equipment and its limitations. Additionally, those employees who will be required to use respiratory protective equipment in atmospheres immediately dangerous to life or health should be trained in rescue procedures.

The training has to include instructions on fitting and how to check the facepiece-to-face seal. The employee must be given an opportunity to handle the respirator, wear it in normal air for a period of time to become familiar with it, practice adjusting it, and then wear it in a test atmosphere.

OSHA requires that employee respirator training has to include an explanation of the following:

- Why the respirator is necessary, including the nature of the respiratory hazard and what may happen if the respirator is not fitted, used, or maintained properly;
- Engineering and administrative controls being used and the need for the respirator as added protection;
- Reason(s) for selecting a particular type of respirator;
- Capabilities and limitations of the selected respirator;
- How to inspect, put on and remove, and check the seals of the respirator;
- Respirator maintenance and storage requirements;

- How to use the respirator effectively in emergency situations, including when the respirator malfunctions; and
- How to recognize medical signs and symptoms that may limit or prevent the effective use of the respirator.

Users should know that improper respirator use or maintenance may cause overexposure. They also need to understand that continued use of poorly fitted and maintained respirators can cause chronic disease or death from overexposure to air contaminants.

Fit testing

Different types of respirators and even different brands of the same type of respirator have different fit characteristics. No one respirator will fit everyone. Some employees may be unable to get an adequate fit with certain models of a particular type of respirator. That's why it is important for employers to purchase several brands of each type of respirator in various sizes to ensure that every employee can select an acceptable respirator that fits properly.

Corrective lenses

Corrective eyeglasses worn by employees may present a problem when fitting respirators. Special mountings are available to hold corrective lenses inside full facepieces. If corrective lenses are needed, the facepiece and lenses must be fitted by a qualified individual to provide good vision, comfort, and proper sealing.

Tight face seal

Although respirators are designed for maximum efficiency, they can't provide protection without a tight seal between the facepiece and wearer. Consequently, beards and other facial hair can substantially reduce the effectiveness of a respirator. Where facial hair prohibits a tight fit, provide hood or helmet respirators which do not require a facial seal. Additionally, the absence of dentures can seriously affect the fit of a facepiece.

To assure proper respiratory protection, a facepiece must be checked each time the respirator is worn. This can be accomplished by performing either a positive-pressure or negative-pressure check. Detailed instructions for performing these tests can be found in the respiratory protection standard.

Qualitative and quantitative fit testing

The respirator wearer has to be trained in proper fit testing procedures, including demonstrations and practice in how to wear the respirator, how to adjust it, and how to determine if it fits properly. Fit testing for a tight-fitting facepiece respirator can be done in two ways — qualitatively and quantitatively.

Qualitative fit testing involves the introduction of a harmless odorous or irritating substance into the breathing zone around the respirator while being worn. If no odor or irritation is detected, a proper fit is indicated.

Quantitative fit testing offers the most accurate, detailed information on respirator fit. It involves the introduction of a harmless aerosol to the wearer while he or she is in a test chamber. While the wearer performs exercises that could induce facepiece leakage, the air inside and outside the facepiece is measured for the presence of the harmless aerosol to determine any leakage into the respirator.

Acceptable fit-testing methods		
Respirator	**QLFT**	**QNFT**
Half-face, negative pressure, APR (<100 fit factor)	Yes	Yes
Full-face, negative pressure, APR (<100 fit factor) used in atmospheres up to 10 times the PEL	Yes	Yes
Full-face, negative pressure, APR (>100 fit factor)	No	Yes
PAPR	Yes	Yes
Supplied-air (SAR) or SCBA used in negative pressure (demand mode) (>100 fit factor)	No	Yes
Supplied-air (SAR) or SCBA used in positive pressure (demand mode)	Yes	Yes
SCBA - structural fire fighting, positive pressure	Yes	Yes
SCBA/SAR - IDLH, positive pressure	Yes	Yes
Mouthbit respirators	Fit-testing not required	
Loose-fitting respirators (e.g., hoods, helmets)		

Respirator use in specific circumstances

Physiological response

It's important to realize that every situation can present a new set of circumstances. You should be aware of the following examples of specific circumstances that could be encountered while wearing respiratory protective equipment.

Facial hair

Facial hair that lies along the sealing area of the respirator, such as beards, sideburns, moustaches, or even a few days growth of stubble, should not be permitted on employees who are required to wear respirators that rely on a tight facepiece fit to achieve maximum protection. Facial hair between the wear's skin and the sealing surfaces of the respirator will prevent a good seal.

A respirator that permits negative air pressure inside the facepiece during inhalation may allow leakage and, in the case of positive pressure devices, will either reduce service time or waste breathing air. A worker should not enter a contaminated work area when conditions prevent a good seal of the respirator facepiece to the face. Provide loose-fitting hood or helmet style respirators to workers with facial hair.

Eyeglasses

Ordinary eyeglasses should not be used with full-facepiece respirators. Eyeglasses with temple bars or straps that pass between the sealing surface of a full-facepiece and the worker's face will prevent a good seal, and should not be used. Special corrective lenses can be mounted inside a full-facepiece respirator and are available from all manufacturers of full-facepiece respirators. To ensure good vision, comfort, and a proper facepiece seal, these corrective lenses should be mounted by an individual designated by the manufacturer as qualified to install accessory items.

Eyeglasses or goggles may interfere with the half facepieces. When interference occurs, a full-facepiece with special corrective lenses should be provided and worn.

Contact lenses

Several factors may restrict or even prohibit the use of contact lenses while wearing any type of respiratory device. This is especially true of atmosphere-supplying respirators. With full-facepieces, incoming air directed toward the eye can cause discomfort from dirt, lint, or other debris lodging between the contact lens and the pupil.

Facial deformities

Facial deformities, such as scars, deep skin creases, prominent cheekbones, severe acne, and the lack of teeth or dentures, can prevent a respirator from sealing properly.

Communications

Talking while wearing a respirator equipped with a facepiece may break the seal. When communication is necessary within a contaminated area, it should be done with the help of special communicating equipment obtained from the manufacturer of the respirator.

IDLH atmospheres

Written procedures must be prepared for safe respirator use in immediately dangerous to life or health (IDLH) atmospheres that may occur in normal operations or emergencies. Personnel need to be familiar with these procedures and respirators. At least one standby person, equipped with proper rescue equipment, including a SCBA, should be present in the nearest safe area for emergency rescue of those wearing respirators in an IDLH atmosphere.

Communications (visual, voice, signal line, telephone, radio, or other suitable type) have to be maintained among all persons present (those in the IDLH atmosphere and the standby personnel). OSHA requires that the respirator wearers be equipped with safety harnesses and safety lines to permit their removal from the IDLH atmosphere if they are overcome.

Confined spaces

Confined spaces are enclosures that are difficult to get into and out of, such as storage tanks, tank cars, boilers, sewers, tunnels, pipelines, pits, and vats. The atmospheres in a confined space can be immediately dangerous to life or health because of toxic air contaminants or lack of oxygen. Before anyone enters a confined space, tests must be made to determine the oxygen concentration; the presence and concentration of flammable/combustible vapors or gases; and the presence of toxic airborne particulates, vapors, or gases.

The confined space should be forced air ventilated to keep the concentration of a flammable substance at a safe level. No one should enter if a flammable substance exceeds the lower explosive limit. No one should enter without wearing the proper type of respirator if any air contaminant exceeds the established permissible exposure limit or if there is an oxygen deficiency. Even if the contaminant concentration is below the established breathing time-weighted average limit and there is enough oxygen, the safest procedure is to ventilate the entire space continuously and to monitor the contaminant and oxygen concentrations continuously if people are to work in the confined space without respirators.

Appropriate air-purifying respirators may be worn in a confined space only if tests show that the atmosphere contains adequate oxygen and that air contaminants are below levels immediately dangerous to life or health. While people wearing these types of respirators are in a confined space, its atmosphere should be monitored continuously.

If the atmosphere in a confined space is immediately dangerous to life or health owing to a high concentration of air contaminant or oxygen deficiency, those who must enter the space should wear a pressure-demand SCBA or a combination pressure-demand airline and self-contained breathing apparatus that always maintains positive air pressure inside the respiratory inlet covering. This is the best safety practice for confined spaces.

While personnel are in a confined space, at least one standby person with proper rescue equipment, including a SCBA, should be present outside for emergency rescue. Communications (visual, voice, signal line, telephone, radio, or other suitable type) should be maintained with those inside. Also, those inside the space should be equipped with safety harnesses and safety lines to allow their removal in case they are overcome.

Low temperatures

Low temperatures may fog respirator lenses. Coating the inner surface of the lens with the anti-fogging compound normally available from the respirator manufacturer should prevent fogging down to 32°F, but severe fogging may occur below 0°F. Full facepieces with nose cups that direct the warm, moist exhaled air through the exhalation valve without its touching the lens, are available. They should provide satisfactory vision at as low as -30°F. At very low temperatures, exhalation valves may freeze due to moisture. Dry respirable air should be used with airline respirators and with the type of SCBA that has an air cylinder when they are used in low temperatures.

NIOSH performs cold temperature testing on SCBA. The minimum temperature that the SCBA has been tested to and approved for is listed on the approval label.

High temperatures

High temperatures often place a person under physical stress. Wearing a respirator causes additional stress which should be minimized by using a light-weight respirator with low breathing resistance. In atmospheres that are not immediately dangerous to life or health, the airline type supplied-air respirator is recommended. Such a respirator used in low or high temperature atmospheres may be equipped with a vortex tube to either warm or cool the air supplied.

Physiological stress

Wearing any respirator, alone or in conjunction with other types of protective equipment, will impose some physiological stress on the wearer. Weight of the equipment, for example, increases the energy requirement for a given task. Selection of respiratory protective devices should be based on the breathing resistance, weight of the respirator, the type and amount of protection needed as well as the individual's tolerance of the given device.

Use of respirators in conjunction with protective clothing can greatly affect the human response and endurance, especially in hot environments. Normally, in hot environments or during heavy work, the body relies a great deal on heat loss through the evaporation of sweat. With impermeable clothing, the heat loss by water evaporation is not possible. Additionally, the weight of the respirator (up to 35 pounds for a SCBA) adds to the metabolic rate of workers, increasing the amount of heat the body produces. The net effect is one of heat stress.

Based on this limited research, the following recommendations are made:

1. Select the lightest weight protective ensembles and respiratory protective devices that adequately protect the worker. This will minimize the physiological demands placed on the worker by carrying the weight of this equipment.
2. If available, select protective clothing made of material that will allow evaporation of water vapor, while providing skin protection from the contaminant.

3. Reduce work rate by:
    - adjusting the work/rest schedules,
    - using automated procedures and/or mechanical assistance where possible, and
    - minimizing the work intensity.
4. Educate workers on the symptoms and prevention of heat illness and schedule periodic fluid replacement breaks.
5. Reduce heat stress by scheduling work at night or early morning or by providing external cooling, where possible (either through cooling garments and/or by providing cool respirable breathing air through pressure-demand air supplied respirators).
6. When conducting pipe/boiler lagging removal, ensure that steam lines are cool to minimize heat exposure from these sources.

Inspection, maintenance, cleaning, and storage

All respirators must be inspected for component wear and deterioration before each use and during cleaning. Special attention should be given to rubber or plastic parts which can deteriorate. The facepiece, especially the face seal surface, headband, valves, connecting tube, fittings, and canister need to be maintained in good condition. A respirator inspection has to include a check of the tightness of the connections.

SCBAs must be inspected at least monthly. Air and oxygen cylinders have to be fully charged according to the manufacturer's instructions. Regulator and warning devices need to be checked to assure their proper function.

Chemical cartridges and gas mask canisters should be replaced as necessary to provide complete protection, following the manufacturer's recommendations. Mechanical filters must be replaced as necessary to avoid high resistance to breathing.

Inspection and maintenance

Repairs

Repairs must be made only by experienced persons using parts specifically designed for the respirator. The manufacturer's instructions should be consulted for any repair, and no attempt made to repair or replace components or make adjustments/repairs beyond the manufacturer's recommendations.

Cleaning

A respirator that has been used must be cleaned and disinfected before it is reissued. Emergency-use rescue equipment has to be cleaned and disinfected immediately after each use. Retain records of inspection dates and findings.

Respirators may be washed in a detergent solution and then sanitized by immersion in a sanitizing solution. Cleaner-sanitizers that effectively clean the respirator and contain a bactericidal agent are commercially available. The bactericidal agent frequently used is a quaternary ammonium compound. Strong cleaning and sanitizing agents and many solvents can damage rubber or elastomeric respirator parts. Such materials must be used with caution or after consultation with the respirator manufacturer.

Storage

Store respirators to protect them from dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Protection against any mechanical damage should also be provided. Store respirators so that facepieces and exhalation valves will rest in a normal position to prevent the rubber or plastic from reforming into an abnormal shape.

Medical examinations

OSHA requires that no one may be assigned a task requiring a respirator unless found physically able to do the work while wearing the equipment. In addition, some regulatory standards for specific substances and occupations may also contain requirements for medical examinations. Both types of standards declare that a physician or other licensed health care professional (PLHCP) should determine what health and physical conditions are pertinent, and that respirator wearers' medical status will be reviewed under the following circumstances which are also listed in the Respiratory Protection standard at 1910.134(e)(7).

At minimum, additional medical evaluations must be done:

- If an employee reports medical signs or symptoms related to the ability to wear the respirator;
- If a PLHCP, supervisor, or program administrator believes that the employee needs to be reevaluated;
- Observations made during fit testing and program evaluation indicate the need for reevaluation; or
- A change occurs in workplace conditions, such as physical work effort, protective clothing, or temperature, that may result in a substantial increase in the physiological burden placed on the wearer.

Pre-placement medical examinations should screen out those who are physically or psychologically unfit to wear respirators. As another part of this examination, medical tests pertinent to the respiratory hazards that workers may encounter have to be made to get baseline data against which to assess physiological changes in respirator wearers. In addition, consider the workers' previous medical and employment history.The types of information to obtain from the worker include:

History of respiratory disease

Identifies workers with a history of asthma, emphysema, or chronic lung disease. These people may be at risk when wearing a respirator.

Work history

Identifies workers who have been exposed to asbestos, silica, cotton dust, beryllium, etc., within the past ten years, or workers who have worked in occupations or industries where such exposure was probable. If past exposures are identified, medical tests can be obtained for comparison. Some of the specific items of information which might be obtained include:

- Previous occupations;
- Problems associated with breathing during normal work activities; and
- Past problems with respirator use.

Any other medical information

This information may provide evidence of the worker's ability or inability to wear and use respirators, such as:

- Psychological problems or symptoms including claustrophobia;
- Any known physical deformities or abnormalities, including those which may interfere with respirator use;

- Past and current usage of medication; and
- Tolerance to increased heart rate, which can be produced by heat stress.

Periodic medical exams

Periodic routine medical examinations should be made to determine whether respirator wearers have been exposed to harmful levels of respiratory hazards. Base the examination frequency on the particular situation and specific substance standards. Review test results taken to determine whether harmful amounts of hazardous substances have been taken into the body.

These may include urine, blood, or fecal analysis and other techniques to determine the intake and excretion of toxic substances. The findings of these tests, when correlated with other exposure data, such as air sampling data for wearers of such equipment, can serve as an indication of the program's effectiveness. Follow up positive exposure evidence with appropriate surveillance of work area conditions to determine if there is any relationship to inadequate respiratory protection or a need for additional engineering controls.

Work area surveillance

Work area surveillance is essential for monitoring the conditions and degree of worker exposure or stress (combinations of work rate, environmental conditions, and physiological burdens of wearing a respirator).

Changes in operating procedures, temperature, air movement, humidity, and work practices may influence the concentration of a substance in the work atmosphere. These factors necessitate periodic monitoring of the air contaminant concentration. Testing should continue to assure that the contaminant exposure has not risen above the maximum protective capability of the respirators being used.

Employees using SCBAs or SARs with auxiliary SCBAs in confined spaces where the environment is or may be immediately dangerous to life or health have to wear safety harnesses and lifelines. A second person equipped with complete protective gear must be standing by ready to help if the entrant gets into trouble. Communications (visual, voice, or signal line) has to be maintained with all personnel. Precautions must be taken so that in the event of an emergency situation, one person will be unaffected and have the proper training and rescue equipment to assist the others.

Air quality standards

Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration has to be of high purity. Oxygen must meet the requirements of the United States Pharmacopoeia for medical or breathable oxygen and breathable air meet at least the requirement for Type 1-Grade D breathable air described in Compressed Gas Association (CGA) Commodity Specification G-7.1-1989.

NOTE: Compressed oxygen must not be used in open circuit SCBAs or SARs that have previously used compressed air. Never use oxygen with air-line respirators.

Breathable air may be supplied to respirators from cylinders or air compressors. For testing cylinders, see Shipping Container Specifications of the Department of Transportation (49 CFR parts 173 and 178). Containers of breathable gas have to be clearly marked according to NIOSH specifications.

The compressor for supplying air has to be equipped with the necessary safety devices and alarms. Compressors must be constructed and situated to avoid any entry of contaminated air into the system and equipped with suitable inline, air-purifying sorbent beds and filters installed to assure air quality.

The system also needs to have a receiver of sufficient capacity to enable the wearer to escape from a contaminated atmosphere in the event of compressor failure and alarms to indicate compressor failure and overheating. If an oil-lubricated compressor is used, it must have a high-temperature, or carbon monoxide alarm, or both. If only the high-temperature alarm is used, the air from the compressor has to be tested frequently for carbon monoxide.

NOTE: Always ensure that air-line couplings are incompatible with outlets for other gas systems to prevent accidental servicing of air-line respirators with nonrespirable gases or oxygen.

Approved respirators

OSHA requires that all respiratory protective devices be NIOSH-certified for the contaminant or situation to which the employee is exposed.

Summary

When planning a program to control occupational illness caused by contaminated air, the primary objective should always be to prevent or eliminate atmospheric contamination. But, when this is not feasible, provide respirators and establish a respiratory protection program to protect the health of your exposed employees.

To have an effective safety program, one administrator must be responsible for its coordination. First line supervisors have to thoroughly understand the hazards and be held accountable for their staffs' use of personal protective equipment.

Teaming the correct personal protective equipment with a good training program can give the worker a large measure of safety where other controls are inadequate or impossible. And, an on-going safety program should be used to motivate employees to continue to use protective gear.

Personal protective equipment can be effective only if the equipment is selected based on its intended use, employees are trained in its use, and the equipment is properly tested and maintained, and worn. In the final analysis the best protection comes from an interested management and work force committed to sound work practices.

Respiratory protection program

This respirator program specifies operating procedures to ensure the protection of all employees from respiratory hazards through proper selection and use of respirators. Respirators are to be used only in areas where engineering controls are not feasible, while engineering controls are being installed, or in emergencies. This program meets the requirements of the Respiratory Protection Standard at 1910.134.

Administrative duties

At _____ our Respiratory Protection Program administrator is _____. This person is solely responsible for all facets of the program and has full authority to make necessary decisions to ensure success of this program. The program administrator's duties include purchasing equipment necessary to implement and operate the program. The administrator will develop written detailed instructions covering each of the basic elements in this program, and is the sole person authorized to amend these instructions.

The program administrator is qualified, by appropriate training and experience relative to the complexity of the program, to administer our Respiratory Protection Program and conduct the necessary evaluations of program effectiveness.

Employees may review a copy of our Respiratory Protection Program. It is located in _____. The program administrator reviews this program periodically to ensure its effectiveness. Only the program administrator may amend the written program.

Respirator selection

Respirators are selected on the basis of respiratory hazards to which the worker is exposed and workplace and user factors that affect respirator performance and reliability. All decisions made regarding respirator selection is done by the program administrator.

The administrator will develop detailed written standard operating procedures for the selection of respirators using 1910.134(d) and the following guidelines: _____. Detailed procedures will be included as appendices to this program. Outside consultation, manufacturer's assistance, and other recognized authorities may be consulted regarding proper selection.

Our company's selection procedures include coverage of the following OSHA requirements: _____.

Selection procedure checklist

When selecting respirators, we use the following guidelines:

- Select and provide respirators based on respiratory hazard(s) to which a worker is exposed and workplace and user factors that affect respirator performance and reliability.
- Select a NIOSH-certified respirator. (NIOSH stands for the National Institute for Occupational Safety and Health)
- Identify and evaluate the respiratory hazard(s) in the workplace, including a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form. Consider the atmosphere to be immediately dangerous to life or health (IDLH) if you cannot identify or reasonably estimate employee exposure.
- Select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

When selecting respirators for IDLH atmospheres, we follow these guidelines:

- Provide these respirators:
  - A full facepiece pressure demand self-contained breathing apparatus (SCBA) certified by NIOSH for a minimum service life of thirty minutes, or
  - A combination full facepiece pressure demand supplied-air respirator Self-contained breathing apparatus (SAR) with auxiliary self-contained air supply.
- Provide respirators NIOSH-certified for escape from the atmosphere in which they will be used when they are used only for escape from IDLH atmospheres.
- Consider all oxygen-deficient atmospheres to be IDLH. Exception: If we can demonstrate that, under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in Table II of 1910.134 (i.e., for the altitudes set out in the table), then any atmosphere-supplying respirator may be used.

When selecting respirators for atmospheres that are not IDLH:

- Provide a respirator that is adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations.
- Select a respirator that meets or exceeds the required level of employee protection by using the assigned protection factors (APFs) listed in 1910.134 Table 1.
- For combination respirators (e.g., airline respirators with an air-purifying filter, ensure that the APF is appropriate to the mode of operation in which the respirator is being used.
- Select a respirator for employee use that maintains the employee's exposure to the hazardous substance at or below the maximum use concentration (MUC), when measured outside the respirator.
- Do not apply MUCs to conditions that are immediately dangerous to life or health (IDLH); instead use respirators listed for IDLH conditions in 1910.134(d)(2).

- Set the MUC at the lower limit when the calculated MUC exceeds the IDLH level for a hazardous substance or the performance limits of the cartridge or canister.
- Select respirators appropriate for the chemical state and physical form of the contaminant.
- For protection against gases and vapors, provide:
    - An atmosphere-supplying respirator, or
    - An air-purifying respirator, provided that: (1) The respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or (2) If there is no ESLI appropriate for conditions in our workplace, implement a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. Describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.
- For protection against particulates, provide:
    - An atmosphere-supplying respirator; or
    - An air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR 84; or
    - For contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH.

Respirator types and uses

Only NIOSH-certified respirators are selected and used. Where practicable, the respirators will be assigned to individual workers for their exclusive use. The following types of respirators are in use in this facility: _____.

Medical evaluations

A medical evaluation to determine whether an employee is able to use a respirator is necessary to prevent injuries or illnesses from the physiological burden imposed by respirator use.

Employees will not be assigned to tasks requiring use of respirators nor fit tested unless it has been determined that they are physically able to perform the work and use the respirator.

_____ will perform medical evaluations using a medical questionnaire found in Sections 1 and 2, Part A of Appendix C of the Respiratory Protection standard.

All medical questionnaires and examinations are confidential and handled during the employee's normal working hours or at a time and place convenient to the employee. All employees are provided an opportunity to discuss the questionnaire and examination results with their physician or other licensed health care professional (PLHCP).

Before any initial examination or questionnaire is given, we supply the PLHCP with the following information so that PLHCP can make the best recommendation concerning an employee's ability to use a respirator:

- Type and weight of the respirator to be used by the employee;
- Duration and frequency of respirator use (including use for rescue and escape);
- Expected physical work effort;

- Additional protective clothing and equipment to be worn;
- Temperature and humidity extremes that may be encountered.

We also supply the PLHCP with the following information: _____.

Once the PLHCP determines whether the employee has the ability to use or not use a respirator, a written recommendation containing only the following information is sent to _____. The recommendation contains the following information:

- Limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
- The need, if any, for follow-up medical evaluations; and
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

Follow-up medical examination

A follow-up medical examination will be provided if a positive response is given to any question among questions 1 through 8 in Section 2, Part A of Appendix C of 1910.134 or if an employee's initial medical examination demonstrates the need for a follow-up medical examination. Our follow-up medical examination includes tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

If the respirator is a negative pressure respirator and the PLHCP finds a medical condition that may place the employee's health at increased risk if the respirator is used, our company will provide a powered air-purifying respirator (PAPR) if the PLHCP's medical evaluation finds that the employee can use such a respirator. If a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then we are no longer required to provide a PAPR.

Additional medical examinations

Our company provides additional medical evaluations if:

- An employee reports medical signs or symptoms that are related to ability to use a respirator;
- A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

Medical examinations are also conducted at the following time(s): _____.

Fit testing procedures

Respirators must fit properly to provide adequate protection. If a tight seal is not maintained between the facepiece and the employee's face, contaminated air will be drawn into the facepiece and be breathed by the employee. Fit testing seeks to protect the employee against breathing contaminated ambient air and is one of the core provisions of our respirator program.

Fit testing may be either qualitative or quantitative. Qualitative fit testing (QLFT) involves the introduction of a gas, vapor, or aerosol test agent into an area around the head of the respirator user. If that user can detect the presence of the test agent through subjective means, such as odor, taste, or irritation, the respirator fit is inadequate.

In a quantitative respirator fit test (QNFT), the adequacy of respirator fit is assessed by measuring the amount of leakage into the respirator, either by generating a test aerosol as a test atmosphere, using ambient aerosol as a test agent, or using controlled negative pressure to measure the volumetric leak rate. Appropriate instrumentation is required to quantify respirator fit in QNFT.

_____ is responsible for ensuring employees are fit tested at the following times with the same make, model, style, and size of respirator that will be used:

- Before any of our employees are required to use any respirator with a negative or positive pressure tight-fitting facepiece;
- Whenever a different respirator facepiece (size, style, model, or make) is used;
- At least annually;
- Whenever the employee reports, or our company, PLHCP, supervisor, or Program Administrator makes visual observations of changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight; and
- When the employee, subsequently after passing a QLFT or QNFT, notifies the company, Program Administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable. That employee will be retested with a different respirator facepiece.

Employees must pass one of the following fit test types that follow the protocols and procedures contained in 1910.134 Appendix A:

- QLFT (Only used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less. May be used to test tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators if tested in the negative pressure mode); or
- QNFT (May be used to fit test a tight-fitting half facepiece respirator that must achieve a fit factor of 100 or greater OR a tight-fitting full facepiece respirator that must achieve a fit factor of 500 or greater OR tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators if tested in the negative pressure mode).

Our workplace-specific fit testing procedures include the following: _____.

Proper use procedures

After the respirator has been properly selected and fitted, its protection efficiency must be maintained by proper use. Our company ensures that respirators are used properly in the workplace by following these procedures: _____.

Our company follows this checklist for proper use procedures:

Facepiece seal protection

- Do not permit respirators with tight-fitting facepieces to be worn by employees who have:
  - Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or
  - Any condition that interferes with the face-to-facepiece seal or valve function.

- If an employee wears corrective glasses or goggles or other personal protective equipment, ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.
- For all tight-fitting respirators, ensure that employees perform a user seal check each time they put on the respirator using the procedures in 29 CFR 1910.134 Appendix B-1 (User Seal Check Procedures) or procedures recommended by the respirator manufacturer that you can demonstrate are as effective as those in Appendix B-1.

Continuing respirator effectiveness

- Appropriate surveillance must be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, reevaluate the continued effectiveness of the respirator.
- Ensure that employees leave the respirator use area:
    - To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use; or
    - If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece; or
    - To replace the respirator or the filter, cartridge, or canister elements.
- If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece, replace or repair the respirator before allowing the employee to return to the work area.

Procedures for IDLH atmospheres

We ensure that:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere;
- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere;
- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue;
- The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue;
- The employer or designee authorized to do so by the company, once notified, provides necessary assistance appropriate to the situation;

Employee(s) located outside the IDLH atmospheres are equipped with:

- Pressure demand or other positive pressure self-contained breathing apparatuses (SCBAs), or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either:
- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or
- Equivalent means for rescue where retrieval equipment is not required under the bullet item above this one.

Procedures for interior structural firefighting

In addition to the requirements for IDLH atmospheres, in interior structural fires, we ensure that:

- At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times;
- At least two employees are located outside the IDLH atmosphere; and
- All employees engaged in interior structural firefighting use SCBAs.

Notes:

One of the two individuals located outside the IDLH atmosphere may be assigned to an additional role, such as incident commander in charge of the emergency or safety officer, so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident.

Nothing in this proper use procedures section is meant to preclude firefighters from performing emergency rescue activities before an entire team has assembled.

Maintenance and care procedures

In order to ensure the continuing protection of respirators, our company has established maintenance and care procedures and schedules.

Cleaning and disinfecting

We provide each respirator user with a respirator that is clean, sanitary, and in good working order. We ensure that respirators are cleaned and disinfected using the procedures outlined in the Respiratory Protection standard at Appendix B-2 and/or on the recommendation of the manufacturer.

The respirators are cleaned and disinfected at the following intervals:

- Issued for the exclusive use of an employee: As often as necessary to be maintained in a sanitary condition.
- Issued to more than one employee: Before being worn by different individuals.
- Maintained for emergency use: After each use.
- Used in fit testing and training: After each use.

In order to meet these intervals, we have created the following schedules to be used for each respirator: _____.

Storage

Proper storage of respirators ensures that the equipment is protected and not subject to environmental conditions that may cause deterioration. We ensure that respirators are stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Respirators are stored in _____ to prevent deformation of the facepiece and exhalation valve. In addition, emergency respirators are kept accessible to the work area; stored in _____ that are clearly marked as containing emergency respirators and according to the manufacturer's recommendations.

Inspection

In order to ensure the continued reliability of respirator equipment, we inspect it on a regular basis. The frequency of inspection is related to the frequency of use. Respirator inspections are done at the following intervals:

- All types used in routine situations: Before each use and during cleaning.
- Maintained for use in emergency situations: At least monthly and in accordance with the manufacturer's recommendations, and checked for proper function before and after each use.
- Emergency escape-only respirators: Before being carried into the workplace for use.

A respirator inspections include may include a check:

- For respirator function, tightness of connections, and the condition of the various parts including the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters; and elastomeric parts for pliability and signs of deterioration.
- Additionally, for self-contained breathing apparatus, on a monthly basis, we maintain air and oxygen cylinders in a fully charged state and recharge when the pressure falls to 90 percent of the manufacturer's recommended pressure level and determine that the regulator and warning devices function properly.

For respirators maintained for emergency use, we certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator. This information is retained until replaced by a subsequent certification.See the attached respirator inspection records.

Repairs

_____ is responsible for making decisions regarding respirator repairs. Respirators that fail an inspection or are otherwise found to be defective are removed from service and are discarded, repaired, or adjusted based on the following procedures:

- Repairs or adjustments are made only by persons appropriately trained to perform such operations and only with the respirator manufacturer's NIOSH-approved parts designed for the respirator;
- Repairs are made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and
- Reducing and admission valves, regulators, and alarms are adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

Discarding respirators

We discard respirators that fail an inspection, are not fit for use, or cannot be repaired using the following procedure: _____.

Air quality procedures

When atmosphere-supplying respirators are being used to protect employees it is essential to ensure that the air being breathed is of sufficiently high quality. Our company's procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators include coverage of the following OSHA requirements:

Compressed air, compressed oxygen, liquid air, and liquid oxygen:

- The compressed and liquid oxygen we use meets the United States Pharmacopoeia requirements for medical or breathing oxygen.

- Compressed breathing air must meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:
  - Oxygen content (v/v) of 19.5-23.5%;
  - Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
  - Carbon monoxide (CO) content of 10 parts per million (ppm) or less;
  - Carbon dioxide content of 1,000 ppm or less; and
  - Lack of a noticeable odor.
- Ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.
- Ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

Cylinders used to supply breathing air:

- We have our cylinders tested and maintained as required in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR 173 and 178).
- Cylinders of purchased breathing air are certified by the supplier that the breathing air meets the requirements for Grade D breathing air.
- The moisture content in the cylinder does not exceed a dew point of -50°F (-45.6°C) at 1 atmosphere pressure.

Compressors:

- We ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:
  - Prevent entry of contaminated air into the air-supply system;
  - Minimize moisture content so that the dew point at 1 atmosphere pressure is 10°F (5.56°C) below the ambient temperature;
  - Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters must be maintained and replaced or refurbished periodically following the manufacturer's instructions; and
  - Have a tag containing the most recent change date and the signature of the person authorized by our company to perform the change. The tag must be maintained at the compressor.
- For compressors that are not oil-lubricated, ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.
- For oil-lubricated compressors, use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply must be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

Breathing air couplings:

We ensure that breathing air couplings are incompatible with outlets for non-respirable worksite air or other gas systems. No asphyxiating substance must be introduced into breathing air lines.

Breathing gas containers:

We use breathing gas containers marked with the NIOSH respirator certification standard, 42 CFR 84.

Filters, cartridges, and canisters:

We ensure that all filters, cartridges and canisters used in the workplace are labeled and color-coded with the NIOSH approval label and that the label is not removed and remains legible.

The following detailed procedures ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators: _____.

Training

The most thorough respiratory protection program will not be effective if employees do not wear respirators, or if wearing them, do not do so properly. The only way to ensure that our employees are aware of the purpose of wearing respirators, and how they are to be worn is to train them.

Our training program provided by _____ is two-fold; it covers both the:

1. Respiratory hazards to which our employees are potentially exposed during routine and emergency situations, and
2. Proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance.

Both training elements are provided prior to requiring an employee to use a respirator in our workplace. However, if an employee has received training within 12 months addressing the seven basic elements of respiratory protection and the employee can demonstrate that he/she has knowledge of those elements, then that employee is not required to repeat such training initially.

We require all of our employees to be retrained annually and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
- Any other situation arises in which retraining appears necessary to ensure safe respirator use.

Seven basic training elements:

Our employees are trained sufficiently to be able to demonstrate knowledge of at least these seven elements:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator _____.
- What are the limitations and capabilities of the respirator _____.
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions _____.

- How to inspect, put on, remove, use, and check the seals of the respirator _____.
- What the procedures are for maintenance and storage of the respirator _____.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators _____.
- The general requirements of 1910.134 _____.

The basic advisory information on respirators is provided by our program administrator to employees who wear respirators voluntarily when use is not required by the regulations or by our company:

Information for employees using respirators voluntarily

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker.

Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

See training curriculum/materials attached to this program.

Program evaluation

It is inherent in respirator use that problems with protection, irritation, breathing resistance, comfort, and other respirator-related factors occasionally arise in most respirator protection programs. Although it is not possible to eliminate all problems associated with respirator use, we try to eliminate as many problems as possible to improve respiratory protection and encourage employee acceptance and safe use of respirators. By having our program administrator thoroughly evaluate and revise our Respiratory Protection Program, we can eliminate problems effectively.

At _____, program evaluation, performed at least _____ by our program administrator, involves the following:

- Conducting evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

- Regularly consulting employees required to use respirators to assess their views on program effectiveness and to identify any problems. Any problems that are identified during this assessment must be corrected. Factors to assess include, but are not limited to:
  - Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
  - Appropriate respirator selection for the hazards to which the employee is exposed;
  - Proper respirator use under the workplace conditions the employee encounters; and
  - Proper respirator maintenance.

Appendix

The following documents are attached to this Respiratory Protection Program: _____.

OSHA COMPLIANCE MANUAL

SAFETY AND HEALTH PROGRAMS

OSHA COMPLIANCE MANUAL

OSHA COMPLIANCE MANUAL

OSHA's voluntary safety and health program management guidelines

Introduction

In January 1989, OSHA issued safety and health program management guidelines for employers to use to reduce workplace injuries and illnesses. The language in these voluntary guidelines is general so that it may be broadly applied in general industry, shipyards, marine terminals, and longshoring activities regardless of the size, nature, or complexity of the operations.

Effective management for worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses. Effective management addresses all work-related hazards, including those potential hazards which could result from a change in worksite conditions or practices. It addresses all hazards, whether or not they are regulated by government standards.

Workplace evaluations project a basic relationship between the effective management of worker safety and health protection and lower numbers of employee injuries. Such management also correlates with the elimination or adequate control of employee exposure to toxic substances and other unhealthful conditions.

Four-point program

OSHA's guidelines, often referred to as the "Four-Point Program," describe comprehensive safety and health components which employers may use to inspect their worksites and correct hazards they find in order to effectively reduce accidents and injuries. The four points of the program guidelines that OSHA expects employers to carry out are:

1. Management commitment and employee involvement;
2. Worksite analysis;
3. Hazard prevention and control; and
4. Training for employees, supervisors, and managers.

There are many positive side effects from a strong safety and health program, not the least of which is improved employee morale and productivity, as well as a significant reduction of workers' compensation costs and other less obvious costs of work-related injuries and illnesses. Use the following OSHA guidelines to address the specific operations and conditions in your worksite.

Voluntary safety and health program management guidelines

General

Employers are advised and encouraged to institute and maintain in their establishments a program which provides systematic policies, procedures, and practices that are adequate to recognize and protect their employees from occupational safety and health hazards.

An effective program includes provisions for the systematic identification, evaluation, and prevention or control of general workplace hazards, specific job hazards, and potential hazards which may arise from foreseeable conditions.

Although compliance with the law, including specific OSHA standards, is an important objective, an effective program looks beyond specific requirements of law to address all hazards. It will seek to prevent injuries and illnesses whether or not compliance is at issue.

OSHA COMPLIANCE MANUAL

The extent to which the program is described in writing is less important than how effective it is in practice. As the size of a worksite or the complexity of a hazardous operation increases, however, the need for written guidance increases to ensure clear communication of policies and priorities and consistent and fair application of rules.

Major elements

An effective occupational safety and health program will include the following four elements. To implement these elements, follow the actions described in "recommend actions."

1. *Management commitment and employee involvement* are complementary. Management commitment provides the motivating force and the resources for organizing and controlling activities within an organization. In an effective program, management regards worker safety and health as a fundamental value of the organization and applies its commitment to safety and health protection with as much vigor as to other organizational purposes. Employee involvement provides the means through which workers develop and/or express their own commitment to safety and health protection, for themselves and for their fellow workers.
2. *Worksite analysis* involves a variety of worksite examinations, to identify not only existing hazards but also conditions and operations in which changes might occur to create hazards. Unawareness of a hazard which stems from failure to examine the worksite is a sure sign that safety and health policies and/or practices are ineffective. Effective management actively analyzes the work and worksite, to *anticipate* and prevent harmful occurrences.
3. *Hazard prevention and control* are triggered by a determination that a hazard or potential hazard exists. Where feasible, hazards are prevented by effective design of the job site or job. Where it is not feasible to eliminate them, they are controlled to prevent unsafe and unhealthful exposure. Elimination or control is accomplished in a timely manner, once a hazard or potential hazard is recognized.
4. *Safety and health training* addresses the safety and health responsibilities of all personnel concerned with the site, whether salaried or hourly. It is often most effective when incorporated into other training about performance requirements and job practices. Its complexity depends on the size and complexity of the worksite, and the nature of the hazards and potential hazards at the site.

Management commitment and employee involvement

1. State clearly a worksite policy on safe and healthful work and working conditions, so that all personnel with responsibility at the site and personnel at other locations with responsibility for the site understand the priority of safety and health protection in relation to other organizational values.

2. Establish and communicate a clear goal for the safety and health program and objectives for meeting that goal, so that all members of the organization understand the results desired and the measure planned for achieving them.

3. Provide visible top management involvement in implementing the program, so that all will understand that management's commitment is serious.

4. Provide for and encourage employee involvement in the structure and operation of the program and in decisions that affect their safety and health, so that they will commit their insight and energy to achieving the safety and health program's goal and objectives.

5. Assign and communicate responsibility for all aspects of the program, so that managers, supervisors, and employees in all parts of the organization know what performance is expected of them.

6. Provide adequate authority and resources to responsible parties, so that assigned responsibilities can be met.

7. Hold managers, supervisors, and employees accountable for meeting their responsibilities, so that essential tasks will be performed.

8. Review program operations at least annually to evaluate their success in meeting the goal and objectives, so that deficiencies can be identified and the program and/or the objectives can be revised when they do not meet the goal of effective safety and health protection.

Worksite analysis

1. So that all hazards are identified:

   (A) Conduct comprehensive baseline worksite surveys for safety and health and periodic comprehensive update surveys;

   (B) Analyze planned and new facilities, processes, materials, and equipment; and

   (C) Perform routine job hazard analyses.

2. Provide for regular site safety and health inspections, so that new or previously missed hazards and failures in hazard controls are identified.

3. So that employee insight and experience in safety and health protection may be utilized and employee concerns may be addressed, provide a reliable system for employees, without fear of reprisal, to notify management personnel about conditions that appear hazardous and to receive timely and appropriate responses: and encourage employees to use the system.

4. Provide for investigation of accidents and “near miss” incidents, so that their causes and means for their prevention are identified.

5. Analyze injury and illness trends over time, so that patterns with common causes can be identified and prevented.

Hazard prevention and control

1. So that all current and potential hazards, however detected, are corrected or controlled in a timely manner, establish procedures for that purpose, using the following measures:

   (A) Engineering techniques where feasible and appropriate;

   (B) Procedures for safe work which are understood and followed by all affected parties, as a result of training, positive reinforcement, correction of unsafe performance, and, if necessary, enforcement through a clearly communicated disciplinary system;

   (C) Provision of personal protective equipment; and

   (D) Administrative controls, such as reducing the duration of exposure.

2. Provide for facility and equipment maintenance, so that hazardous breakdown is prevented.

3. Plan and prepare for emergencies, and conduct training and drills as needed, so that the response of all parties to emergencies will be “second nature.”

4. Establish a medical program which includes availability of first aid on site and of physician and emergency medical care nearby, so that harm will be minimized if an injury or illness does occur.

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Safety and health training

1. Ensure that all employees understand the hazards to which they may be exposed and how to prevent harm to themselves and others from exposure to these hazards, so that employees accept and follow established safety and health protections.

2. So that supervisors will carry out their safety and health responsibilities effectively, ensure that they understand those responsibilities and the reasons for them, including:

   (A) Analyzing the work under their supervision to identify unrecognized potential hazards;

   (B) Maintaining physical protections in their work areas; and

   (C) Reinforcing employee training on the nature of potential hazards in their work and on needed protective measures, through continual performance feedback and, if necessary, through enforcement of safe work practices.

3. Ensure that managers understand their safety and health responsibilities, as described under "Management Commitment and Employee Involvement," so that the managers will effectively carry out those responsibilities.

POINT ONE:
Management commitment and employee involvement

As the owner or manager of a small business, your attitude towards job safety and health will be reflected by your employees. If you are not interested in preventing employee injury and illness, nobody else is likely to be.

At all times, demonstrate your personal concern for employee safety and health and the priority you place on them in your workplace. Your policy must be clearly set. Only you can show its importance through your own actions.

Demonstrate to your employees the depth of your commitment by involving them in planning and carrying out your efforts. If you seriously involve your employees in identifying and resolving safety and health problems, they will commit their unique insights and energy to helping achieve the goal, and objectives of your program.

Consider forming a joint employee-management safety committee. This can assist you in starting a program and will help maintain interest in the program once it is operating. Committees can be an excellent way of communicating safety and health information. If you have few employees, consider rotating them so that all can have an active part in the safety and health programming. The men and women who work for you are among the most valuable assets you have. Their safety, health and goodwill are essential to the success of your business. Having them cooperate with you in protecting their safety and health not only helps to keep them healthy — it makes your job easier.

As a small business employer, you have inherent advantages such as close contact with your employees, a specific acquaintance with the problems of the whole business, and usually a low worker turnover. Probably you have already developed a personal relationship of loyalty and cooperation that can be built up very easily. These advantages may not only increase your concern for your employees but also may make it easier to get their help.

Actions to take:

- Post your own policy on the importance of worker safety and health next to the OSHA workplace poster where all employees can see it.
- Hold a meeting with all your employees to communicate that policy to them and to discuss your objectives for safety and health for the rest of the year. (These objectives will result from the decisions you make about changes you think are needed.)

- Make sure that support from the top is visible by taking an active part, personally, in the activities that are part of your safety and health program. For example, personally review all inspection and accident reports to ensure follow-up when needed.
- Ensure that you, your managers, and supervisors follow all safety requirements that employees must follow, even if you are only in their area briefly. If, for instance, you require a hard hat, safety glasses, and/or safety shoes in an area, wear them yourself when you are in that area.
- Use your employee's special knowledge and help them buy into the program by having them make inspections, put on safety training, and/or help to investigate accidents.
- Make clear assignments of responsibility for every part of the program that you develop. Make certain everyone understands them. The more people involved, the better. A good rule of thumb is to assign safety and health responsibilities in the same way you assign production responsibilities. Make it a special part of everyone's job to operate safely. That way, as you grow and disperse production responsibilities more widely, you will disperse safety and health responsibilities with them.
- Give those with responsibility enough people, on-the-clock time, training, money, and authority to get the job done.
- Don't forget about it after you make assignments, make sure personally that they get the job done. Recognize and reward those who do well, and correct those who don't.
- Take time, at least annually, to review what you have accomplished against what you set as your objectives and decide if you need new objectives or program revisions to get where you want to be.

POINT TWO:
Worksite analysis

It is your responsibility to know what you have in your workplace that could hurt your workers. Worksite analysis is a group of processes that helps you make sure that you know what you need to keep your workers safe. You may need help in getting started with these processes. You can call on your states OSHA consultation service for this help. Once you get everything set up, you or your employees can do many of them.

Actions to take:

- Request a consultation visit from your state consultation service covering both safety and health to get a full survey of the hazards which exist in your workplace and those which could develop. (You can also contract for such services from expert private consultants if you prefer.)
- Set up a way to get expert help when you make changes, to be sure that the changes are not introducing new hazards into your workplace. Also, find ways to keep current on newly recognized hazards in your industry.
- Make an assignment (maybe to teams that include employees) to look carefully at each job from time to time, taking it apart step-by-step to see if there are any hidden hazards in the equipment or procedures. Some training may be necessary at the start.
- Set up a system of checking to make sure that your hazard controls haven't failed and that new hazards haven't appeared. This is usually done by routine self-inspections. Your state consultant can probably assist you to establish an effective inspection system.
- Provide a way for your employees to let you or another member of management know when they see things that look harmful to them and encourage them to use it.
- Learn how to do a thorough investigation when things go wrong and someone gets sick or hurt. This will help you find ways to prevent recurrences.
- Initially, take the time to look back over several years of injury or illness experience to identify patterns that can lead to further prevention. Thereafter, periodically look back over several months of experience to determine if any new patterns are developing.

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POINT THREE:
Hazard prevention and control

Once you know what your hazards and potential hazards are, you are ready to put in place the systems that prevent or control those hazards. Your state consultant can help you do this. Whenever possible, you will want to eliminate those hazards. Sometimes that can be done through substitution of a less toxic material or through engineering controls that can be built in. When you cannot eliminate hazards, systems should be set up to control them.

Actions to take:

- Set up safe work procedures, based on the analysis of the hazards in your employees' jobs, and make sure that the employees doing each job understand the procedures and follow them. This may be easier if employees are involved in the analysis that results in those procedures.
- Be ready, if necessary, to enforce the rules for safe work procedures by asking your employees to help you set up a disciplinary system that will be fair and understood by everyone.
- Where necessary to protect your employees, provide personal protective equipment (PPE) and be sure your employees know why they need it, how to use it, and how to maintain it.
- Provide for regular equipment maintenance to prevent breakdowns that can create hazards.
- Plan for emergencies, including fire and natural disasters, and drill everyone frequently enough so that if the real thing happens, everyone will know what to do even under stressful conditions.
- Ask your state consultant to help you develop a medical program that fits your worksite and involves nearby doctors and emergency facilities. Invite these medical personnel to visit the plant before emergencies occur and help you plan the best way to avoid injuries and illness during emergency situations.
- You must ensure the ready availability of medical personnel for advice and consultation on matters of employee health. This does not mean that you must provide healthcare. But, if health problems develop in your workplace, you are expected to get medical help to treat them and their causes.

To fulfill these requirements, consider the following:

- You should have an emergency medical procedure for handling injuries, transporting ill or injured workers, and notifying medical facilities with a minimum of confusion. Posting emergency numbers is a good idea.
- Survey the medical facilities near your place of business and make arrangements for them to handle routine and emergency cases. Cooperative agreements could possibly be made with nearby larger plants that have medical personnel and/or facilities onsite.
- You should have a procedure for reporting injuries and illnesses that is understood by all employees.
- If your business is remote from medical facilities, you are required to ensure that a person or persons be adequately trained and available to render first aid. Adequate first aid supplies must be readily available for emergency use. Arrangements for this training can be made through your local Red Cross chapter, your insurance carrier, your local safety council, and others.
- You should check battery charging stations, maintenance operations, laboratories, heating and ventilating operations, and any corrosive materials areas to make sure you have the required eye wash facilities and showers.
- Consider retaining a local doctor or an occupational health nurse on a part-time or as-used basis to advise you in your medical and first aid planning.

OSHA COMPLIANCE MANUAL

POINT FOUR:
Training for employees, supervisors, and managers

An effective accident prevention program requires proper job performance from everyone in the workplace. As an owner or manager, you must ensure that all employees know about the materials and equipment they work with, what known hazards are in the operation, and how you are controlling the hazards. Each employee needs to know the following:

- No employee is expected to undertake a job until he or she has received job instructions on how to do it properly and has been authorized to perform that job.
- No employee should undertake a job that appears unsafe.

You may be able to combine safety and health training with other training that you do, depending upon the kinds of potential and existing hazards that you have. With training, the "proof is in the pudding" in that the result that you want is everyone knowing what they need to know to keep themselves and their fellow workers safe and healthy.

Actions to take:

- Ask your state consultant to recommend training for your worksite. The consultant may be able to do some of the training while he or she is there.
- Make sure you have trained your employees on every potential hazard that they could be exposed to and how to protect themselves. Then verify that they really understand what you taught them.
- Pay particular attention to your new employees and to old employees who are moving to new jobs. Because they are learning new operations, they are more likely to get hurt.
- Make sure that you train your supervisors to know all the hazards that face the people they supervise and how to reinforce training with quick reminders and refreshers, and with disciplinary action if necessary. Verify that they know what is expected of them.
- Make sure that you and your top management staff understand all of your responsibilities and how to hold subordinate supervisory employees accountable for theirs.

Document your activities

Document your activities in all elements of the Four-Point Workplace Program. Essential records, including those legally required for workers' compensation, insurance audits, and government inspections must be maintained as long as the actual need exists. Keeping records of your activities, such as policy statements, training sessions for management and employees safety and health meetings held, information distributed to employees, and medical arrangements made, is greatly encouraged.

Maintaining essential records demonstrates sound business management as supporting proof for credit applications, for showing "good faith" in reducing any proposed penalties from OSHA inspections, and for insurance audits and others. They also provide a review of your current safety and health activities for better control of your operations and to plan improvements.

Safety and health recordkeeping

Records of sales, costs, profits, and losses are essential to all successful businesses. They enable the company to learn from experience and to make corrections for future operations. Records of accidents, related injuries, illnesses, and property losses can serve the same purpose, if they are used the same way. The sole purpose of OSHA recordkeeping is to store factual information about certain accidents that have happened. When the facts have been determined, causes can often be identified, and control procedures can be instituted to prevent a similar occurrence from happening.

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Injury/illness records

OSHA's injury and illness recordkeeping standard requires a minimum of paperwork. These records will provide you with one measure for evaluating the success of your safety and health activities. Success would generally mean a lack of, or a reduced number of, employee injuries or illnesses during a calendar year.

There are five important steps required by the OSHA recordkeeping system:

1. Obtain a report on every injury or illness requiring medical treatment as described in §1904.7.

2. Record each injury or illness on the OSHA 300 Log according to the instructions provided.

3. Prepare an incident report for each recordable injury or illness case on either an OSHA 301 form or a workers' compensation report providing comparable information.

4. Every year, prepare an annual summary on the OSHA 300A; post it from February 1 through April 30 (such as next to the OSHA 3165 workplace poster).

5. Retain these records for at least five years and update cases that carry over to the next year.

During the year, periodically review the records to see where injuries are occurring. Look for any patterns or repeat situations. These records can help you to identify those high risk areas to which you should direct your immediate attention.

Since the basic OSHA records include only injuries and illnesses, you might consider expanding your own system to include all incidents, including those where no recordable injury or illness resulted, if you think such information would assist you in pinpointing unsafe conditions and/or procedures. Safety councils, insurance carriers, and others can assist you in instituting such a system.

Injury and illness recordkeeping makes sense, and OSHA recommends this practice to all employers. Generally, companies are not required to keep records under the OSHA injury and illness recordkeeping system if they employ 10 or fewer employees or if they are in an exempt industry.

Regardless of the number of employees you have, you may be selected by the Bureau of Labor Statistics (BLS) or OSHA's site-specific targeting program for inclusion in an annual survey. If you are selected, you will receive a letter directly from the appropriate agency with instructions.

Exposure and other records

The injury/illness records may not be the only records you will need to maintain. Certain OSHA standards that deal with toxic substances and hazardous exposures require records on the exposure of employees, physical examination reports, and employment records.

As you work on identifying hazards, you will be able to determine whether these requirements apply to your situation on a case-by-case basis. We mention it here so that you will be aware of these records and that, if required, they should be used with your control procedures and with your self-inspection activity. They should not be considered merely as bookkeeping.

Starting your voluntary activity

You can use this basic action plan to get started on your program. To avoid confusion, we need to explain that this action plan is not organized solely in the order of the four points described earlier. Rather, it provides the most direct route to getting organized to complete your Four-Point Program.

When you have completed your action plan, your activities should be organized around the four points.

OSHA COMPLIANCE MANUAL

Decide to start now

The time to start your safety and health program is now. You have a better picture of what constitutes a good safety and health program. Now you can address the practical concerns of putting these elements together and coming up with a program to suit your workplace.

Presumably you have been taking notes for your action plan as you went through the preceding description of the Four-Point Program. You should be ready now to decide exactly what you want to accomplish, and to determine what steps are necessary to achieve your goals. Then you will plan out how and when each step will be done, and who will do it.

Your plan should consider your company's immediate needs, and provide for ongoing, "long-lasting" worker protection. Once your plan is designed, it is important to follow through and use it in the workplace. You will then have a program to anticipate, identify, and eliminate conditions or practices which could result in injuries and illnesses.

If you have difficulty in deciding where to begin, a phone call to your state consultation service will get you the assistance you need. A state consultant will survey your workplace for existing or potential hazards. Then, if you request it, he or she will determine what you need to make your safety and health program effective. The consultant will work with you to develop a plan for making these improvements, and to establish procedures for making sure that your program stays effective.

Whether you choose to work with a consultant or to develop a program yourself, there are materials available which spell out in greater detail the steps you can take to create an effective safety and health program for your workplace. The rewards for your efforts will be a workplace with a high level of efficiency and productivity, and a low level of loss and injury.

Designating responsibility

You must decide who in your company is the most appropriate person to manage the safety and health program. It must be someone who will ensure that the program becomes an integral part of the business.

Whomever you choose should be as committed to workplace safety and health as you are, who has the time to devote to developing and managing the program, and who is willing to take on the responsibility and accountability that goes with operating an effective program. The success of the program hinges on the success of the individual you choose, and he or she cannot succeed without your full cooperation and support. Remember, though, that the ultimate responsibility for safety and health in the workplace rests with the owner.

Having made your selection of a safety and health manager, you or your designee and any others you choose will need to take (or be sure you have already taken) the following actions.

Get help on the details

First, you may need to catch up with all the changes made since the Act became law in December 1970. For example, the federal law contains provisions for allowing a state to develop and operate its own occupational safety and health program in place of the federal OSHA program. It is possible that the regulatory aspect of the law (setting of mandatory minimum standards and conducting inspections of workplaces) is now being operated by your state government.

You need to know which level of government has current jurisdiction over your establishment. If you are not sure of this, telephone the nearest OSHA Area Office to find out. (See the REFERENCE section).

Second, you will need certain federal OSHA publications (or comparable state publications) for use in your safety and health activities:

1. *OSHA workplace poster (Job Safety and Health Protection OSHA 2203 or 3165 "It's the Law"):* You must have the federal or state OSHA poster prominently displayed in your workplace.

2. *Standards that apply to your operations:* You need these standards for reference material in your daily operations. These are the regulations OSHA uses when inspecting for compliance with the OSH Act. These standards are the baseline for your own inspections and are useful in determining what specific changes need to be made when hazards are identified. Most businesses come under OSHA's General Industry Standards, but if you are involved with construction or maritime operations you will need the standards that apply to these classifications. (In states with OSHA programs, use the appropriate state standards.)

3. *Recordkeeping requirements and the necessary forms:* You need these if you have 11 or more employees and your company is not part of an exempt SIC. These forms are not too different from other information forms you have been keeping for workers' compensation and other records.

4. *Occupational Safety and Health Act:* You may want this for your own information and reference.

Clean up your place of business

Poor housekeeping is a major contributor to low morale and sloppy work in general, even if it is not usually the cause of major accidents. Most safety action programs start with an intensive clean-up campaign in all areas of business.

- Get rid of rubbish that has collected;
- Make sure proper containers are provided;
- See that flammables are properly stored;
- Make sure that exits are not blocked;
- If necessary, mark aisles and passageways; and
- Provide adequate lighting.

Get everyone involved and impress on them exactly what it is you want to do to make your workplace safer, more healthful, and more efficient.

Start gathering specific facts about your situation

Before you make any changes in your operations, you will want to gather as much information as possible about the current conditions at your workplace and about business practices that are already part of your safety and health program. This information can help you identify any workplace problems and see what's involved in solving them.

The assessment of your workplace should be conducted by the person responsible for the safety and health program and/or a professional safety and health consultant. It consists of two major activities.

Comprehensive survey

The first is a comprehensive safety and health survey of your entire facility, designed to identify any existing or potential safety and health hazards. This initial survey should focus on evaluating workplace conditions with respect to safety and health regulations and generally recognized safe and healthful work practices. It should include checking on the use of any hazardous materials, observing employee work habits and practices, and discussing safety and health problems with employees.

Program assessment

The second major activity is an assessment of your existing safety and health program to identify areas that may be working well and those that may need improvement. You will want to gather together as much information as you can that relates to the safety and health management of your workplace. You should include the following in this review:

- **Safety and health activities** — Examine current ongoing activities as well as those tried previously, company policy statements, rules (both work and safety), guidelines for proper work practices and procedures, and records of training programs.
- **Equipment** — Make a list of your major equipment, principal operations, and the locations of each. Special attention should be given to inspection schedules, maintenance activities and plant and office layouts.
- **Employees' capabilities** — Make an alphabetical list of all employees, showing the date they were hired, what their jobs are and what experience and training they have had. Special attention should be given to new employees and to employees with handicaps.
- **Accident and injury/illness history** — Take a look at your first aid cases, workers' compensation insurance payments, and workers' compensation awards. Review any losses. Determine how your insurance rate compares with others in your group. Special attention should be given to recurring accidents, types of injuries, etc.

With whatever facts you have been able to assemble, take a quick look to see if any major problem areas can be identified. You would be looking for such things as interruptions in your normal operations, too many employees taking too much time off, too many damaged products, etc. General assistance in this kind of problem identification can often be obtained from compensation carriers, local safety councils, state agencies, your major suppliers and even, perhaps, a competitor.

If there is a major problem, see what can be done to solve it. Once a problem is identified, you can work on the corrective action or a plan for controlling the problem. Take immediate action at this point and make a record of what you have done. Don't become overly involved in looking for major problem areas during this fact-finding stage. Remember that no one hazardous situation causes all of your safety and health problems. Therefore, it is likely that no single action will greatly improve your safety and health program.

If you have found no major problem at this point, don't stop here. Now it is time to develop a comprehensive safety and health program that meets your needs and those of your employees. This will make it more difficult for major problems to crop up in the future.

Establish your four-point safety and health program

The success of any workplace safety and health program depends on careful planning. This means that you have taken time to think through what you want to accomplish, and you may even have a general idea of what it will take to accomplish your goals. Based on that, you can design a step-by-step process that will take you from the idea stage to having a fully effective operation.

The most effective way to create the safest possible workplace for you and your employees is to institute the Four-Point Program.

Establish your management commitment and involve your employees. No safety and health program will work, especially in the long term, without this commitment and involvement. You should have already taken the first step by designating the person who will be responsible for the program.

Be certain that employees are as widely involved in the program as possible from the beginning. They are the people most in contact with the potential and actual safety and health hazards at your worksite. They will have constructive input into the development of your safety and health program. Its ultimate success will depend upon their support — support that will be more forthcoming for a program in which they have had a meaningful input.

Make sure your program assigns responsibility and accountability to all employees in your organization. A good safety and health program makes it clear that each and every employee from you through the supervisory levels to the line worker is responsible for his or her part of the program. You will make their safety and health duties clear and each of them will be held accountable for his or her safety and health related duties.

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Establish and regularly conduct your worksite analysis. You can't have a successful safety and health program if it has not identified all the hazards and potential hazards present in the workplace. This is an ongoing process that includes routine self-inspections if you are to know where probable hazards exist and whether or not they are under control.

Create the systems and procedures necessary to prevent and control the hazards that have been identified through your worksite analysis. These control procedures will be the basic means for preventing accidents. The OSHA standards can be of great assistance to you since they address controls in order of effectiveness and preference. Where no standard exists, creative problem solving and consultant resources should help you create effective controls. The basic formula OSHA follows is, in order of preference:

1. *Eliminating the hazard* from the machine, the method, the material, or the plant structure.

2. *Abating the hazard* by limiting exposure or controlling it at its source.

3. *Training personnel* to be aware of the hazard and to follow safe work procedures to avoid it.

4. *Prescribing personal protective equipment* for protecting employees against the hazard.

Be sure to establish and provide ongoing training for employees, supervisors, and managers. This should ensure that everyone will know about the hazards that exist and how to control them.

Each of these points is crucial if you want to establish a safe and healthy workplace. They also work together to reinforce each other, thereby making it more difficult for accidents to occur and for work-related health problems to develop.

Develop an action plan

Develop an action plan to help you build your safety and health program around the four point program. It can serve as a road map to get your program from where it is now to where you want it to be. It tells you what has to be done, the logical order in which to do it, who is responsible, and perhaps most important, where you want to be when you finish. It is a specific description of problems and solutions, but it is not ironclad — it can and should be changed to correspond with changes in the workplace.

A good action plan has two parts:

1. *An overall list of the major changes or improvements* that are needed to make your safety and health program effective. Assign each item a priority and a target date for completion, and identify the person who will monitor or direct each action.

2. *A specific plan on how to implement each major change or improvement*. Here, you would write out what you wanted to accomplish, the steps required, who would be assigned to do what, and when you plan to be finished. This part of the action plan will help you keep track of program improvements so that details do not slip through the cracks. When several improvements are being made at once, it is easy to overlook something that may be an important prerequisite for your next action.

Implement the action plan

Once the plan has been established, you must begin putting it into action. This begins with the item that has been assigned the highest priority. Check to make sure it is realistic and manageable, then address the steps you have written out for that item. This detailed description of the steps required will help you keep track of the development that is taking place. Keep in mind that you can, of course, work on more than one item at a time, and that the priorities may change as other needs are identified or as your company's resources change.

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Open communication with employees is crucial to the success of your efforts. Their cooperation depends on understanding what the safety and health program is all about, why it is important to them, and how it affects their work. The more you do to involve them in the changes you are making, the smoother your transition will be.

By putting an action plan into operation at your workplace, you will have taken a major step toward having an effective safety and health program. Remember, a safety and health program is a plan put into practice. Keep your program on track by periodically checking its progress and by calling on a state consultant when you need assistance.

Review the program

Any good management system requires a periodic review to make sure that the system is operating as intended. Every so often (quarterly, semi-annually, or annually), you should take a careful look at each critical component in the safety and health program to determine what is working well and what changes are needed. Your consultant can assist you in this area as well. When you identify improvements that should be made, you have the basis for new safety and health objectives for the coming year. Developing new action plans for those improvements will help you to continue to progress toward an effective safety and health program. That, in turn, will reduce your safety and health risks and increase efficiency and profit.

Remember, however, that it is also important to document the activities. The only way you can evaluate the success of your safety and health program is to have the documentation available to tell you what has been done, to assess how it has worked, and to provide guidance on how you can make it work even better.

Technical assistance may be available to you through your insurance carrier, your fellow business people, suppliers of your durable equipment and raw materials, the local safety council, and many local, state and federal agencies, including the state consultation programs and OSHA Area Offices. You may find help in the yellow pages of your telephone directory which will give you the names of many companies which specialize in items and services relating to safety, health, and fire prevention.

Reap the rewards

Establishing a quality safety and health program at your place of business will take some time and involve some resources. However, you should be pleasantly surprised with the results. You will have happier employees because they will know you are committed to their safety and health on the job. You will probably save money through increased productivity and reduced workers' compensation insurance costs. You will find increased respect in your community. The rewards you receive will surely exceed the cost of your investment in safety and health protection.

Overview of California's workplace injury and illness prevention (IIP) program

The following information highlights the main elements of the safety and health program required by California OSHA. While employers in states covered by Federal OSHA are not required to have a safety and health program, many choose to develop a comprehensive program that pulls together all workplace safety and health issues.

If you're thinking about implementing a safety program, the California plan is one of several state plans you can use as a guide. Or, if you already have a program in place, use this overview to evaluate its effectiveness, strengths, and weaknesses. The complete California Injury and Illness Prevention Program requirements are located in Title 8, Section 6760 of the *California Code of Regulations*, on the Internet at www.dir.ca.gov/title8/6760.html.

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Guide to developing an injury and illness prevention program

In California, every employer has a legal obligation to provide and maintain a safe and healthful workplace for the employees. A written, Injury and Illness Prevention (IIP) Program has been required for every California employer since 1991.

Employers have responsibilities to establish, implement, and maintain an IIP program that helps assure the safety and health of employees while on the job. Under the California requirements of SB 198, a written injury and illness prevention program must include the following procedures and put them into practice:

- Management commitment/assignment of responsibilities,
- Safety communications system with employees,
- System for assuring employee compliance with safe work practices,
- Scheduled inspections/evaluation system,
- Accident investigation,
- Procedures for correcting unsafe/unhealthy conditions,
- Safety and health training and instruction, and
- Recordkeeping and documentation.

Management commitment and assigning responsibilities

An employer's commitment to safety and health shows in every decision that is made and every action taken. Employees will respond to that commitment.

The person or persons with the authority and responsibility for your safety and health program must be identified and given management's full support. You can demonstrate your commitment through your personal concern for employee safety and health and by the priority you place on these issues.

If you and your management team do not support and participate in the program, you are doomed to failure from the start. It is especially important for plant supervisors and field superintendents to set a good example.

Safety communications

Your program must include a system for communicating with employees — in a form readily understandable by all affected employees — on matters relating to occupational safety and health, including provisions designed to encourage employees to inform the employer of hazards at the worksite without fear of reprisal.

1. Your communication system needs to be in a form that is readily understandable by all affected employees. This means you should be prepared to communicate with employees in a language they can understand, either through written text, orally, or some other method that is "readily understandable."
2. Schedule general employee meetings at which safety is freely and openly discussed by those present.
3. Training programs.
4. Posters and bulletins.
5. Newsletters or similar publications devoted to safety.
6. A safety suggestion box.

7. Publish a brief company safety policy or statement informing all employees that safety is a priority issue with management, and urge employees to actively participate in the program for the common good of all concerned.
8. Communicate your concerns about safety to all levels of management.
9. Document all communication efforts.

Hazard assessment and control

Periodic inspections and procedures for correction and control provide a method of identifying existing or potential hazards in the workplace and eliminating or controlling them. Hazard control is the heart of an effective injury and illness prevention program.

Hazards that occur or recur reflect a breakdown in the hazard control system. An effective hazard control system will identify hazards that exist or develop in your workplace, how to correct those hazards, and steps you can take to prevent their recurrence. The hazard control system is also the basis for developing safe work procedures and injury/illness prevention training.

Accident investigation

Accident investigation is the primary tool you should be using to identify and recognize the areas and jobs responsible for accidents. The investigation proceedings need to be in writing and adequately identify the cause(s) of the accident or near-miss occurrence.

Accident investigations should be conducted by trained individuals, with the primary focus of understanding why the accident or near miss occurred and what actions can be taken to preclude recurrence. Questions to ask in an accident investigation include:

1. What happened?
2. Why did the incident happen?
3. What should be done?
4. What action has been taken?

Thorough investigation of all accidents and near misses will help you identify causes and corrections, and can help you determine why accidents occur, where they happen, and any accident trends. This type of information is critical to preventing and controlling hazards and potential accidents.

Safety planning, rules, and work procedures

Planning for safety and health is an important part of every business decision, including purchasing, engineering, changes in work processes, and planning for emergencies. Safety and health planning is effective when your workplace has:

1. Rules that apply to everyone, addressing areas such as personal protective equipment, appropriate clothing, expected behavior, and emergency procedures.
2. Safe and healthful work practices developed for each specific job.
3. Discipline and reward procedures.
4. A written plan for emergency situations.

Safety and health training

Training is one of the most important elements of any injury and illness prevention program. It allows employees to learn their jobs properly, brings new ideas into the workplace, reinforces existing ideas and practices, and puts your program into action.

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An effective injury and illness prevention program requires proper job performance by everyone in the workplace. As the employer, you must ensure that all employees are knowledgeable about the materials and equipment they are working with, what known hazards are present, and how they are controlled.

Supervisors must recognize that they are often the primary safety trainers in your organization. Encourage and help them by providing supervisory training.

Getting started

Put the elements of an injury and illness prevention program together and come up with a plan to suit your individual workplace. Decide exactly what you want to accomplish and determine what steps are necessary to achieve your goals.

Then plan out how and when each step will be carried out and who will do it — and put this plan in writing. In developing the plan, consider your company's immediate needs and provide for ongoing worker protection.

Assign responsibilities

Decide who in your company will be given responsibility and authority to manage this program. In many cases, it's the owner.

When considering responsibility, don't forget to include all of your employees. Give each employee training and responsibility to follow your safety and health procedures, and to recognize and report hazards in his/her immediate work area.

Look at what you have

Before you make any changes in your safety and health operations, gather as much information as possible about current workplace conditions and practices that are already part of your injury and illness prevention program. This information will help you identify workplace problems and determine what is needed to solve them.

Safety and health survey

Perform a comprehensive safety and health survey of your facility to identify existing or potential safety and health hazards. This survey should evaluate workplace conditions with respect to:

- Safety and health regulations,
- Generally recognized safe work practices,
- Physical hazards,
- Use of any hazardous materials,
- Employee work habits, and
- Safety and health problems with employees.

The survey must be documented if made for the purpose of establishing an injury and illness prevention program.

Workplace assessment

Perform an evaluation of your existing injury and illness prevention program to identify areas that may be working well and those that may need improvement by examining:

- Accident, injury or illness data,
- Workers' compensation costs,

- Rates of employee turnover or absenteeism,
- Information on safety and health activities ongoing or previously tried,
- Policy statements,
- Rules — both work and safety,
- Guidelines for proper work practices and procedures,
- Records of training programs,
- Compliance with all applicable state and federal regulations,
- Employee capabilities — make an alphabetical list of all employees, showing the dates they were hired, their jobs, work experience, and training — give special attention to new employees and employees with handicaps,
- Joint labor-management safety and health committee activities, and
- Other safety-related programs.

Review and compare

After all the facts are gathered, look at how the information on your workplace corresponds with applicable standards and with the critical components of an injury and illness prevention program: management commitment assignment of responsibilities; safety communications system with employees; system for assuring employee compliance with safe work practices; scheduled inspections/evaluation system; accident investigation; procedures for correcting unsafe/unhealthy conditions; safety and health training and instruction; and recordkeeping and documentation.

Develop an action plan

An action plan is a specific, written description of problems and solutions — it can and should be changed to correspond with changes in the workplace. A good action plan has two parts:

- An overall list of major changes or improvements needed to make your program effective.
- Taking each major change or improvement listed and working out a specific plan for making that change.

Take action

Put your plan into action, beginning with the item assigned highest priority. Make sure it's realistic and manageable, then address the steps you've written out for that item.

By putting your plan into operation, you will have taken a major step toward having an effective injury and illness prevention program. Remember, an injury and illness prevention *program* is a *plan* put into *practice*.

Maintain your program

Schedule a review — quarterly, semi-annually or annually — to look at each critical component in your injury and illness prevention program. Evaluate for what is working well and what changes, if any, are needed. When you identify needs that should be addressed, you have the basis for new safety and health objectives for program improvement.

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Safety and health recordkeeping

No operation can be successful without adequate recordkeeping, which enables you to learn from past experience and make corrections for future operations. Records of accidents, work-related injuries, illnesses and property losses serve a valuable purpose. Upon review, causes can be identified and control procedures instituted to prevent the illness or injury from recurring.

Injury and illness records

Injury and illness records give you one measure for evaluating the success of your safety and health activities. The reduction or elimination of employee injuries or illnesses during a calendar year is a measurement of a successful program.

Exposure records

Injury and illness records are not be the only records you need to maintain. Some standards concerning toxic substances and hazardous exposures require employee exposure records to be maintained, as well as physical examination reports, employment records, and other information.

Document your activities

Essential records, including those legally required for workers' compensation, insurance audits, and government inspections, must be maintained for as long as required.

Overview of Minnesota's workplace accident and injury reduction (AWAIR) program

The following information highlights the main elements of the safety and health program required by Minnesota OSHA. While employers in states covered by Federal OSHA are not required to have a safety and health program, many choose to develop a comprehensive program that pulls together all workplace safety and health issues.

If you're thinking about implementing a safety program, the Minnesota plan is one of several state plans that you can use as a guide. Or, if you already have a program in place, use this overview to evaluate its effectiveness, strengths, and weaknesses. The full text of the Minnesota AWAIR Program is located on the Minnesota Department of Labor website at www.doli.state.mn.us/awair.pdf.

Guide to developing a workplace accident and injury reduction (AWAIR) program

In 1990, the Minnesota legislature enacted a law requiring state employers in certain industries to develop written, comprehensive workplace safety and health programs. This legislation is known as A Workplace Accident and Injury Reduction (AWAIR) Act, and programs developed to comply with the act are known as AWAIR programs.

There are several reasons why a company should consider developing a comprehensive safety and health program, even if it is not required. One reason is that federal OSHA has documented a strong link between active safety and health programs and low rates of occupational injury and illness. Companies with effective safety and health programs have significantly lower injury and illness rates than those that do not.

Secondly, a safety and health program can help an employer develop and organize all of the organization's specific programs, such as hazard communication, respiratory protection, and emergency response.

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Goals and objectives

Central to AWAIR programs are the goals and objectives that an organization sets for its overall safety and health program. Goals establish the direction for the program and state what the organization wants to achieve. The best goals are generally challenging to reach or complete, but are also possible to achieve. They should be specific to the organization or facility.

Objectives are the specific actions that will be taken to attempt to achieve the goals. The best objectives are those that can either be measured or demonstrated.

Example

Goal: We will reduce our injury and illness rate by 15 percent by 2004, using 1998 as the baseline.

Objectives:

1. We will address all employee safety issues in a timely manner, i.e., hazards that potentially pose an imminent danger of death or serious physical injury will be initially addressed within one shift and other hazards will be initially addressed within one week.
2. We will perform a monthly safety inspection of all departments and will take corrective action or begin investigating long-term solutions for all hazards identified during the inspection within one week.
3. We will investigate all accidents and near-miss events and will take corrective action within 24 hours to prevent a recurrence.

Ideally, a company's safety and health program will correspond with and become part of the overall mission or business plan. Every employee should know what the goals of the organization's safety program are and how they are to be achieved.

Roles and responsibilities

Safety and health programs must describe how everyone in the organization, whether management, first-line supervision, or labor is responsible for making the program work. These duties should be clearly laid out. Everyone in the organization should be able to explain what his or her role is in creating a safer, healthier workplace.

Employees need to feel they have some ownership and responsibility for creating a safe workplace. They must be provided with the training, equipment, resources, and assistance to carry out their roles. Employees and supervisors need to know where to go to get assistance to resolve issues of safety and health and to get their concerns addressed and questions answered. Most importantly, they need to know how to correct safety and health hazards in the workplace as the hazards are identified.

Management participation and commitment is crucial to the success of the safety and health program. Management must not only establish the program and communicate it to everyone in the organization, but also provide the resources to improve safety and health throughout the entire organization. This includes providing employees and supervisors with the:

- Authority to identify and correct hazards,
- Budget to purchase new equipment or make repairs,
- Training necessary to work safely and to recognize hazards, and
- Systems to get repairs made, materials ordered and other improvements accomplished.

Management also establishes the importance of the program, both by the priority they give workplace safety and health issues, and by the example they set by initiating safety and health improvements, correcting hazards, enforcing safety rules, rewarding excellent performance in safety and health, and by following all safety rules. Safety and health programs are similar to quality improvement and other efforts organizations

engage in to continually improve performance, customer service, competitiveness, and organizational culture.

Some questions to ask when evaluating the development and implementation of roles and responsibilities in the safety program include:

- Does everyone in the organization, whether a worker, a supervisor, or a manager, know what their role is in the safety and health program and what their responsibilities are?
- Do employees feel as if they personally are part of the safety program and are responsible for their safety and that of their coworkers?
- Does management put the same value on worker safety and health as other organizational programs, such as product quality, on-time delivery, and cost containment?
- Does everyone, including management, follow all safety rules?
- Do employees feel they are able to get their safety and health concerns addressed in a timely manner?
- Are executives, managers, and supervisors held accountable for workplace safety and health?

Hazard identification, analysis, and control

Another important facet of Minnesota's AWAIR program is a discussion about what methods the organization plans to use to identify, analyze, and control workplace hazards. This includes both hazards that currently exist in the workplace and those that may occur due to future changes, such as the introduction of new equipment, processes or materials, or the revision of existing procedures.

There are several methods companies can use to identify hazards. Some rely solely on walkaround inspections by first-line supervisors, management, or safety committees; others go through formal hazard analyses of different parts of the operation; and some use a combination of methods. Regardless of the methods used, the best hazard identification methods combine expert opinion about safety and health hazards with input from either a cross-disciplinary team or at least one employee who works directly with the process or equipment in question.

At least some of the individuals involved in hazard identification need to be trained in hazard recognition. Inspections must be done on a regular basis to identify both newly developed hazards and those previously missed. Employers should also consider the value of periodic industrial hygiene monitoring and sampling for agents such as hazardous substances, noise, and heat.

Checklists

Checklists are common tools used for hazard identification. Checklists can serve as a good starting point for identifying workplace hazards. Some checklists identify the most common hazards associated with a specific industry or process, while others cover a wide variety of workplaces. One disadvantage of using a checklist is it focuses an inspection on certain specific hazards and can cause other hazards not on the checklist to go unnoticed. This is particularly true of generic checklists that are not site- or process-specific.

Job hazard analysis

Another method often used to identify workplace hazards is job hazard analysis (JHA), also known as job safety analysis. This type of analysis is a step-by-step method of identifying the hazards associated with a particular task or job. The employee who normally performs the job should be involved in the development of the JHA. Use the following steps to create a JHA:

1. List all the job steps or tasks the worker must perform to complete the job. The list is created by watching the employee perform the operation in question, recording each step of the process, and reviewing the list with the employee for completeness.
2. Review each step to determine what safety and health hazards are or could be present; these should be listed as well. Further observation may be necessary to assure all possible hazards are identified.

3. Determine what measures, if any, can eliminate or lessen the risk of injury or illness to the employee from the identified hazards. These measures can include engineering controls such as guarding or ventilation, work practices, administrative controls such as job rotation, and personal protective equipment.

Process hazard analysis

A process hazard analysis (PHA) is generally a more complex procedure. Federal OSHA defines a PHA as "an organized and systematic effort to identify and analyze the significance of potential hazards associated with the processing or handling of highly hazardous chemicals." This analysis is typically associated with the Process Safety Management of Highly Hazardous Chemicals standard.

Regardless of the technique used, all employees should know how to report workplace safety and health hazards to have them evaluated and corrected. Use of the reporting system should be encouraged by management. Employers need to respond to complaints in a timely fashion. The employees should be updated about the status of the complaint investigation and its outcome and have the authority and ability to correct hazards themselves whenever feasible.

Communication

A written safety and health program is just words on paper if management and employees are not aware of it and understand it. Employees cannot follow safety rules, identify hazards, use correct work procedures or protective equipment, or work to achieve goals if they do not have the necessary knowledge to do so. Furthermore, if employees are afraid to discuss safety and health concerns with management or have no clear method of reporting their concerns to management, safety and health hazards can go undetected. Uncorrected hazards can adversely affect employee morale and productivity, even if an accident, injury or illness does not occur as a result.

While communication regarding safety and health issues should be a continual process, there are times when it is especially critical, including the beginning of an employee's new job assignment, whenever material, process or procedural changes are implemented, and whenever the employer notices deficiencies in safe work practices.

How to communicate

Communication can take many forms. One of the most commonly used methods is training; safety training should go beyond the minimum requirements of OSHA regulations. Supervisors have to receive at least as much safety and health training as their employees, if not more. Don't rely strictly on written materials because many working adults lack basic reading skills. Many also have limited use of the English language. Be sure to take these factors into consideration when safety and health information is communicated.

Other methods of communicating job safety and health information include:

- Posters,
- Employee handbooks,
- Handout materials — including one-page fact sheets or booklets,
- Computer-based learning, and
- Safety promotional activities.

One of the strongest methods of communication is by example. Managers and supervisors must model their behavior for employees by working safely and following all safety and health rules.

Effective communication flows in two directions. Employees must feel free to discuss their safety concerns with their supervisors without fear of retaliation. They should know the proper procedures for reporting safety and health hazards in the workplace to get the hazards corrected or to get their questions answered. Supervisors should know who to contact for assistance in addressing safety issues and have the authority to take appropriate corrective action. Top management should work to make sure communication is occurring on all levels of the organization.

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Accident investigation

Accident investigation is a key component of a safety and health program. The goal of an accident investigation should be hazard identification and prevention. It should not be to affix blame.

All events that cause injuries or property damage must be examined. All near misses, those events where injury or property damage does not occur, but could have if conditions were different, should also be investigated. Start the incident investigation as soon as possible. Take precautions to control any remaining hazards in the area before the investigation team enters.

Federal OSHA describes the following as three cause levels for accidents.

- *Direct causes* — the immediate causes of the injury, illness or damage. Direct causes are the hazardous material(s) or energy (e.g., electrical energy, potential energy or heat) that caused the injury or damage.
- *Indirect causes* — unsafe acts and conditions that caused the hazardous materials or energy to exceed safe limits.
- *Basic causes* — those that contribute to the creation of the indirect hazards. These can include poor management policies, personal factors or environmental factors.

The goal is to identify the causes of the accident and determine how to eliminate one or more of these causes to prevent another accident. Investigators need to ask questions, such as:

- Who was involved in the event?
- Who witnessed the event?
- What happened?
- What was abnormal or different before the accident occurred?
- When did each event in the incident occur?
- Where did the hazard first occur?
- How and why did an event take place?

The ultimate goal of the investigation is to determine the basic and root causes, and to determine appropriate corrective action so the incident does not happen again. To simply attribute an accident to "employee error," without further consideration of the basic causes, deprives the organization of the opportunity to take real preventive action.

Possible use of engineering controls, improved work practices and administrative controls should be considered to help employees do their jobs safely. Management practices should also be considered as a possible basic factor. If there is managerial or supervisory pressure to increase production or cut costs, employees may take unsafe shortcuts in work procedures or necessary preventive maintenance may be delayed or skipped.

Enforcement of safety and health programs

Responsibility for safety and health exists at all levels in an organization. Managers, supervisors and employees need to know what their duties are to create a safe and healthful workplace and follow all safety rules. All employees must know and understand what to do and not do to make the workplace safer for themselves and their coworkers. They have to be trained on safe work practices, and the proper use of engineering controls and personal protective equipment. Employees should be coached to correct unsafe behavior and disciplined if violations continue. Safety procedures need to become a key part of the daily routine.

Enforcement of safe work practices has to be fair, consistent throughout the organization, and based on established policy. Management and supervision should be conscious of the examples they set for the workplace and obey the same rules as the rest of the workforce.

Negative behavior must be discouraged and positive behavior reinforced. Exceptional performance or efforts in workplace safety and health should be recognized by the organization.

Program review

Program review is vital, because it serves as a check to see if the organization is making progress towards its goal of creating a safer, healthier workplace for all employees. The Minnesota AWAIR Act requires employers to review the entire program at least annually and document the findings.

Review documentation

The first step in a program evaluation should be a review of the documents created during the past year relevant to the workplace safety and health program.

- One of the first documents that should be reviewed is the facility's OSHA 300 *Log of Work-Related Injuries and Illnesses*. The log and the accompanying *First Report of Injury* forms should be examined for trends, such as similar injuries to those workers with similar job duties, similar causes of injuries and illnesses, or departments with higher than average injury rates.
- Accident investigation reports should also be reviewed. If similar accidents or near misses continue to occur in the facility, perhaps the root causes of the events are not being determined during the investigation or corrective action is not being implemented.
- Reports from safety committee or supervisor inspections or walkarounds should be reviewed as well. If the hazards causing injury or illness in the workplace are not being identified through these inspections, then efforts should be made to assist the individuals to improve the process. Possibilities include additional training about hazard recognition, technical assistance from an OSHA workplace safety consultant, insurance loss-control specialist or private consultant, or the allotment of more time for more extensive or frequent inspections.
- Specific written programs, such as Employee Right-To-Know and Respiratory Protection, should also be reviewed for completeness and accuracy.

Talk to employees and supervisors

Employee and supervisor interviews are the next step. These can be formally conducted or simply a casual conversation as part of an inspection or walkaround. Employees should be selected at random. Contractor employees, if present, should be interviewed as well. Some questions to ask include:

- What are some of the hazards involved with your job? How do you protect yourself from them?
- Are written operating procedures correct? Do you follow them as written? Describe the safety precautions that you follow.
- What are your responsibilities for workplace safety?
- Do you know what the organization's goals are for workplace safety and health? What are they?
- What are the chemicals that you work with? What are some of the possible health effects if you are overexposed to them?
- Do you have any specific safety and health concerns? What are they?
- Do you know how to report a safety hazard so that it can be corrected? How?
- Are safety hazards corrected when you point them out to your supervisor or manager? If not, why not?

Review corrective actions

Corrective actions resulting from hazards identified during accident investigations or routine inspections should be taken as soon as possible. Review documents verifying corrective actions have been taken.

Safety committees

Minnesota requires that all employers with more than 25 employees "establish and administer a joint labor-management safety committee." Employers with 25 or fewer employees that either have a lost-workday case incidence rate in the top 10 percent of all rates for employers in the same industry or have a workers' compensation pure premium rate as reported by the Workers' Compensation Rating Association in the top 25 percent of premium rates for all classes also must establish a committee.

The statutory requirements for these committees are that the safety committee must hold regularly scheduled meetings unless otherwise provided in a collective bargaining agreement, and that employee safety committee members must be selected by employees.

An active, trained safety committee can be an important tool for implementing an effective safety and health program. Duties that safety committee members can assume include:

1. Participating in regular walkaround inspections;
2. Training new employees about safe working procedures;
3. Performing job hazard analyses (JHAs);
4. Providing input for the creation of workplace safety and health rules;
5. Presenting safety and health information at regularly scheduled staff meetings;
6. Assisting in accident investigations; and
7. Bringing employee safety and health concerns and complaints to supervision and management for correction.

Safety committee members should be able to perform their duties without fear of discrimination or retaliation by management.

Safety and health program evaluation profile (PEP)

OSHA's assessment of safety and health conditions in the workplace depends on a clear understanding of the programs and management systems that an employer is using for compliance. In 1996, the Agency developed the Program Evaluation Profile (PEP) as an assessment tool for evaluating safety and health programs.

Editor's note: The PEP proved difficult and timely for compliance officers to use, and in November 1996, OSHA cancelled the program. While PEP is no longer enforceable, it provides an example of an auditing tool for employers to use when evaluating safety and health programs. Basic elements of the PEP follow.

Basic elements

Evaluate and score the following basic elements of a good safety and health program.

- **Management leadership and employee participation.** In addition to these elements, the evaluation will include the implementation process. This involves the tools provided by management such as budget, information, personnel, assigned responsibility, adequate expertise and authority, line accountability, and program review procedures.
- **Workplace analysis**. Includes survey and hazard analysis, inspection, and reporting.
- **Accident and record analysis.** Covers the investigation of accidents, near-miss incidents, and data analysis.

- **Hazard prevention and control.** Includes hazard control, maintenance, and the medical program.
- **Emergency response.** Covers emergency preparedness and first aid.
- **Safety and health training** (as a whole).

Program levels

Calculate an overall score for each worksite by taking the average of the individual scores and dividing by six. The overall score on the PEP constitutes the level at which an establishment's safety and health program is evaluated.

5 = Outstanding program

4 = Superior program

3 = Basic program

2 = Developmental program

1 = No program or an ineffective program

Safety and health programs should be in writing to be effectively implemented and communicated. However, a program's effectiveness is more important than whether or not it is in writing. A small worksite may have an effective program that is not written, but is understood and followed by employees.

Using the PEP

1. **Recording the score.** The program elements in the PEP correspond generally to the major elements of the 1989 Voluntary Safety and Health Program Management Guidelines.

   a. **Elements.** The six elements to be scored in the PEP are:

      (1) Management leadership and employee participation.

      (2) Workplace analysis.

      (3) Accident and record analysis.

      (4) Hazard prevention and control.

      (5) Emergency response.

      (6) Safety and health training.

   b. **Factors.** These elements [except for (6),Training] are divided into factors, which will also be scored. The score for an element will be determined by the factor scores. The factors are:

      (1) Management leadership and employee participation.

         - Management leadership.
         - Employee participation.
         - Implementation [tools provided by management, including budget, information, personnel, assigned responsibility, adequate expertise and authority, line accountability, and program review procedures].
         - Contractor safety.

      (2) Workplace analysis.

         - Survey and hazard analysis.
         - Inspection.
         - Reporting.

(3) Accident and record analysis.

- Investigation of accidents and near-miss incidents.
- Data analysis.

(4) Hazard prevention and control.

- Hazard control.
- Maintenance.
- Medical program.

(5) Emergency response.

- Emergency preparedness.
- First aid.

(6) Safety and health training (as a whole).

c. **Scoring.**

(1) The **PEP Tables** provide verbal descriptors of workplace characteristics for each factor for each of the five levels. Refer to these tables to ensure that the score you assign to a factor corresponds to the descriptor that best fits the worksite.

NOTE: The descriptors are intended as brief illustrations of a workplace at a particular level. The descriptor that "best fits" will not necessarily match the workplace exactly or in literal detail.

(2) Determine scores for each of the six elements as follows:

(a) The score for the "Management Leadership and Employee Participation" element shall be whichever is the lowest of the following:

1. The score for the "Management Leadership" factor.
2. The score for the "Employee Participation" factor.
3. The average score for all four factors.

NOTE: The factors of "Management Leadership" and "Employee Participation" are given greater weight because they are considered the foundation of a safety and health program.

(b) For the sixth element, Training, just determine the level 1-5 that best fits the worksite and note it in the appropriate box on the PEP.

(c) For each of the other four elements, average the scores for the factors.

(d) In averaging factor scores, round to the nearest whole number (1, 2, 3, 4, or 5). Round up from one-half (.5) or greater; round down from less than one-half (.5).

(3) If the element or factor does not apply to the worksite being inspected, a notation of "Not Applicable" shall be made in the space provided. This shall be represented by "N/A" or, in IMIS applications, "0." The score will not be affected.

d. **Overall score.** An "Overall Score" for the worksite will be recorded on the score summary. This will be the average of the six individual scores for elements, rounded to the nearest whole number (1, 2, 3, 4, or 5). Round up from one-half (.5) or greater; round down from less than one-half (.5).

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EXAMPLE: A PEP's element scores are:

2 2 1 3 2 3 — 13	$\frac{13}{6} = 2.16 = 2$

e. **Rating and tracking.** The six individual element scores, in sequence (e.g., "2-2-1-2-3-1") will constitute a "rating" for purposes of tracking improvements in an establishment's safety and health program, and shall be recorded.

2. **Program levels.** The Overall Score on the PEP constitutes the "level" at which the establishment's safety and health program is scored. Remember: this level is a relatively informal assessment of the program, and it does not represent a compliance judgement by OSHA — that is, it does not determine whether an employer is in compliance with OSHA standards. The following chart summarizes the levels:

Score	Level of safety and health program
5	Outstanding program
4	Superior program
3	Basic program
2	Developmental program
1	No program or ineffective program

3. **Specific scoring guidance.** The following shall be taken into account in assessing specific factors:

a. **Written programs**. Employer safety and health programs should be in writing in order to be effectively implemented and communicated.

(1) Nevertheless, a program's effectiveness is more important than whether it is in writing. A small worksite may well have an effective program that is not written, but which is well understood and followed by employees.

b. **Employee participation.**

(1) Employee involvement in an establishment's safety and health program is essential to its effectiveness. Thus, evaluation of safety and health programs must include objective assessment of the ways in which workers' rights under the OSH Act are addressed in form and practice. The PEP Tables include helpful information in this regard.

(2) Employee involvement should also include participation in the OSHA enforcement process; e.g., walk around inspections, interviews, informal conferences, and formal settlement discussions, as may be appropriate. Many methods of employee involvement may be encountered in individual workplaces.

c. **Comprehensiveness.** The importance of a safety and health program's comprehensiveness is implicitly addressed in Workplace Analysis under both "Survey and hazard analysis" and "Data analysis." An effective safety and health program shall address all known and potential sources of workplace injuries and illnesses, whether or not they are covered by a specific OSHA standard. For example, lifting hazards and workplace violence problems should be addressed if they pertain to the specific conditions in the establishment.

d. **Consistency with violations/hazards found.** The PEP evaluation and the scores assigned to the individual elements and factors should be consistent with the types and numbers of violations or hazards found during the inspection and with any citations issued in the case. As a general rule, high scores will be inconsistent with numerous or grave violations or a high injury/illness rate. The following are examples for general guidance:

(1) If applicable OSHA standards require training, but the employer does not provide it, the PEP score for "Training" should not normally exceed "2."

(2) If hazard analyses (e.g., for permit-required confined spaces or process safety management) are required but not performed by the employer, the PEP score for "Work place analysis" should not normally exceed "2."

(3) If the inspection finds numerous serious violations — in particular, high-gravity serious violations — relative to the size and type of workplace, the PEP score for "Hazard Prevention and Control" should not normally exceed "2."

4. **Scope of the PEP review.** The duration of the PEP review will vary depending on the circumstances of the workplace and the inspection. In all cases, however, this review shall include:

a. A review of any appropriate employer documentation relating to the safety and health program.

b. A walk around inspection of pertinent areas of the workplace.

c. Interviews with an appropriate number of employer and employee representatives.

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Appendix A

The Program Evaluation Profile (PEP)

Each of the elements and factors of the PEP may be scored from 1 to 5, indicating the level of the safety and health program, as follows:

Overall score	Level of safety and health program
5	Outstanding program
4	Superior program
3	Basic program
2	Developmental program
1	No program or ineffective program

Scoring. Score the establishment on each of the factors and elements after obtaining the necessary information to do so. These shall be given a score of 1, 2, 3, 4, or 5.

- Refer to the PEP Tables, Appendix B of this notice, as appropriate, to ensure that the score given to a factor corresponds to the descriptor that best fits the worksite. Determine scores for each of the six elements as follows:
- The score for the Management Leadership and Employee Participation element shall be whichever is the lowest of the following:
  - The score for the "Management Leadership" factor, or
  - The score for the Employee Participation" factor, or
  - The average score for all four factors.
- For the sixth element, Training, just determine the level 1-5 that best fits the worksite and note it in the appropriate box on the PEP.
- For each of the other four elements, average the scores for the factors.
- If the employer declines to provide pertinent information regarding one or more factors or elements, a score of 1 shall be recorded for the factor or element.
- If the element or factor does not apply to the worksite being inspected, a notation of "Not Applicable" shall be made in the space provided. This shall be represented by "N/A" or, in IMIS applications, "0" This shall not affect the score.

Overall Score. An "Overall Score" for the worksite will be recorded on the PEP. This will be the average of the six individual scores for elements, rounded to the nearest whole number (1, 2, 3, 4, or 5). Round up from one-half (.5) or greater; round down from less than one-half (.5).

EXAMPLE: A PEP's element scores are:

2.5
2.7 = 2.16 = **2** PEP Score
2.3
3.0
2.3

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Appendix B

The PEP Tables

The text in each block provides a description of the program element or factor that corresponds to the level of program that the employer has implemented in the workplace.

To avoid duplicative language, each level should be understood as containing all positive factors included in the level below it. Similarly, each element score should be understood as containing all positive factors of the element scores below it. That is, a 3 is at least as good as a 2; a 4 is at least as good as a 3, and so on.

The descriptors are intended as brief illustrations of a workplace at a particular level. In exercising their professional judgement, compliance officers should proceed with the understanding that the descriptor that "best fits" will not necessarily match the workplace exactly or in literal detail.

Management leadership and employee participation	
Management leadership	
Visible management leadership provides the motivating force for an effective safety and health program.	
1	Management demonstrates no policy, goals, objectives, or interest in safety and health issues at this worksite.
2	Management sets and communicates safety and health policy and goals, but remains detached from all other safety and health efforts.
3	Management follows all safety and health rules, and gives visible support to the safety and health efforts of others.
4	Management participates in significant aspects of the site's safety and health program, such as site inspections, incident reviews, and program reviews. Incentive programs that discourage reporting of accidents, symptoms, injuries, or hazards are absent. Other incentive programs may be present.
5	Site safety and health issues are regularly included on agendas of management operations meetings. Management clearly demonstrates — by involvement, support, and example — the primary importance of safety and health for everyone on the worksite. Performance is consistent and sustained or has improved over time.

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Management leadership and employee participation	
Employee participation	
Employee participation provides the means through which workers identify hazards, recommend and monitor abatement, and otherwise participate in their own protection.	
1	Worker participation in workplace safety and health concerns is not encouraged. Incentive programs are present which have the effect of discouraging reporting of incidents, injuries, potential hazards or symptoms. Employees/employee representatives are not involved in the safety and health program.
2	Workers and their representatives can participate freely in safety and health activities at the worksite without fear of reprisal. Procedures are in place for communication between employer and workers on safety and health matters. Worker rights under the Occupational Safety and Health Act to refuse or stop work that they reasonably believe involves imminent danger are understood by workers and honored by management. Workers are paid while performing safety activities.
3	Workers and their representatives are involved in the safety and health program, involved in inspection of work area, and are permitted to observe monitoring and receive results. Workers' and representatives' right of access to information is understood by workers and recognized by management. A documented procedure is in place for raising complaints of hazards or discrimination and receiving timely employer responses.
4	Workers and their representatives participate in workplace analysis, inspections and investigations, and development of control strategies throughout facility, and have necessary training and education to participate in such activities. Workers and their representatives have access to all pertinent health and safety information, including safety reports and audits. Workers are informed of their right to refuse job assignments that pose serious hazards to themselves pending management response.
5	Workers and their representatives participate fully in development of the safety and health program and conduct of training and education. Workers participate in audits, program reviews conducted by management or third parties, and collection of samples for monitoring purposes, and have necessary training and education to participate in such activities. Employer encourages and authorizes employees to stop activities that present potentially serious safety and health hazards.

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Management leadership and employee participation	
Implementation	
Implementation means tools, provided by management, that include: —budget —information —personnel —assigned responsibility —adequate expertise and authority —means to hold responsible persons accountable (line accountability) —program review procedures	
1	Tools to implement a safety and health program are inadequate or missing.
2	Some tools to implement a safety and health program are adequate and effectively used; others are ineffective or inadequate. Management assigns responsibility for implementing a site safety and health program to identified person(s). Management's designated representative has authority to direct abatement of hazards that can be corrected without major capital expenditure.
3	Tools to implement a safety and health program are adequate, but are not all effectively used. Management representative has some expertise in hazard recognition and applicable OSHA requirements. Management keeps or has access to applicable OSHA standards at the facility, and seeks appropriate guidance information for interpretation of OSHA standards. Management representative has authority to order/purchase safety and health equipment.
4	All tools to implement a safety and health program are more than adequate and effectively used. Written safety procedures, policies, and interpretations are updated based on reviews of the safety and health program. Safety and health expenditures, including training costs and personnel, are identified in the facility budget. Hazard abatement is an element in management performance evaluation.
5	All tools necessary to implement a good safety and health program are more than adequate and effectively used. Management safety and health representative has expertise appropriate to facility size and process, and has access to professional advice when needed. Safety and health budgets and funding procedures are reviewed periodically for adequacy.

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Management leadership and employee participation	
Contractor safety	
Contractor safety: An effective safety and health program protects all personnel on the worksite, including the employees of contractors and subcontractors. It is the responsibility of management to address contractor safety.	
1	Management makes no provision to include contractors within the scope of the worksite's safety and health program.
2	Management policy requires contractor to conform to OSHA regulations and other legal requirements.
3	Management designates a representative to monitor contractor safety and health practices, and that individual has authority to stop contractor practices that expose host or contractor employees to hazards. Management informs contractor and employees of hazards present at the facility.
4	Management investigates a contractor's safety and health record as one of the bidding criteria.
5	The site's safety and health program ensures protection of everyone employed at the worksite, i.e., regular full-time employees, contractors, temporary and part-time employees.

Workplace analysis	
Survey and hazard analysis	
Survey and hazard analysis: An effective, proactive safety and health program will seek to identify and analyze all hazards. In large or complex workplaces, components of such analysis are the comprehensive survey and analyses of job hazards and changes in conditions.	
1	No system or requirement exists for hazard review of planned/changed/new operations. There is no evidence of a comprehensive survey for safety or health hazards or for routine job hazard analysis.
2	Surveys for violations of standards are conducted by knowledgeable person(s), but only in response to accidents or complaints. The employer has identified principal OSHA standards which apply to the worksite.
3	Process, task, and environmental surveys are conducted by knowledgeable person(s) and updated as needed and as required by applicable standards. Current hazard analyses are written (where appropriate) for all high-hazard jobs and processes; analyses are communicated to and understood by affected employees. Hazard analyses are conducted for jobs/ tasks/workstations where injury or illnesses have been recorded.
4	Methodical surveys are conducted periodically and drive appropriate corrective action. Initial surveys are conducted by a qualified professional. Current hazard analyses are documented for all work areas and are communicated and available to all the workforce; knowledgeable persons review all planned/changed/new facilities, processes, materials, or equipment.
5	Regular surveys including documented comprehensive workplace hazard evaluations are conducted by certified safety and health professional or professional engineer, etc. Corrective action is documented and hazard inventories are updated. Hazard analysis is integrated into the design, development, implementation, and changing of all processes and work practices.

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Workplace analysis	
Inspection	
Inspection: To identify new or previously missed hazards and failures in hazard controls, an effective safety and health program will include regular site inspections.	
1	No routine physical inspection of the workplace and equipment is conducted.
2	Supervisors dedicate time to observing work practices and other safety and health conditions in work areas where they have responsibility.
3	Competent personnel conduct inspections with appropriate involvement of employees. Items in need of correction are documented. Inspections include compliance with relevant OSHA standards. Time periods for correction are set.
4	Inspections are conducted by specifically trained employees, and all items are corrected promptly and appropriately. Workplace inspections are planned, with key observations or check points defined and results documented. Persons conducting inspections have specific training in hazard identification applicable to the facility. Corrections are documented through follow-up inspections. Results are available to workers.
5	Inspections are planned and overseen by certified safety or health professionals. Statistically valid random audits of compliance with all elements of the safety and health program are conducted. Observations are analyzed to evaluate progress.

Workplace analysis	
Hazard reporting	
A reliable **hazard reporting system** enables employees, without fear of reprisal, to notify management of conditions that appear hazardous and to receive timely and appropriate responses.	
1	No formal hazard reporting system exists, or employees are reluctant to report hazards.
2	Employees are instructed to report hazards to management. Supervisors are instructed and are aware of a procedure for evaluating and responding to such reports. Employees use the system with no risk of reprisals.
3	A formal system for hazard reporting exists. Employee reports of hazards are documented, corrective action is scheduled, and records maintained.
4	Employees are periodically instructed in hazard identification and reporting procedures. Management conducts surveys of employee observations of hazards to ensure that the system is working. Results are documented.
5	Management responds to reports of hazards in writing within specified time frames. The workforce readily identifies and self-corrects hazards; they are supported by management when they do so.

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Accident and record analysis	
Accident investigation	
Accident investigation: An effective program will provide for **investigation of accidents and "near miss" incidents,** so that their causes, and the means for their prevention, are identified.	
1	No investigation of accidents, injuries, near misses, or other incidents is conducted.
2	Some investigation of incidents takes place, but root cause may not be identified, and correction may be inconsistent. Supervisors prepare injury reports for lost time cases.
3	OSHA 301 is completed for all recordable incidents. Reports are generally prepared with cause identification and corrective measures prescribed.
4	OSHA-recordable incidents are always investigated, and effective prevention is implemented. Reports and recommendations are available to employees. Quality and completeness of investigations are systematically reviewed by trained safety personnel.
5	All loss-producing accidents and "near-misses" are investigated for root causes by teams or individuals that include trained safety personnel and employees.

Accident and record analysis	
Data analysis	
Data analysis: An effective program will **analyze injury and illness records** for indications of sources and locations of hazards, and jobs that experience higher numbers of injuries. By analyzing injury and illness trends over time, patterns with common causes can be identified and prevented.	
1	Little or no analysis of injury/illness records; records (OSHA 300/301, exposure monitoring) are kept or conducted.
2	Data is collected and analyzed, but not widely used for prevention. OSHA-301 is completed for all recordable cases. Exposure records and analyses are organized and are available to safety personnel.
3	Injury/illness logs and exposure records are kept correctly, are audited by facility personnel, and are essentially accurate and complete. Rates are calculated so as to identify high risk areas and jobs. Workers' compensation claim records are analyzed and the results used in the program. Significant analytical findings are used for prevention.
4	Employer can identify the frequent and most severe problem areas, the high risk areas and job classifications, and any exposures responsible for OSHA recordable cases. Data are fully analyzed and effectively communicated to employees. Illness/injury data are audited and certified by a company executive.
5	All levels of management and the workforce are aware of results of data analyses and resulting preventive activity. External audits of accuracy of injury and illness data, including review of all available data sources are conducted. Scientific analysis of health information, including non-occupational data bases is included where appropriate in the program.

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Hazard prevention and control	
Hazard control	
Hazard Control: Workforce exposure to all current and potential hazards should be prevented or controlled by using **engineering controls** wherever feasible and appropriate, **work practices** and **administrative controls,** and **personal protective equipment** (PPE).	
1	Hazard control is seriously lacking or absent from the facility.
2	Hazard controls are generally in place, but effectiveness and completeness vary. Serious hazards may still exist. Employer has achieved general compliance with applicable OSHA standards regarding hazards with a significant probability of causing serious physical harm. Hazards that have caused past injuries in the facility have been corrected.
3	Appropriate controls (engineering, work practice, and administrative controls, and PPE) are in place for significant hazards. Some serious hazards may exist. Employer is generally in compliance with voluntary standards, industry practices, and manufacturers, and suppliers' safety recommendations. Documented reviews of needs for machine guarding, energy lockout, ergonomics, materials handling, bloodborne pathogens, confined space, hazard communication, and other generally applicable standards have been conducted. The overall program tolerates occasional deviations.
4	Hazard controls are fully in place, and are known and supported by the workforce. Few serious hazards exist. The employer requires strict and complete compliance with all OSHA, consensus, and industry standards and recommendations. All deviations are identified and causes determined.
5	Hazard controls are fully in place and continually improved upon based on workplace experience and general knowledge. Documented reviews of needs are conducted by certified health and safety professionals or professional engineers, etc.

Hazard prevention and control	
Maintenance	
Maintenance: An effective safety and health program will provide for **facility and equipment maintenance,** so that hazardous breakdowns are prevented.	
1	No preventive maintenance program is in place; break-down maintenance is the rule.
2	There is a preventive maintenance schedule, but it does not cover everything and may be allowed to slide or performance is not documented. Safety devices on machinery and equipment are generally checked before each production shift.
3	A preventive maintenance schedule is implemented for areas where it is most needed; it is followed under normal circumstances. Manufacturers' and industry recommendations and consensus standards for maintenance frequency are complied with. Breakdown repairs for safety related items are expedited. Safety device checks are documented. Ventilation system function is observed periodically.
4	The employer has effectively implemented a preventive maintenance schedule that applies to all equipment. Facility experience is used to improve safety-related preventative maintenance scheduling.
5	There is a comprehensive safety and preventive maintenance program that maximizes equipment reliability.

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Hazard prevention and control	
Medical program	
An effective safety and health program will include a suitable **medical program** where it is appropriate for the size and nature of the workplace and its hazards.	
1	Employer is unaware of, or unresponsive to medical needs. Required medical surveillance, monitoring, and reporting are absent or inadequate.
2	Required medical surveillance, monitoring, removal, and reporting responsibilities for applicable standards are assigned and carried out, but results may be incomplete or inadequate.
3	Medical surveillance, removal, monitoring, and reporting comply with applicable standards. Employees report early signs/symptoms of job-related injury or illness and receive appropriate treatment.
4	Health care providers provide follow-up on employee treatment protocols and are involved in hazard identification and control in the workplace. Medical surveillance addresses conditions not covered by specific standards. Employee concerns about medical treatment are documented and responded to.
5	Health care providers are on-site for all production shifts and are involved in hazard identification and training. Health care providers periodically observe the work areas and activities and are fully involved in hazard identification and training.

Emergency response	
Emergency preparedness	
Emergency preparedness: There should be appropriate **planning, training/drills, and equipment** for response to emergencies. **Note:** In some facilities the employer plan is to evacuate and call the fire department. In such cases, only applicable items listed below should be considered.	
1	Little or no effective effort to prepare for emergencies.
2	Emergency response plans for fire, chemical, and weather emergencies as required by 29 CFR 1910.38, 1910.39, 1910.120, or 1926.35 are present. Training is conducted as required by the applicable standard. Some deficiencies may exist.
3	Emergency response plans have been prepared by persons with specific training. Appropriate alarm systems are present. Employees are trained in emergency procedures. The emergency response extends to spills and incidents in routine production. Adequate supply of spill control and PPE appropriate to hazards on site is available.
4	Evacuation drills are conducted no less than annually. The plan is reviewed by a qualified safety and health professional.
5	Designated emergency response team with adequate training is on-site. All potential emergencies have been identified. Plan is reviewed by the local fire department. Plan and performance are reevaluated at least annually and after each significant incident. Procedures for terminating an emergency response condition are clearly defined.

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Emergency response	
First aid	
First aid/emergency care should be readily available to minimize harm if an injury or illness occurs.	
1	Neither onsite nor nearby community aid (e.g., emergency room) can be ensured.
2	Either onsite or nearby community aid is available on every shift.
3	Personnel with appropriate first aid skills commensurate with likely hazards in the workplace and as required by OSHA standards (e.g., 1910.151, 1926.23) are available. Management documents and evaluates response time on a continuing basis.
4	Personnel with certified first aid skills are always available onsite; their level of training is appropriate to the hazards of the work being done. Adequacy of first aid is formally reviewed after significant incidents.
5	Personnel trained in advanced first aid and/or emergency medical care are always available onsite. In larger facilities a healthcare provider is onsite for each production shift.

Safety and health training	
Safety and health training should cover the safety and health responsibilities of all personnel who work at the site or affect its operations. It is most effective when incorporated into other training about performance requirements and job practices. It should include all subjects and areas necessary to address the hazards at the site.	
1	Facility depends on experience and peer training to meet needs. Managers/supervisors demonstrate little or no involvement in safety and health training responsibilities.
2	Some orientation training is given to new hires. Some safety training materials (e.g., pamphlets, posters, videotapes) are available or are used periodically at safety meetings, but there is little or no documentation of training or assessment of worker knowledge in this area. Managers generally demonstrate awareness of safety and health responsibilities, but have limited training themselves or involvement in the site's training program.
3	Training includes OSHA rights and access to information. Training required by applicable standards is provided to all site employees. Supervisors and managers attend training in all subjects provided to employees under their direction. Employees can generally demonstrate the skills/knowledge necessary to perform their jobs safely. Records of training are kept and training is evaluated to ensure that it is effective.
4	Knowledgeable persons conduct safety and health training that is scheduled, assessed, and documented, and addresses all necessary technical topics. Employees are trained to recognize hazards, violations of OSHA standards, and facility practices. Employees are trained to report violations to management. All site employees — including supervisors and managers — can generally demonstrate preparedness for participation in the overall safety and health program. There are easily retrievable scheduling and recordkeeping systems.
5	Knowledgeable persons conduct safety and health training that is scheduled, assessed, and documented. Training covers all necessary topics and situations, and includes all persons working at the site (hourly employees, supervisors, managers, contractors, part-time and temporary employees). Employees participate in creating site-specific training methods and materials. Employees are trained to recognize inadequate responses to reported program violations. Retrievable recordkeeping system provides for appropriate retraining, makeup training, and modifications to training as the result of evaluations.

OSHA COMPLIANCE MANUAL

PEP Program Evaluation Profile		Management Leadership and Employee Participation				Workplace Analysis			Accident and Record Analysis		Hazard Prevention and Control			Emergency Response		Safety and Health Training	
Employer; Inspection No: Date: CSHO ID:		**Management Leadership**	**Employee Participation**	**Implementation**	**Contractor Safety**	**Survey and Hazard Analysis**	**Inspection**	**Reporting**	**Accident Investigation**	**Data Analysis**	**Hazard Control**	**Maintenance**	**Medical Program**	**Emergency Preparedness**	**First Aid**	**Training**	
Outstanding	5																5
Superior	4																4
Basic	3																3
Developmental	2																2
Absent or Ineffective	1																1
Score for element																	
Overall Score																	

OSHA COMPLIANCE MANUAL

FORMS

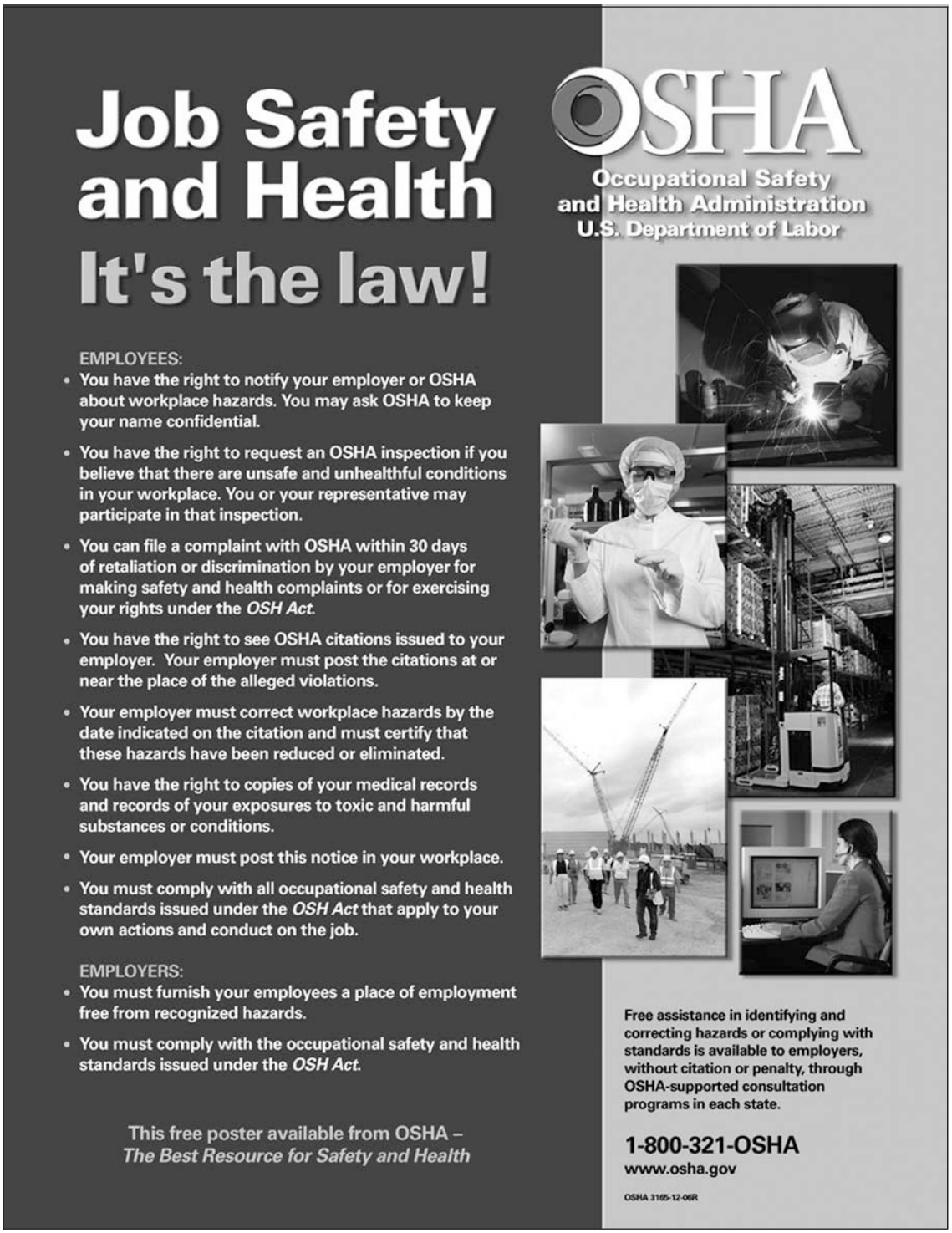
Page

OSHA COMPLIANCE MANUAL

Reserved

Forms

"It's the Law" Posters — OSHA 3165



Seguridad y Salud en el Trabajo

¡Es la Ley!

OSHA

Administración de Seguridad y Salud Ocupacional

Departamento del Trabajo de los Estados Unidos

EMPLEADOS:

- Usted tiene el derecho de notificar a su empleador o a la OSHA sobre peligros en el lugar de trabajo. Usted también puede pedir que la OSHA no revele su nombre.
- Usted tiene el derecho de pedir a la OSHA que realize una inspección si usted piensa que en su trabajo existen condiciones peligrosas o poco saludables. Usted o su representante pueden participar en esa inspección.
- Usted tiene 30 días para presentar una queja ante la OSHA si su empleador llega a tomar represalias o discriminar en su contra por haber denunciado la condición de seguridad o salud o por ejercer los derechos consagrados bajo la Ley OSH.
- Usted tiene el derecho de ver las citaciones enviadas por la OSHA a su empleador. Su empleador debe colocar las citaciones en el lugar donde se encontraron las supuestas infracciones o cerca del mismo.
- Su empleador debe corregir los peligros en el lugar de trabajo para la fecha indicada en la citación y debe certificar que dichos peligros se hayan reducido o desaparecido.
- Usted tiene derecho de recibir copias de su historial o registro médico y el registro de su exposición a sustancias o condiciones tóxicas o dañinas.
- Su empleador debe colocar este aviso en su lugar de trabajo.
- Usted debe cumplir con todas las normas de seguridad y salud ocupacionales expedidas conforme a la Ley OSH que sean aplicables a sus propias acciones y conducta en el trabajo.

EMPLEADORES:

- Usted debe proporcionar a sus empleados un lugar de empleo libre de peligros conocidos.
- Usted debe cumplir con las normas de seguridad y salud ocupacionales expedidas conforme a la Ley OSH.

Los empleadores pueden obtener ayuda gratis para identificar y corregir las fuentes de peligro y para cumplir con las normas, sin citación ni multa, por medio de programas de consulta respaldados por la OSHA en cada estado del país.

1-800-321-OSHA

www.osha.gov

OSHA 3167-01-07R

You Have a Right to a Safe and Healthful Workplace.

IT'S THE LAW!

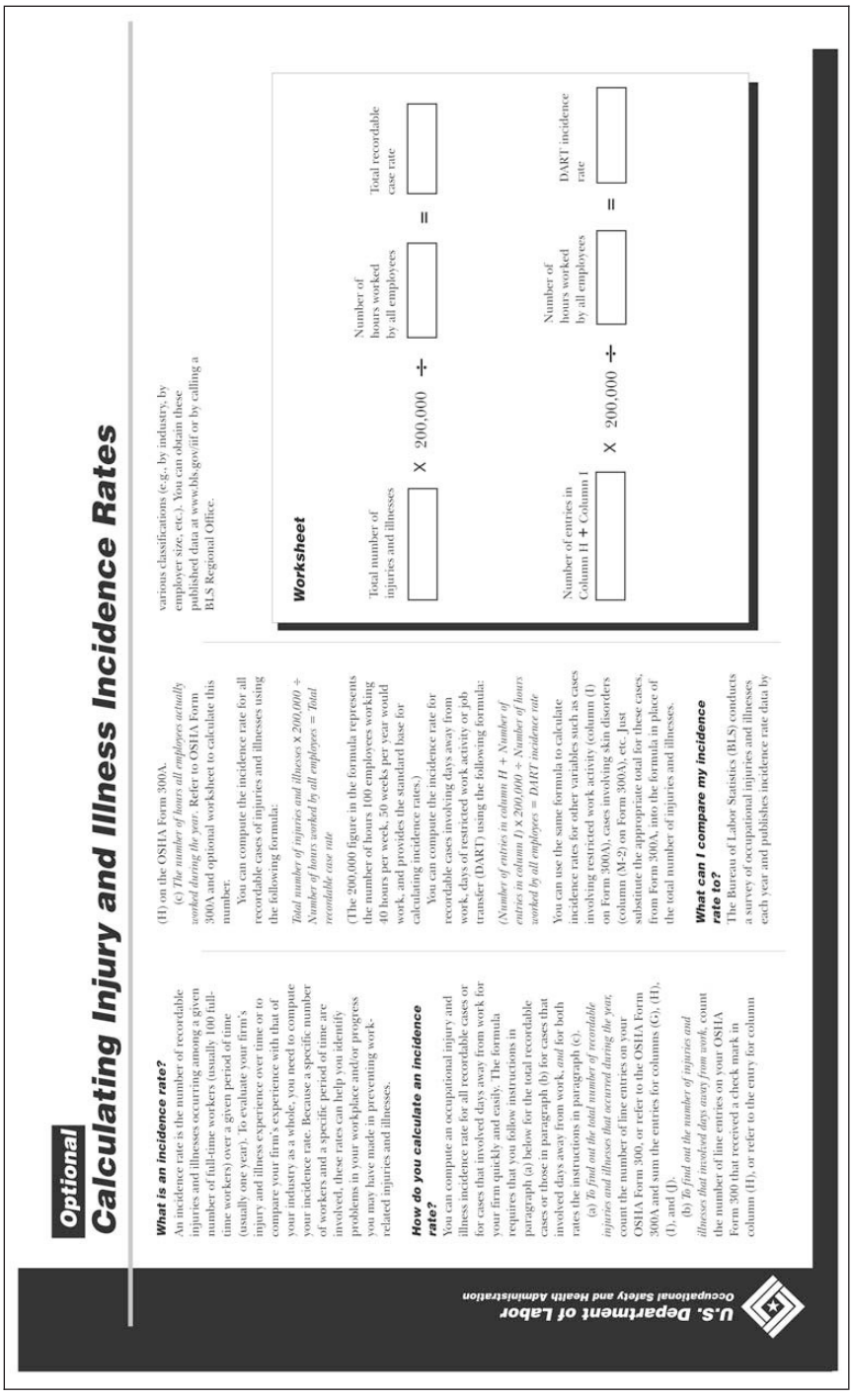
- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act.*
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.

The *Occupational Safety and Health Act of 1970 (OSH Act),* P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act.* The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at **www.osha.gov**. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA
www.osha.gov

U.S. Department of Labor • Occupational Safety and Health Administration • OSHA 3165

Calculating injury and illness incidence rates



Optional

Calculating Injury and Illness Incidence Rates

U.S. Department of Labor
Occupational Safety and Health Administration

What is an incidence rate?

An incidence rate is the number of recordable injuries and illnesses occurring among a given number of full-time workers (usually 100 full-time workers) over a given period of time (usually one year). To evaluate your firm's injury and illness experience over time or to compare your firm's experience with that of your industry as a whole, you need to compute your incidence rate. Because a specific number of workers and a specific period of time are involved, these rates can help you identify problems in your workplace and/or progress you may have made in preventing work-related injuries and illnesses.

How do you calculate an incidence rate?

You can compute an occupational injury and illness incidence rate for all recordable cases or for cases that involved days away from work for your firm quickly and easily. The formula requires that you follow instructions in paragraph (a) below for the total recordable cases or those in paragraph (b) for cases that involved days away from work, *and* for both rates the instructions in paragraph (c).

(a) *To find out the total number of recordable injuries and illnesses that occurred during the year,* count the number of line entries on your OSHA Form 300, or refer to the OSHA Form 300A and sum the entries for columns (G), (H), (I), and (J).

(b) *To find out the number of injuries and illnesses that involved days away from work,* count the number of line entries on your OSHA Form 300 that received a check mark in column (H), or refer to the entry for column (H) on the OSHA Form 300A.

(c) *The number of hours all employees actually worked during the year.* Refer to OSHA Form 300A and optional worksheet to calculate this number.

You can compute the incidence rate for all recordable cases of injuries and illnesses using the following formula:

Total number of injuries and illnesses X *200,000* ÷ *Number of hours worked by all employees* = *Total recordable case rate*

(The 200,000 figure in the formula represents the number of hours 100 employees working 40 hours per week, 50 weeks per year would work, and provides the standard base for calculating incidence rates.)

You can compute the incidence rate for recordable cases involving days away from work, days of restricted work activity or job transfer (DART) using the following formula:

(Number of entries in column H + Number of entries in column I) X *200,000* ÷ *Number of hours worked by all employees* = *DART incidence rate*

You can use the same formula to calculate incidence rates for other variables such as cases involving restricted work activity (column (I) on Form 300A), cases involving skin disorders (column (M-2) on Form 300A), etc. Just substitute the appropriate total for these cases, from Form 300A, into the formula in place of the total number of injuries and illnesses.

What can I compare my incidence rate to?

The Bureau of Labor Statistics (BLS) conducts a survey of occupational injuries and illnesses each year and publishes incidence rate data by various classifications (e.g., by industry, by employer size, etc.). You can obtain these published data at www.bls.gov/iif or by calling a BLS Regional Office.

Worksheet

Total number of injuries and illnesses		X 200,000 ÷	Number of hours worked by all employees	=	Total recordable case rate

Number of entries in Column H + Column I		X 200,000 ÷	Number of hours worked by all employees	=	DART incidence rate

Log of work-related injuries and illnesses

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ______________________

City ______________ State __________

Identify the person			Describe the case			Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
								Remained at Work									
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	(G) Death	(H) Days away from work	(I) Job transfer or restriction	(J) Other recordable cases	(K) Away from work	(L) On job transfer or restriction	(1) Injury	(2) Skin disorder	(3) Respiratory condition	(4) Poisoning	(5) Hearing loss	(6) All other illnesses
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	____	____	___/___ month/day	____	____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
					Page totals ➤	____	____	____	____	____	____	____	____	____	____	____	____
												(1) Injury	(2) Skin disorder	(3) Respiratory condition	(4) Poisoning	(5) Hearing loss	(6) All other illnesses

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Page ___ of ___

Injury and illness incident report

OSHA's Form 301

Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (____) ____-____ **Date** ____/____/____

Information about the employee

1) **Full name** _____

2) **Street** _____

City _____ State ____ ZIP ____

3) **Date of birth** ____/____/____

4) **Date hired** ____/____/____

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) **Name of physician or other health care professional** _____

_____

7) **If treatment was given away from the worksite, where was it given?**

Facility _____

Street _____

City _____ State ____ ZIP ____

8) **Was employee treated in an emergency room?**
☐ Yes
☐ No

9) **Was employee hospitalized overnight as an in-patient?**
☐ Yes
☐ No

Information about the case

10) **Case number from the Log** _____ *(Transfer the case number from the Log after you record the case.)*

11) **Date of injury or illness** ____/____/____

12) **Time employee began work** _____ AM / PM

13) **Time of event** _____ AM / PM ☐ Check if time cannot be determined

14) ***What was the employee doing just before the incident occurred?*** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) ***What happened?*** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) ***What was the injury or illness?*** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) ***What object or substance directly harmed the employee?*** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." *If this question does not apply to the incident, leave it blank.*

18) ***If the employee died, when did death occur?*** Date of death ____/____/____

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . . (M)			
(1) Injuries	_____	(4) Poisonings	_____
		(5) Hearing loss	_____
(2) Skin disorders	_____	(6) All other illnesses	_____
(3) Respiratory conditions	_____		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

___ ___ ___ ___

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

___ ___ ___ ___ ___ ___

Employment information *(If you don't have these figures, see the Worksheet on the back of this page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

( ) _____ - _____ / /
Phone Date

Optional

Worksheet to Help You Fill Out the Summary

At the end of the year, OSHA requires you to enter the average number of employees and the total hours worked by your employees on the summary. If you don't have these figures, you can use the information on this page to estimate the numbers you will need to enter on the Summary page at the end of the year.

How to figure the average number of employees who worked for your establishment during the year:

❶ ***Add*** the total number of employees your establishment paid in all pay periods during the year. Include all employees: full-time, part-time, temporary, seasonal, salaried, and hourly.

The number of employees paid in all pay periods = ❶ _____

❷ ***Count*** the number of pay periods your establishment had during the year. Be sure to include any pay periods when you had no employees.

The number of pay periods during the year = ❷ _____

❸ ***Divide*** the number of employees by the number of pay periods.

❶ _____ / ❷ _____ = ❸ _____

❹ ***Round the answer*** to the next highest whole number. Write the rounded number in the blank marked *Annual average number of employees.*

The number rounded = ❹ _____

For example, Acme Construction figured its average employment this way:

For pay period...	**Acme paid this number of employees...**	
1	10	Number of employees paid = 830 ❶
2	0	
3	15	Number of pay periods = 26 ❷
4	30	
5	40	830 = 31.92 ❸
▼	▼	26
24	20	31.92 rounds to 32 ❹
25	15	
26	+10	32 is the annual average number of employees
	830	

How to figure the total hours worked by all employees:

Include hours worked by salaried, hourly, part-time and seasonal workers, as well as hours worked by other workers subject to day to day supervision by your establishment (e.g., temporary help services workers).

Do not include vacation, sick leave, holidays, or any other non-work time, even if employees were paid for it. If your establishment keeps records of only the hours paid or if you have employees who are not paid by the hour, please estimate the hours that the employees actually worked.

If this number isn't available, you can use this optional worksheet to estimate it.

Optional Worksheet

_____ ***Find*** the number of full-time employees in your establishment for the year.

X _____ ***Multiply*** by the number of work hours for a full-time employee in a year.

_____ This is the number of full-time hours worked.

\+ _____ ***Add*** the number of any overtime hours as well as the hours worked by other employees (part-time, temporary, seasonal)

_____ ***Round*** the answer to the next highest whole number. Write the rounded number in the blank marked *Total hours worked by all employees last year.*

U.S. Department of Labor
Occupational Safety and Health Administration

Authorization letter for the release of employee medical record information

I,_____

hereby authorize _____ (individual or organization holding the medical records) to release to _____ (individual or organization authorized to receive the medical information), the following medical information from my personal medical records.

_____

(Describe generally the information desired to be released).

I give my permission for this medical information to be used for the following purpose:

_____

but I do not give permission for any other use or re-disclosure of this information.

(**Note:** Several extra lines are provided below so that you can place additional restrictions on this authorization letter if you want to. You may, however, leave these lines blank. On the other hand, you may want to (1) specify a particular expiration date for this letter (if less than one year); (2) describe medical information to be created in the future that you intend to be covered by this authorization letter; or (3) describe portions of the medical information in your records which you do not intend to be released as a result of this letter.)

_____ _

Full name of Employee or Legal Representative

_____

Signature of Employee or Legal Representative

_____

Date of Signature _____

Sample Letter Requesting an SDS

(date)

Blitz Manufacturing Company

1923 Oak Grove Lane

Springfield, Massachusetts 02110

Dear Sir or Madame:

The Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200) requires employers be provided Safety Data Sheets (SDSs) for all hazardous substances used in their facility, and to make these SDSs available to employees potentially exposed to these hazardous substances. We, therefore, request a copy of the SDS for your product listed as Stock Number _____.

We did not receive an SDS with the initial shipment of _____ we received from you on (date). We also request any additional information, supplemental SDSs, or any other relevant data that your company or supplier has concerning the safety and health aspects of this product.

Please consider this letter as a standing request to your company for any information concerning the safety and health aspects of using this product that may become known in the future. The SDS and any other relevant information should be sent to us within 10, 20, 30 days (select appropriate time). Delays in receiving the SDS information may prevent use of your product.

Please send the requested information to Mr. Robert Smith, Safety and Health Manager, XYZ Company, Boston, Massachusetts 02109.

Please be advised that if we do not receive the SDS on the above chemical by (date), we may have to notify OSHA of our inability to obtain this information. It is our intent to comply with all provisions of the Hazard Communication Standard (1910.1200) and the SDSs are integral to this effort. Your cooperation is greatly appreciated. Thank you for your timely response to this request.

If you have any questions concerning this matter, please contact Mr. Smith at (617) 223–9460.

Sincerely,

George Rogers

President

XYZ Company

Permit: Confined space entry

This is an example of a CONFINED SPACE ENTRY PERMIT. The actual entry permit you will use depends on the atmospheric and physical hazards of that particular confined space. All regulations for that permit are addressed in 29 CFR Part 1910.146 Permit-Required Confined Spaces for General Industry; Final Rule.

CONFINED SPACE ENTRY PERMIT

1. Permit Space To Be Entered _____
2. Purpose of Entry _____
3. Date of Entry _____ Authorized Duration of Entry Permit _____
4. Authorized Entrants _____ _____
5. Attendants(s) _____ _____
6. Name of Current Entry Supervisor(s) 1. _____ Time _____
   2. _____ Time _____
   Entry Supervisor who Originally Authorized Entry _____
   Signature or Initials

7. Record hazards of the permit space to be entered.				8. Check or list the measures used to isolate the permit space and to eliminate or control permit space hazards before entry.
Hazard	Yes	No	N/A	
A. Lack of Oxygen				☐ A. Purge-Flush and Vent
B. Combustible Gases				
C. Combustible Vapors				☐ B. Ventilation
D. Combustible Dusts				
E. Toxic Gases				☐ C. Lockout/Tag Out
F. Toxic Vapors				
G. Chemical Contact				☐ D. Inerting
H. Electrical Hazards				
I. Mechanical Exposure				☐ E. Blanking, Blocking, Bleeding
J. Temperature				
K. Engulfment				☐ F. External Barricades
L. Entrapment				
M. Others				☐ G. Confined Space Identification/Signs

DO NOT DESTROY THIS PERMIT
AFTER CANCELLATION THIS ENTRY PERMIT MUST BE RETAINED BY EMPLOYER FOR AT LEAST ONE YEAR.

184-F
(REV. 4/93)

Permit: Confined space entry

CONFINED SPACE ENTRY PERMIT

9. Acceptable Entry Conditions

10. Test(s) To Be Taken	Permissible Entry Levels	Test 1	Test 2	Test 3	Test 4
A. Percent of Oxygen	19.5% to 23.5%				
B.					
C.					
D.					
E.					
F.					
G.					
H.					
I.					
Name or Initials of Tester					
Test Times					

11. Rescue and Emergency Services Available:

Name _____ Name _____

Telephone _____ Telephone _____

12. Communication procedures to be used by authorized entrants and attendants.

13. Equipment supplied to the employee.

Yes	No	N/A	Equipment	Description		
			(i) Gas Test and Monitoring	Name _____ Model/Type _____ Serial/Unit No.		
			(ii) Ventilating			
			(iii) Communications			
			(iv) Personal Protective Equipment	☐ Safety Harness With Life Lines ☐ Respiratory	☐ Hard Hats ☐ Eye ☐ Ear ☐ Face	☐ Hand ☐ Foot ☐ Clothing
			(v) Lighting			
			(vi) Barriers/ Shields	☐ Pedestrian	☐ Vehicle	☐ Other
			(vii) Safe Ingress/Egress	☐ Ladders		
			(viii) Rescue and Emergency	☐ Lifelines	☐ Hoists	☐ Resuscitators-Inhalator
			(ix) Other Safety Equipment			

14. Other information for this particular confined space to ensure employee safety.

15. Additional Permits Required. ☐ Hot Work ☐ Other

THIS CONFINED SPACE ENTRY PERMIT HAS BEEN CANCELLED:

BY _____ (Entry Permit Supervisor) _____ : _____ AM PM (Time) _____ (Date)

Permit: Hot work

HOT WORK PERMIT

All temporary operations involving open flames or producing heat and/or sparks require a Hot Work Permit. This includes, but is not limited to, Brazing, Cutting, Grinding, Soldering, Thawing, and Welding.

PART A

INSTRUCTIONS FOR FIRE SAFETY SUPERVISOR

1. **Verify precautions listed at right (or do not proceed with the work).**
2. **Complete PLY 1 and retain for job files.**
3. **Post PLY 2 in vicinity of hot work.**

DATE _____ JOB NO. _____

LOCATION/BUILDING & FLOOR (Be Specific) _____

DESCRIPTION OF WORK BEING PERFORMED _____

NAME OF PERSON DOING HOT WORK _____

The above location has been examined, the precautions checked on the Hot Work Checklist have been taken to prevent fire, and permission is authorized for this work.

SIGNED: _____
(Fire Safety Supervisor)

SIGNED: _____
(Person doing Hot Work)

SIGNED: _____
(Fire Watch)

TIME
STARTED: Date: _____ Time: _____ AM/PM

Date: _____ Time: _____ AM/PM

FIRE WATCH SIGNOFF

Work area and all adjacent areas to which sparks and heat might have spread were inspected during the fire watch period and were found fire safe.

Signed: _____

FINAL CHECKUP (minimum 30 minutes after Hot Work)

Work area was monitored for _____ hour(s) following Hot Work and found fire safe.

Signed: _____

FILL OUT EMERGENCY INFORMATION ON BACK OF PLY 2.

HOT WORK CHECKLIST

- ☐ Sprinklers and hose streams in service/operable.
- ☐ Hot Work Equipment in good condition (e.g., power source, welding leads, torches, etc.)
- ☐ Multi-purpose fire extinguisher and/or water pump can.

REQUIREMENTS WITHIN 35 FEET OF WORK

- ☐ Dust, Lint, Debris, Flammable Liquids and oily deposits removed.
- ☐ Explosive atmosphere in area eliminated.
- ☐ Combustible floors (e.g., wood, tile, carpeting) wet down, covered with damp sand or fire blankets.
- ☐ Remove flammable and combustible material where possible. Otherwise protect with fire blankets, guards, or metal shields.
- ☐ All wall and floor openings covered.
- ☐ Walkways protected beneath hot work.

WORK ON WALLS OR CEILINGS

- ☐ Combustibles moved away from other side of wall.

WORK IN CONFINED SPACES

- ☐ Confined space cleaned of all combustibles (example: grease, oil, flammable vapors).
- ☐ Containers purged of flammable liquids/vapors.
- ☐ Follow confined space guidelines.

FIRE WATCH/HOT WORK AREA MONITORING

- ☐ Fire watch will be provided during and for 30 minutes after work, including any coffee or lunch breaks.
- ☐ Fire watch is supplied with an extinguisher, and/or water pump can, also making use of other extinguishers located throughout work area.
- ☐ Fire watch is trained in use of this equipment and familiar with location of sounding alarm.
- ☐ Fire watch may be required for opposite side of walls, above, and below floors and ceilings.

OTHER PRECAUTIONS TAKEN

- ☐ _____
  _____
  _____

WARNING!

HOT WORK IN PROGRESS
WATCH FOR FIRE!

IN CASE OF AN EMERGENCY:

CALL: _____

AT: _____

_____

_____

WARNING!

Driver discrimination poster - OSHA 3113

Attention

Drivers

Did You Know That. . .

You can act to protect yourself and the public from unsafe working conditions. For example, you can:

- refuse to operate a commercial motor vehicle that fails to meet Federal safety requirements.
- refuse to violate a DOT regulation.
- report violations of vehicle safety requirements.
- refuse to drive under conditions that you reasonably believe might cause serious injury to yourself or the public.

Did You Know That. . .

It is illegal for your employer to discriminate* against you in any way solely because you take any of these actions. For example, your employer may not:

- fire or demote you.
- assign you to an undesirable job or shift.
- take away your seniority.
- take away earned sick leave or vacation time.
- blacklist or threaten you.

Did You Know That. . .

If you believe you have been discriminated against you should complain to any OSHA office as soon as possible, then OSHA will investigate and may be able to restore your job and status if your complaint is substantiated.

More Information

You can obtain more information about these safety and health rights from the nearest OSHA Regional Office in the following locations:

Atlanta	(404) 347-3573
Boston	(617) 565-7164
Chicago	(312) 353-2220
Dallas	(214) 767-4731
Denver	(303) 844-3061
Kansas City	(816) 426-5861
New York	(212) 337-2378
Philadelphia	(215) 596-1201
San Francisco	(415) 995-5672
Seattle	(206) 442-5930

*Interstate truckers and bus drivers: To obtain protection against discrimination, you must first seek from your employer, and be unable to obtain, correction of the alleged violation.

Washington, D.C.
1989
OSHA 3113

Elizabeth Dole

Elizabeth Dole, Secretary of Labor

U.S. Department of Labor
Occupational Safety and Health Administration

For more information about this poster, see the "Labels, Signs and Markings" chapter, *Related Regulations, Miscellaneous Posting Requirements.*

Sharps injury log

Establishment/Facility Name: _____

Sample Sharps Injury Log Year 2____

Date	Case/ Report number	Type of device (e.g., syringe, suture needle)	Brand name of device	Work area where injury occurred [e.g., Geriatrics, Lab]	Brief description of how the incident occurred [i.e., procedure being done, action being performed (disposal, injection, etc.), body part injured]

29 CFR 1910.1030, OSHA's Bloodborne Pathogens standard, in paragraph (h)(5), requires an employer to establish and maintain a Sharps Injury Log for recording all percutaneous injuries in a facility occurring from *contaminated* sharps. The purpose of the Log is to aid in the evaluation of devices being used in healthcare and other facilities and to id entify problem devices or procedures requiring additional attention or review. This log must be kept in addition to the injury and illness log required by 29 CFR 1904. The Sharps Injury Log should include all sharps injuries occurring in a calendar year. The log must be retained for five years following the end of the year to which it relates. The Log must be kept in a manner that preserves the confidentiality of the affected employee.

PPE hazard assessment

1

PPE Hazard Assessment

Location(s) _____

Conducted by:_____

Date of assessment:_____

Task or area	Hazard/Exposure (e.g., sparks, chemical, impact)	PPE required (check all that apply) *For each entry, complete reverse with specific PPE details or specifications
1.		Face____ Head ____ Eye____ Torso ____ Feet/Leg ____ Hearing ____ Hands ____ Respiratory ____
2.		Face____ Head ____ Eye____ Torso ____ Feet/Leg ____ Hearing ____ Hands ____ Respiratory ____
3.		Face____ Head ____ Eye____ Torso ____ Feet/Leg ____ Hearing ____ Hands ____ Respiratory ____
4.		Face____ Head ____ Eye____ Torso ____ Feet/Leg ____ Hearing ____ Hands ____ Respiratory ____
5.		Face____ Head ____ Eye____ Torso ____ Feet/Leg ____ Hearing ____ Hands ____ Respiratory ____
6.		Face____ Head ____ Eye____ Torso ____ Feet/Leg ____ Hearing ____ Hands ____ Respiratory ____

Task	PPE Explanation (e.g., "goggles," "faceshield," "leather gloves," "Type 1, Class G hardhat")
1.	
2.	
3.	
4.	
5.	
6..	

2

Lockout/Tagout Periodic Inspection Form

LOCKOUT/TAGOUT PERIODIC INSPECTION

Page ____ of ____

Company Name _____ Date _____

Address _____ City _____ State _____

Machine/Equipment Name _____ I.D. No. _____

Authorized Inspector (Print) _____ I.D. No. _____

The identified machine/equipment requires a periodic inspection of the energy control procedures according to §1910.147(c)(6) – The Control of Hazardous Energy (Lockout/Tagout). Check (✓) or complete all elements of this form that apply to the Periodic Inspection. *[NOTE: This standard does not apply to construction, agriculture, or maritime industries.]*

ENERGY SOURCES

☐ Electrical ☐ Hydraulic ☐ Chemical ☐ Other: _____
☐ Mechanical ☐ Pneumatic ☐ Thermal _____

ENERGY ISOLATING DEVICES

☐ A manually operated electrical circuit breaker
☐ A disconnect switch
☐ A manually operated switch by which the circuit's conductors can be disconnected from all underground supply conductors (no pole can be operated independently)
☐ A line valve
☐ A block
☐ A similar device used to block or isolate energy
☐ Other: _____

NOTE: *Push buttons, selector switches, and other circuit type devices are not energy-isolating devices.*

☐ The authorized employees understand the energy control procedures for this machine/equipment
☐ The authorized employees understand how the requirements of the standard apply
☐ The authorized employees understand which locks/tags are to be used on this machine/equipment
☐ The lockout/tagout procedures are being followed
☐ Employees understand their responsibilities in the energy control procedures
☐ Any identified deviations or inadequacies that require attention are listed on the following page

☐ Tagout procedures have been reviewed when tagout alone is the only means of energy isolation
☐ Tagout also uses the removal of an isolating circuit element
☐ Tagout also uses blocking of a controlling switch
☐ Tagout also uses valve handle removal
☐ Tagout also uses the opening of an extra disconnect switcl

THE ITEMS CHECKED ABOVE HAVE BEEN REVIEWED/EXPLAINED WITH THE AUTHORIZED EMPLOYEES AT THE TIME OF THE PERIODIC INSPECTION. (AFFECTED EMPLOYEES WERE INCLUDED IF TAGOUT ALONE IS USED.)

Employee (Signature)	Date	Employee (Signature)	Date

I hereby certify the periodic inspection for compliance with lockout/tagout standards on this machine/equipment as specified by OSHA §1910.147 has been satisfactorily completed with the employees identified above.

Authorized Inspector: _____ (Signature) _____ (Title) _____ (Date)

LOCKOUT/TAGOUT PERIODIC INSPECTION – SUMMARY SHEET

Page ____ of ____

Location _____ Date _____

Machine/Equipment Name _____ I.D. No. _____

Authorized Inspector (Print) _____ Title _____

Record any deviations or inadequacies that need attention:

Deviations or inadequacies to be corrected by (date): _____

Routed to _____ Date _____

Authorized Inspector _____ Date _____
(signature)

Repairs/corrections have been completed:

_____ _____ _____
Name (signature) Title Date

OSHA COMPLIANCE MANUAL

REFERENCE

Page

OSHA COMPLIANCE MANUAL

Reserved

Reference

States with OSHA-Approved Programs

The OSH Act encourages states to develop and operate their own job safety and health programs. Federal OSHA approves and monitors state plans and provides up to 50 percent of an approved plan's operating costs. There are currently 22 states and jurisdictions operating complete state plans (covering both the private sector and state and local government employees) and five states which cover public employees only. The following information is current as of **May 7, 2013**.

Alaska

http://labor.state.ak.us/lss/home.htm
Alaska Department of Labor & Workforce Development
1111 W 8th Street, Room 304
P.O. Box 111149
Juneau, AK 99811-1149
(907) 465-4855

Arizona

www.ica.state.az.us/ADOSH/ADOSH_main.aspx
Arizona Division of Occupational Safety and Health (ADOSH)
800 W Washington Street, 2nd floor
Phoenix, AZ 85007-2922
(602) 542-5795

California

www.dir.ca.gov/occupational_safety.html
California Department of Industrial Relations (DIR)
Division of Occupational Safety and Health
1515 Clay Street Suite 1901
Oakland, CA 94612
(510) 286-7000

Connecticut

www.ctdol.state.ct.us/osha/osha.htm
Connecticut Department of Labor
200 Folly Brook Boulevard
Wethersfield, CT 06109
(860) 263-6000

Conn-OSHA
38 Wolcott Hill Road
Wethersfield, CT 06109
(860) 263-6900

Hawaii

http://labor.hawaii.gov/hiosh/
Hawaii Department of Labor and Industrial Relations
Hawaii Occupational Safety and Health Division (HIOSH)
830 Punchbowl Street , Suite 425
Honolulu, HI 96813
(808) 586-9100

Illinois

www.state.il.us/agency/idol/
Illinois Department of Labor
900 S. Spring Street
Springfield, IL 62704
(217) 782-6206

Indiana

www.in.gov/dol/index.htm
Indiana Department of Labor
402 West Washington Street, Room W195
Indianapolis, IN 46204
(317) 232-2655

Iowa

www.iowaworkforce.org/labor/index.html
Iowa Division of Labor Services and Workforce Development
1000 East Grand Avenue
Des Moines, IA 50319-0209
(515) 281-5870

Kentucky

www.labor.ky.gov/dows/oshp/Pages/Occupational-Safety-and-Health-Program.aspx
Kentucky Occupational Safety and Health Program
1047 U.S. Highway 127 South, Suite 4
Frankfort, KY 40601
(502) 564-3070

Maryland

www.dllr.state.md.us/labor/mosh.html
Department of Labor, Licensing and Regulation
Division of Labor and Industry
Maryland Occupational Safety and Health (MOSH)
10946 Golden West Drive, Suite 160
Hunt Valley, MD 21031
(410) 527-4499

Michigan

http://www.michigan.gov/lara/0,4601,7-154-61256_11407---,00.html
Michigan Department of Licensing and Regulatory Affairs (LARA)
Michigan Occupational Safety & Health Administration (MIOSHA)
P.O. Box 30643
7150 Harris Drive
Lansing, MI 48909-8143
(517) 322-1814

Minnesota

www.doli.state.mn.us/
Minnesota Department of Labor and Industry
Minnesota OSHA Compliance
443 Lafayette Road North
St. Paul, MN 55155
(651) 284-5050

Nevada

http://dirweb.state.nv.us/
Nevada Division of Industrial Relations
Occupational Safety and Health Administration
1301 North Green Valley Parkway, Suite 200
Henderson, Nevada 89074
(702) 486-9020

New Jersey

www.state.nj.us/labor/lsse/lspeosh.html
New Jersey Department of Labor and Workforce Development
Public Employees Occupational Safety and Health (PEOSH) Office
1 John Fitch Plaza
P.O. Box 110
Trenton, NJ 08625-0110
(609) 633-3896

New Mexico

www.nmenv.state.nm.us/
New Mexico Environment Department
Occupational Safety and Health Bureau
P.O. Box 5469
Santa Fe, NM 87502-5469
(505) 476-8700

New York

www.labor.state.ny.us/workerprotection/safetyhealth/DOSH_PESH.shtm
NYS Department of Labor
Public Employees Safety and Health (PESH) Bureau
W.A. Harriman Campus
Building 12, Room 158
Albany, NY 12240
(518) 457-1263

North Carolina

www.nclabor.com/osha/osh.htm
North Carolina Department of Labor
1101 Mail Service Center
Raleigh, NC 27699-1101
(919) 807-2900

Oregon

www.orosha.org/
Oregon Occupational Safety and Health Division (Oregon OSHA)
Department of Consumer and Business Services
350 Winter Street NE, Room 430
P.O. Box 14480
Salem, OR 97309-0405
(503) 378-3272

Puerto Rico

www.trabajo.pr.gov/prosha/index.asp
Puerto Rico Occupational Safety and Health Administration (PR OSHA)
P.O. Box 195540
San Juan, PR 00919-5540
(787) 754-2172

South Carolina

http://www.scosha.llronline.com/
South Carolina Department of Labor, Licensing and Regulation
South Carolina OSHA
P.O. Box 11329
Columbia, S.C. 29211
(803) 896-7665

Tennessee

http://www.state.tn.us/labor-wfd/tosha.html
Department of Labor and Workforce Development
TOSHA
220 French Landing Drive
Nashville, TN 37243-0655
(615) 741-2793

Utah

www.laborcommission.utah.gov/divisions/UOSH/index.html
Utah Labor Commission
Utah OSHA
160 East 300 South, 3rd Floor
P.O. Box 146600
Salt Lake City, UT 84114-6600
(801) 530-6901

Vermont

www.state.vt.us/labind/vosha.htm
Vermont Department of Labor and Industry
5 Green Mountain Drive
P.O. Box 488
Montpelier, VT 05601-0488
(802) 828-4000

Virgin Islands

www.osha.gov/oshdir/stateprogs/Virgin_Islands.html
Virgin Islands Department of Labor (VIDOSH)
St. Croix Main Office
3012 Golden Rock, VITRACO Mall
St. Croix, VI 00890
(340) 772-1315

St. Thomas Main Office
53A & 54B Kronprindense Gade
St. Thomas, VI 00803-2608
(340) 776-3700

Virginia

www.doli.state.va.us/
Virginia Department of Labor and Industry
Main Street Centre Bldg.
600 East Main Street
Richmond, VA 23219-4101
(804) 371-2327

Washington

www.lni.wa.gov/
Washington Department of Labor and Industries
Division of Occupational Safety & Health (DOSH)
P.O. Box 44600
Olympia, WA 98504-4600
(360) 902-5495

Wyoming

http://wyomingworkforce.org/employers-and-businesses/osha/Pages/default.aspx
Wyoming Workers Safety and Compensation Division
1510 East Pershing Boulevard, West Wing
Cheyenne, WY 82002
(307) 777-7786

Note: Connecticut, Illinois, New Jersey, New York, and the Virgin Islands plans cover public employees only.

OSHA Consultation Services

These addresses are current as of **May 3, 2013.**

Alabama

alabamasafestate.ua.edu/environmental-consultation/
Safe State Environmental Compliance Assistance Program
University of Alabama
432 Martha Parham West
P.O. Box 870388
Tuscaloosa, AL 35487-0388
(205) 348-8975
Fax: (205) 348-9878

Alaska

www.labor.state.ak.us/lss/oshhome.htm
Consultation and Training
State of Alaska
Department of Labor and Workforce Development
Labor Standards and Safety - OSH
3301 Eagle Street, Suite 305
Anchorage, AK 99503-4149
(800) 656-4972
Fax: (907) 269-3723

Arizona

www.ica.state.az.us/ADOSH/ADOSH_Consultation_and_Training.aspx
Consultation and Training
Industrial Commission of Arizona
Division of Occupational Safety & Health
2675 East Broadway Road, Suite 239
Tucson, AZ 85716
(520) 628-5478
Fax: (520) 322-8008

Arkansas

www.labor.ar.gov/divisions/Pages/OSHAConsultation.aspx
OSHA Consultation
Arkansas Department of Labor
10421 West Markham
Little Rock, AR 72205
(501) 682-4522
Fax: (501) 682-4532

California

www.dir.ca.gov/DOSH/consultation.html
Cal/OSHA Consultation
Division of Occupational Safety and Health
2000 East McFadden Ave., Room 214
Santa Ana, CA 92705
(714) 558-4411
Fax: (916) 558-4431

Cal/OSHA Consultation Service Area Offices
Cal/OSHA Consultation toll-free number - (800) 963-9424
Northern California - (916) 263-0704
San Fernando Valley - (818) 901-5754
San Francisco Bay Area - (510) 622-2891
Los Angeles/Orange — (714) 562-5525
San Diego - (619) 767-2060
Central Valley - (559) 454-1295
San Bernardino - (909) 383-4567

Colorado

www.bernardino.colostate.edu/public/
Colorado State University
Department of Environmental and Radiological Health Services
Occupational Health & Safety Consultation
1681 Campus Delivery
Fort Collins, CO 80523
(970) 491-6151
Fax: (970) 491-7778

Connecticut

www.ctdol.state.ct.us/osha/consulti.htm
Connecticut Department of Labor
Division of Occupational Safety & Health
38 Wolcott Hill Road
Wethersfield, CT 06109
(860) 263-6900
Fax: (860) 263-6940

Delaware

dia.delawareworks.com/safety-health-consultation/
Delaware Department of Labor
Office of Safety & Health Consultation
Division of Industrial Affairs
4425 North Market St.
Wilmington, DE 19802
(302) 761-8217
Fax: (302) 761-6602

District of Columbia

does.dc.gov/service/occupational-safety-and-health
Available only for employers within the District of Columbia
DC Department of Employment Services
Labor Standards Bureau
Office of Occupational Safety & Health
4058 Minnesota Avenue, NE
Washington, DC 20019
(202) 671-1800
Fax: (202) 673-2380

Florida

www.usfsafetyflorida.com/
Safety Florida Consultation Program
University of South Florida
13201 Bruce B. Downs Boulevard, MDC 56
Tampa, FL 33612
(866) 273-1105
Fax: (813) 974-8270

Georgia

www.oshainfo.gatech.edu/
21(d) Onsite Consultation Program
Georgia Institute of Technology
430 10th St. Northeast
Atlanta, GA 30332-0837
(404) 407-8276
Fax: (404) 407-8275

Guam

www.dol.guam.gov
Guam Department of Labor
OSHA Onsite Consultation Program
GCIC Building, 8th Floor
414 West Soledad Ave.
Hagatna, Guam 96910
(671) 475-7069
Fax: (671) 475-7070

Hawaii

http://labor.hawaii.gov/
Hawaii Occupational Safety and Health
Department of Labor & Industrial Relations
830 Punchbowl Street, Room 425
Honolulu, HI 96813
(808) 586-9110
Fax: (808) 586-9104

Idaho

http://oshcon.boisestate.edu/
Idaho OSHA Consultation Program
Boise State University
1910 University Drive, MS-1825
Boise, ID 83725-1825
(208) 426-3283
Fax: (208) 426-4411

Illinois

http://www.illinoisosha.com/
Illinois On-site Consultation
Illinois Department of Labor
900 S Spring Street
Springfield, IL 62704
(217) 558-2814
Fax: (217) 785-8776

Indiana

www.in.gov/dol/2375.htm
INSafe
Indiana Department of Labor
402 W Washington St., W195
Indianapolis, IN 46204
(317) 232-2655
Fax: (317) 233-3790

Iowa

www.iowaworkforce.org/labor/iosh/consultation/index.htm
Iowa Workforce Development
Division of Labor Services
Bureau of Consultation and Education
1000 E Grand Ave.
Des Moines, IA 50319
(515) 281-7629
Fax: (515) 281-5522

Kansas

http://www.dol.ks.gov/Safety/assistance.aspx
Kansas Department of Labor
Division of Industrial Safety & Health
417 SW Jackson St.
Topeka, KS 66603-3929
(785) 296-4386
(785) 296-1775

Kentucky

www.labor.ky.gov/dows/oshp/Pages/Occupational-Safety-and-Health-Program.aspx
Kentucky Labor Cabinet
Division of Education & Training
Kentucky OSH Program
1047 U.S. Highway 127 South, Suite 4
Frankfort, KY 40601
(502) 564-3070
Fax: (502) 564-4769

Louisiana

http://www.laworks.net/FAQs/FAQ_WorkComp_OSHA.asp
21(d) Consultation Program
Louisiana Department of Labor
OSHA Consultation, Office of Workers' Compensation
P.O. Box 94094
Baton Rouge, LA 70804-9094
(225) 342-0720
Fax: (225) 342-6756

Maine

www.safetyworksmaine.com/consultations
Maine Bureau of Labor Standards
Workplace Safety & Health Division
45 State House Station
Augusta, ME 04333-0045
(207) 623-7900
Fax: (207) 623-7938

Maryland

http://www.dllr.state.md.us/labor/mosh/volc.shtml
MOSH Consultation Services
10946 Golden West Dr., Ste. 160
Hunt Valley, MD 21031
(410) 527-4472
Fax: (410) 527-5678

Massachusetts

www.mass.gov/lwd/labor-standards/on-site-consultation-program/
Department of Labor Standards
Executive Office of Labor and Workforce Development
37 Shattuck St.
Lawrence, MA 01843
(978) 242-1351
Fax: (978) 688-0352

Michigan

http://www.michigan.gov/lara/0,4601,7-154-61256_11407---,00.html
Consultation Education & Training Division
Michigan Occupational Safety and Health Administration
Labor & Economic Growth
7150 Harris Dr.
P.O. Box 30643
Lansing, MI 48909-8413
(517) 322-1809
(800) 866-4674
Fax: (517) 322-1374

Minnesota

http://www.doli.state.mn.us/Wsc.asp
Minnesota Department of Labor & Industry
Consultation Division
443 LaFayette Road North
St. Paul, MN 55155
(651) 284-5060
Fax: (651) 284-5739

Mississippi

http://www.csh.msstate.edu/
Mississippi State University
Center for Safety & Health
2151 Highway 18, Suite B
Brandon, MS 39042
(662) 825-0783
Fax: (601) 825-6609

Missouri

http://www.labor.mo.gov/DLS/WorkplaceSafety/free_onsite_sharp.asp
Onsite Consultation Program
Division of Labor Standards
Dept. of Labor & Industrial Relations
3315 West Truman Boulevard
P.O. Box 449
Jefferson City, MO 65102-0499
(573) 751-3403
Fax: (573) 751-3721

Montana

http://erd.dli.mt.gov/safety-and-health/safety-consultation-program.html
Montana Safety and Health Bureau
P.O. Box 1728
1625 11th Ave.
Helena, MT 59601
(406) 444-6401
Fax: (406) 444-9396

Nebraska

http://www.dol.nebraska.gov/index.cfm
Nebraska Department of Labor
550 So. 16th St.
P.O. Box 94600
Lincoln, NE 68509-4600
(402) 471-4717
Fax: (402) 471-5039

Nevada

http://www.4safenv.state.nv.us/consultation
Safety Consultation & Training Section
Division of Industrial Relations
Department of Business & Industry
1301 N. Green Valley Parkway, Suite 200
Henderson, NV 89074
(702) 486-9147
Fax: (702) 990-0326

New Hampshire

www.keene.edu/conted/workwisenh/
NH Occupational Health and Safety Consultation Program
WorkWISE NH
Keene State College
175 Ammon Dr., Suite 101
Manchester, NH 03103
(603) 222-1569
Fax: (603) 222-1567

New Jersey

http://lwd.dol.state.nj.us/labor/lsse/employer/peosh_consultation.html
New Jersey Department of Labor and Workforce Development
1 John Fitch Plaza
P.O. Box 386
Trenton, NJ 08625-0386
(609) 292-0404
Fax: (609) 292-4409

New Mexico

http://www.nmenv.state.nm.us/Ohsb_Website/Consultation/
New Mexico Environment Department
Occupational Health & Safety Bureau
525 Marquez Plaza
P.O. Box 26110
Santa Fe, NM 87502
(505) 476-4230
(877) 610-6742
Fax: (505) 827-4422

New York

www.labor.state.ny.us/workerprotection/safetyhealth/DOSH_ONSITE_CONSULTATION.shtm
Division of Safety and Health
State Office Building Campus
Building 12, Room 168
Albany, NY 12240
(518) 457-2238
Fax: (518) 457-3454

North Carolina

www.nclabor.com/osha/consult/consult.htm
Bureau of Consultative Services
NC Department of Labor
1101 Mail Service Center
Raleigh, NC 27699-1101
(919) 807-2905
Fax: (919) 807-2902

North Dakota

http://www.bismarckstate.edu/ceti/ndosh/
North Dakota Occupational Safety & Health Consultation - Bismarck State College
Corporate & Continuing Education
1815 Schafer Street
PO Box 5587
Bismarck, ND 58506
(701) 224-5778
(877) 846-9387
Fax: (701) 224-5763

Ohio

www.ohiobwc.com/employer/programs/safety/sandhoshaandperrp.asp
Ohio Bureau of Workers' Compensation
Division of Safety and Hygiene
OSHA On-Site Consultation Program
13430 Yarmouth Drive
Pickerington, OH 43147
(800) 282-1425
Fax: (614) 644-3133

Oklahoma

www.ok.gov/odol/Business_Services/Safety_Pays_OSHA_Consultation/index.html
Oklahoma Department of Labor
OSHA Consultation Division
3017 N. Stiles, Ste. 100
Oklahoma City, OK 73105-5212
(405) 521-6100
(888) 269-5353
Fax: (405) 521-6018

Oregon

www.orosha.org
Oregon OSHA Consultation and Services
Department of Consumer & Business Services
350 Winter St., Northeast, Rm. 430
Salem, OR 97301-3882
(503) 947-7434
Fax: (503) 947-7462

Pennsylvania

http://www.iup.edu/pa-oshaconsultation
Indiana University Pennsylvania
Room 210 Walsh Hall
302 East Walk
Indiana, PA 15705-1087
(724) 357-2396
(800) 382-1241
Fax: (724) 357-2385

Puerto Rico

http://www.trabajo.pr.gov/
Puerto Rico Occupational Safety and Health Office Administration
Department of Labor & Human Resources
21st Floor
505 Munoz Rivera Ave.
Hata Rey, Puerto Rico 00918
(787) 754-2171
Fax: (787) 767-6051

Rhode Island

http://www.health.ri.gov/programs/oshaconsultation/
OSH Consultation Program
Division of Occupational Health & Radiation Control
Rhode Island Department of Health
3 Capital Hill
Cannon Building, Room 206
Providence, RI 02908
(401) 222-7745
Fax: (401) 222-2456

South Carolina

http://www.scosha.llronline.com/index.asp?file=scovp/consult.htm
South Carolina Department of Labor, Licensing and Regulation
110 Centerview Drive
PO Box 11329
Columbia, SC 29211-1329
(803) 896-7744
Fax: (803) 896-7750

South Dakota

http://www.sdstate.edu/engr/extension/
South Dakota State University
Engineering Extension - OSHA Consultation
SHH 201, Box 2220
Brookings, SD 57007
(605) 688-4101
Fax: (605) 688-6290

Tennessee

www.tn.gov/labor-wfd/tosha/toshcons.shtml
TOSHA Consultation Services Division
Tennessee Department of Labor and Workforce Development
TOSHA/Consultation
220 French Landing Drive
Nashville, TN 37243
(800) 249-8510
(615) 741-2793
Fax: (615) 253-1623

Texas

http://www.tdi.texas.gov/
Workers' Health and Safety Division - MS 22
Texas Department of Insurance
7551 Metro Center Drive
Austin, TX 78744-1609
(512) 804-4693
Fax: (512) 804-4641
OSHCON Request Line: (800) 687-7080

Utah

http://laborcommission.utah.gov/divisions/UOSH/index.html
Utah OSHA Consultation Program
160 East 300 South, 3rd Floor
Salt Lake City, UT 84114-6650
(801) 530-6855
TDY: (801) 530-6901
Fax: (801) 530-6992

Vermont

www.labor.vermont.gov/
Vermont Department of Labor
Workers' Compensation and Safety Division
PO Box 488, 5 Green Mountain Drive
Montpelier, VT 05601-0488
(802) 888-2598
Fax: (802) 828-2195

Virginia

www.doli.virginia.gov/
Virginia Department of Labor & Industry
Occupational Safety & Health
Training & Consultation
13 South 13th Street
Richmond, VA 23219
(804) 786-6613
Fax: (804) 786-8418

Virgin Islands

www.vidol.gov
Safety in Paradise
University of the Virgin Islands
Community Engagement and Lifelong Learning Center
#2 John Brewer's Bay
St. Thomas, Virgin Islands 00803
(340) 693-1100
Fax: (340) 693-1115

Washington

www.lni.wa.gov/wisha/
WISHA Services Division
P.O. Box 4648
Olympia, WA 98504-4648
(360) 902-5554
Fax: (360) 902-5438

West Virginia

http://www.wvlabor.com/newwebsite/Pages/Safety_osha_consultation.html
West Virginia Department of Labor
WISHA Services Division
Capitol Complex Building #6
1800 East Washington Street, Room B-749
Charleston, WV 25305
(304) 558-7890
Fax: (360) 902-5438

Wisconsin

www.slh.wisc.edu/wiscon/
University of Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive
P.O. Box 7996
Madison, WI 53707-7996
(608) 226-5240
(800) 947-0553
Fax: (360) 902-5438

Wyoming

www.wyomingworkforce.org/employers-and-businesses/osha/Pages/safety-and-health-consultation.aspx
Wyoming Workers' Safety
1510 East Pershing Boulevard
Cheyenne, WY 82002
(307) 777-7786
Fax: (307) 777-3646

OSHA regional offices

If you are unable to contact your local OSHA Area Office, you may contact the appropriate OSHA Regional Office for information and/or assistance. These addresses are current as of **May 7, 2013**.

Region I

(CT* MA, ME, NH, RI, VT*)
JFK Federal Building, Room E340
Boston, MA 02203
(617) 565-9860
Fax: (617) 565-9827

Region II

(NJ, NY, Puerto Rico, Virgin Islands)*
201 Varick Street, Room 670
New York, NY 10014
(212) 337-2378
Fax: (212) 337-2371

Region III

(DC, DE, MD,* PA, VA,* WV)
U.S. Department of Labor/OSHA
The Curtis Center—Suite 740 West
170 S. Independence Mall West
Philadelphia, PA 19106-3309
(215) 861-4900
Fax: (215) 861-4904

Region IV

(AL, FL, GA, KY,* MS, NC,* SC,* TN*)
61 Forsyth Street SW
Room 6T50
Atlanta, GA 30303
(678) 237-0400
Fax: (678) 237-0447

Region V

(IL, IN,* MI,* MN,* OH, WI)
230 South Dearborn Street, Room 3244
Chicago, IL 60604
(312) 353-2220
Fax: (312) 353-7774

Region VI

(AR, LA, NM,* OK, TX)
525 Griffin Street, Suite 602
Dallas, TX 75202
(972) 850-4145
Fax: (972) 850-4149

Region VII

(IA,* KS, MO, NE)
Two Pershing Square Building
2300 Main Street, Suite 1010
Kansas City, MO 64108-2416
(816) 283-8745
Fax: (816) 283-0547

Region VIII

(CO, MT, ND, SD, UT,* WY*)
Cesar Chavez Memorial Building
1244 Speer Blvd., Suite 551
Denver, CO 80204
(720) 264-6550
Fax: (720) 264-6585

Region IX

(American Samoa, AZ,* CA,* Guam, HI,* NV,* Trust Territories of the Pacific)
90 7th Street, Suite 18100
San Francisco, CA 94103
(415) 625-2547 (Main Public — 8:00 AM - 4:30 PM Pacific)
Fax: (415) 625-2534

Region X

(AK,* ID, OR,* WA*)
300 Fifth Avenue, Suite 1280
Seattle, WA 98104-2397
(206) 757-6700
Fax: (206) 757-6705

*These states and territories operate their own OSHA-approved job safety and health programs (Connecticut, Illinois, New Jersey, New York, and Virgin Islands plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard.

OSHA district offices

Note: Not all OSHA Regions have a district office. This information is current as of **May 3, 2013.**

Region I

(CT,* MA, ME, NH, RI, VT*)
JFK Federal Bldg., Rm. E340
Boston, MA 02203
(617) 565-9860
Fax: (617) 565-9827

Region II

(NJ, NY,* PR,* VI*)
201 Varick St., Rm. 670
New York, NY 10014
(212) 337-2378
Fax: (212) 337-2371

Region III

(DC, DE, MD,* PA, VA,* WV)
The Curtis Center, Ste. 740 W
170 S. Independence Mall W
Philadelphia, PA 19106-3309
(215) 861-4900
Fax: (215) 861-4904

Region IV

(AL, FL, GA, KY,* MS, NC,* SC,* TN*)
61 Forsyth St., SW
Room 6T50
Atlanta, GA 30303
(678) 237-0400
Fax: (678) 237-0447

Region V

(IL, IN,* MI,* MN,* OH, WI)
230 S Dearborn St., Rm. 3244
Chicago, IL 60604
(312) 353-2220
Fax: (312) 353-7774

Region VI

(AR, LA, NM,* OK, TX)
525 Griffin St., Ste. 602
Dallas, TX 75202
(972) 850-4145
Fax: (972) 850-4149

Region VII

(IA,* KS, MO, NE)
Two Pershing Square Building
2300 Main St., Ste. 1010
Kansas City, MO 64108-2416
(816) 283-8745
Fax: (816) 283-0547

Region VIII

(CO, MT, ND, SD, UT,* WY*)
Cesar Chavez Memorial Building
1244 Speer Blvd., Suite 551
Denver, CO 80204
(720) 264-6550
Fax: (720) 264-6585

Region IX

(American Samoa, AZ,* CA,* Guam, HI,* NV,* Trust Territories of the Pacific)
90 7th St., Ste. 18100
San Francisco, CA 94103
(415) 625-2547
Fax: (415) 625-2534

Region X

(AK,* ID, OR,* WA*)
300 Fifth Ave., Ste. 1280
Seattle, WA 98104-2397
(206) 757-6700
Fax: (206) 757-6705

* These states and territories operate their own OSHA-approved job safety and health programs (Connecticut, Illinois, New Jersey, New York, and Virgin Islands plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the Federal standards.

OSHA local area offices

The following is a list of addresses and telephone numbers of OSHA Local Area Offices. These offices are sources of information, publications, and assistance in understanding the requirements of the standards. These addresses are current as of **May 3, 2013.**

Alabama

http://dir.alabama.gov/
Birmingham Area Office
Medical Forum Building
950 22nd Street North, Room 1050
Birmingham, AL 35203
(205) 731-1534
Fax: (205) 731-0504

Mobile Area Office
1141 Montlimar Drive, Suite 1006
Mobile, AL 36609
(334) 441-6131
Fax: (334) 441-6396

Alaska

www.labor.state.ak.us/
Anchorage Area Office
Scott Ketcham, Area Director
222 W. 7th Avenue, Box 22
Anchorage, AK 99513
(907) 271-5152
Fax: (907) 271-4238

Arizona

www.ica.state.az.us/ADOSH/ADOSH_main.aspx
Industrial Commission of Arizona
800 West Washington Street, 2nd Floor
Phoenix, AZ 85007
(602) 542-5795
Fax: (602) 542-1614

Tucson office
2675 E. Broadway Blvd. #239
Tucson, AZ 85716
(520) 628-5478
Fax: (520) 322-8008

Phoenix Area Office
Arizona Division of Occupational Safety and Health (ADOSH)
800 W. Washington St., 2nd floor
Phoenix, AZ 85007
(602) 542-5795
Fax: (602) 542-1614

Arkansas

www.labor.ar.gov/Pages/default.aspx
Little Rock Area Office
10810 Executive Center Dr.
Danville Building #2, Suite 206
Little Rock, AR 72211
(501) 224-1841
Fax: (501) 224-4431

California

www.dir.ca.gov/occupational_safety.html
California Department of Industrial Relations
Office of the Director
1515 Clay St., 17th Floor
Oakland, CA 94612
(510) 622-3965

Oakland Area Office
U.S. Department of Labor - OSHA
Ronald Dellums Federal Building
1301 Clay St., Suite 1080 N
Oakland, CA 94612-5217
(510) 637-3800
Fax: (510) 637-3846

San Diego Area Office
U.S. Department of Labor - OSHA
550 West C St., Suite 970
San Diego, CA 92101-3540
(619) 557-5030
Fax: (619) 557-6001

Colorado

www.colorado.gov/cs/Satellite/CDLE-LaborLaws/CDLE/1240336908932
Denver Area Office
1391 Speer Boulevard, Suite 210
Denver, CO 80204-2552
(303) 844-5285
Fax: (303) 844-6676

Englewood Area Office
7935 East Prentice Avenue, Suite 209
Englewood, CO 80111-2714
(303) 843-4500
Fax: (303) 843-4515

Connecticut

www.ctdol.state.ct.us/
Bridgeport Area Office
Clark Building
1057 Broad Street, 4th Floor
Bridgeport, CT 06604
(203) 579-5581
Fax: (203) 579-5516

Hartford Area Office
William R. Cotter Federal Building
135 High St., Room 361
Hartford, CT 06103
(860) 240-3152
Fax: (860) 240-3155

Delaware

www.delawareworks.com/
Wilmington Area Office
Mellon Bank Building, Suite 900
919 Market Street
Wilmington, DE 19801-3319
(302) 573-6518
Fax: (302) 573-6532

District of Columbia

Baltimore/Washington, D.C. Area Office
OSHA Area Office
U.S. Department of Labor-OSHA
1099 Winterson Road, Suite 140
Linthicum, MD 21090
(410) 865-2055/2056
Fax: (410) 865-2068

Florida

www.myflorida.com
Fort Lauderdale Area Office
1000 South Pine Island Road, Suite 100
Fort Lauderdale, FL 33324
(954) 424-0242
Fax: (954) 424-3073

Jacksonville Area Office
Ribault Building, Suite 227
1851 Executive Center Drive
Jacksonville, FL 32207
(904) 232-2895
Fax: (904) 232-1294

Tampa Area Office
5807 Breckenridge Parkway, Suite A
Tampa, FL 33610-4249
(813) 626-1177
Fax: (813) 626-7015

Georgia

http://www.dol.state.ga.us/
Atlanta East Area Office
LaVista Perimeter Office Park
2183 North Lake Parkway, Building 7
Suite 110
Tucker, GA 30084-4154
(770) 493-6644
Fax: (770) 493-7725

Atlanta West Area Office
1995 North Park Place S.E., Suite 525
Atlanta, GA 30339
(678) 903-7301
Fax: (770) 984-8855

Savannah Area Office
450 Mall Boulevard, Suite J
Savannah, GA 31406
(912) 652-4393
Fax: (912) 652-4329

Hawaii

http://labor.hawaii.gov/
Honolulu Area Office
U.S. Dept. of Labor – OSHA
Prince Jonah Kuhio Kalanianaole Federal Building
300 Ala Mona Blvd., Room 5-146
Honolulu, HI 96850
(808) 541-2680
Fax: (808) 541-3456

Idaho

http://labor.idaho.gov/dnn/Default.aspx?alias=labor.idaho.gov/dnn/idl
Boise Area Office
1150 North Curtis Road, Suite 201
Boise, ID 83706
(208) 321-2960
Fax: (208) 321-2966

Illinois

www.illinois.gov/idol/Pages/default.aspx
Calumet City Area Office
1600 167th Street, Suite 9
Calumet City, IL 60409
(708) 891-3800
Fax: (708) 862-9659

Chicago North Area Office
701 Lee Street, Suite 950
Des Plaines, IL 60016
(847) 803-4800
Fax: (847) 390-8220

Fairview Heights District Office
11 Executive Drive, Suite 11
Fairview Heights, IL 62208
(618) 632-8612
Fax: (618) 632-5712

North Aurora Area Office
365 Smoke Tree Plaza
North Aurora, IL 60542
(630) 896-8700
Fax: (630) 892-2160

Peoria Area Office
1320 West Commerce Drive
Peoria, IL 61615-1462
(309) 589-7033
Fax: (309) 589-7326

Indiana

www.state.in.us/dol/
Indianapolis Area Office
46 East Ohio Street, Room 453
Indianapolis, IN 46204
(317) 226-7290
Fax: (317) 226-7292

Iowa

www.iowaworkforce.org/
U.S. Department of Labor - OSHA
210 Walnut Street, Room 815
Des Moines, IA 50309-2015
(515) 284-4794
Fax: (515) 284-4058

Kansas

www.kdhe.state.ks.us/
Wichita Area Office
271 West 3rd Street North, Room 400
Wichita, KS 67202
(316) 269-6644
(800) 362-2896 (Kansas residents only)
Fax: (316) 269-6185

Kentucky

www.labor.ky.gov/Pages/LaborHome.aspx
Nashville Area Office
51 Century Boulevard Suite 340
Nashville, TN 37214
(615) 232-3803
Fax: (615) 232-3827

Louisiana

www.ldol.state.la.us/
Baton Rouge Area Office
9100 Bluebonnet Center Boulevard, Suite 201
Baton Rouge, LA 70809
(225) 298-5458
Fax: (225) 298-5457

Maine

www.state.me.us/labor/
Augusta Area Office
E.S. Muskie Federal Building
40 Western Avenue, Room G-26
Augusta, ME 04330
(207) 626-9160
Fax: (207) 622-8213

Bangor District Office
382 Harlow Street
Bangor, ME 04401
(207) 941-8177
Fax: (207) 941-8179

Maryland

www.dllr.state.md.us
Baltimore/Washington, DC Area Office
OSHA Area Office
U.S. Department of Labor-OSHA
1099 Winterson Road, Suite 140
Linthicum, MD 21090
(410) 865-2055/2056
Fax: (410) 865-2068

Massachusetts

http://www.mass.gov/lwd/
North Boston Area Office
Shattuck Office Center
138 River Road, Suite 102
Andover, MA 01810
(978) 837-4460
Fax: (978) 837-4455

South Boston Area Office
639 Granite Street, 4th Floor
Braintree, MA 02184
(617) 565-6924
Fax: (617) 565-6923

Springfield Area Office
1441 Main Street, Room 550
Springfield, MA 01103-1493
(413) 785-0123
Fax: (413) 785-0136

Michigan

www.michigan.gov/lara/0,4601,7-154-61256_11407---,00.html
Lansing Area Office
U.S. Department of Labor
Occupational Safety and Health Administration
315 West Allegan St., Room 207
Lansing, MI 48933
(517) 487-4996
Fax: (517) 487-4997

Minnesota

www.dli.mn.gov/Main.asp
There are no area offices in Minnesota.
Contact the area office in Eau Claire, WI at:
1310 W. Clairemont Avenue
Eau Claire, WI 54701
(715) 832-9019
Fax: (715) 832-1147

Mississippi

www.ms.gov/home/
Jackson Area Office
Dr. A.H. McCoy Federal Bldg.
100 West Capitol St., Suite 749
Jackson, MS 39269-1620
(601) 965-4606
Fax: (601) 965-4610

Missouri

www.labor.mo.gov/
Kansas City Area Office
2300 Main Street, Suite 168
Kansas City, MO 64108
(816) 483-9531
(800) 892-2674 (Missouri residents only)
Fax: (816) 483-9724

St. Louis Area Office
1222 Spruce Street, Room 9.104
St. Louis, MO 63103
(314) 425-4249
Voice Mail: (314) 425-4255
(800) 392-7743 (Missouri residents only)
Fax: (314) 425-4289

Montana

http://dli.mt.gov/
Billings Area Office
2900 4th Avenue North, Suite 303
Billings, MT 59101
(406) 247-7494
Fax: (406) 247-7499

Nebraska

www.dol.nebraska.gov
Omaha Area Office
444 Regency Parkway Drive, Suite 303
Omaha, NE 68114
(402) 553-0171
(800) 642-8963 (Nebraska residents only)
Fax: (402) 551-1288

Nevada

http://dirweb.state.nv.us/
Nevada OSHA
1301 North Green Valley Parkway, Suite 200
Henderson, NV 89074
(702) 486-9020
Fax: (702) 990-0358

New Hampshire

www.nh.gov/labor/
Concord Area Office
J.C. Cleveland Federal Building
53 Pleasant Street, Suite 3901
Concord, NH 03301
(603) 225-1629
Fax: (603) 225-1580

New Jersey

http://lwd.dol.state.nj.us/labor/lsse/safetyhealth_index.html
Avenel Area Office
1030 St. Georges Avenue
Plaza 35, Suite 205
Avenel, NJ 07001
(732) 750-3270
Fax: (732) 750-4737

Hasbrouck Heights Area Office
500 Route 17 South, 2nd Floor
Hasbrouck Heights, NJ 07604
(201) 288-1700
Fax: (201) 288-7315

Marlton Area Office
Marlton Executive Park, Building 2
701 Route 73 South, Suite 120
Marlton, NJ 08053
(856) 596-5200
Fax: (856) 596-5201

Parsippany Area Office
299 Cherry Hill Road, Suite 103
Parsippany, NJ 07054
(973) 263-1003
Fax: (973) 299-7161

New Mexico

www.dws.state.nm.us/
There are no area offices in New Mexico.
Contact the area office in Lubbock, TX at:
Lubbock Area Office
1205 Texas Avenue, Room 806
Lubbock, TX 79401
(806) 472-7681
Fax: (806) 472-7686

New York

www.labor.ny.gov/home/
Albany Area Office
401 New Karner Road, Suite 300
Albany, NY 12205-3809
(518) 464-4338
Fax: (518) 464-4337

Buffalo Area Office
U.S. Dept. of Labor/OSHA
130 South Elmwood Avenue, Suite 500
Buffalo, NY 14202-2465
(716) 551-3053
Fax: (716) 551-3126

Long Island Area Office
1400 Old Country Road
Suite 208
Westbury, NY 11590
(516) 334-3344
Fax: (516) 334-3326

Manhattan Area Office
201 Varick Street, Room 908
New York, NY 10014
(212) 620-3200
Fax: (212) 620-4121

Queens District Office of the Manhattan Area Office
45-17 Marathon Parkway
Little Neck, NY 11362
(718) 279-9060
Fax: (718) 279-9057

Syracuse Area Office
3300 Vickery Road
North Syracuse, NY 13212
(315) 451-0808
Fax: (315) 451-1351

Tarrytown Area Office
660 White Plains Road, 4th Floor
Tarrytown, NY 10591-5107
(914) 524-7510
Fax: (914) 524-7515

North Carolina

www.nclabor.com/osha/osh.htm
Raleigh Area Office
4407 Bland Road
Somerset Park, Suite 210
Raleigh, NC 27609
(919) 790-8096
Fax: (919) 790-8224

North Dakota

www.nd.gov/labor/index.html
Bismarck Area Office
Thomas D. Deutscher, Area Director
U.S. Department of Labor
Occupational Safety and Health Administration
521 East Main Avenue, Suite 200
Bismarck, ND 58501
(701) 250-4521
Fax: (701) 250-4520

Ohio

www.ohiobwc.com/employer/programs/safety/SandHOSHAOnsiteDetails.asp
Cincinnati Area Office
36 Triangle Park Drive
Cincinnati, OH 45246
(513) 841-4132
Fax: (513) 841-4114

Cleveland Area Office
1240 East 9th Street, Room 899
Cleveland,OH 44199
(216) 615-4266
Fax: (216) 615-4234

Columbus Area Office
200 North High Street, Room 620
Columbus, OH 43215
(614) 469-5582
Fax: (614) 469-6791

Toledo Area Office
Ohio Building
420 Madison Avenue, Suite 600
Toledo, OH 43604
(419) 259-7542
Fax: (419) 259-6355

Oklahoma

www.ok.gov/odol/OSHA_Safety_Pays_Consultation_/index.html
Oklahoma City Area Office
55 North Robinson, Suite 315
Oklahoma City, OK 73102-9237
(405) 278-9560
Fax: (405) 278-9572

Oregon

www.cbs.state.or.us/external/osha/
Portland Area Office
911 NE 11th Ave., Suite 649
Portland, OR 97232
(503) 231-2017
Fax: (503) 231-2329

Pennsylvania

www.dli.state.pa.us/landi/site/default.asp
Allentown Area Office
Stabler Corporate Center
3477 Corporate Parkway
Suite 120
Center Valley, PA 18034
(267) 429-7542
Fax: (267) 429-7567

Erie Area Office
1128 State Street, Suite 200
Erie, PA 16501
(814) 874-5150
Fax: (814) 874-5151

Harrisburg Area Office
Progress Plaza
49 North Progress Avenue
Harrisburg, PA 17109-3596
(717) 782-3902
Fax: (717) 782-3746

Philadelphia Area Office
U.S. Custom House, Room 242
Second & Chestnut Street
Philadelphia, PA 19106-2902
(215) 597-4955
Fax: (215) 597-1956

Pittsburgh Area Office
U.S. Department of Labor-OSHA
William Moorhead Federal Building, Room 905
1000 Liberty Avenue
Pittsburgh, PA 15222
(412) 395-4903
Fax: (412) 395-6380

Wilkes-Barre Area Office
The Stegmaier Building, Suite 410
7 North Wilkes-Barre Boulevard
Wilkes-Barre, PA 18702-5241
(570) 826-6538
Fax: (570) 821-4170

Puerto Rico

Puerto Rico Area Office
Triple S Building
1510 FD Roosevelt Avenue, Suite 5B
Guaynabo, Puerto Rico 00968
(787) 277-1560
Fax: (787) 277-1567

Rhode Island

www.dlt.ri.gov/occusafe/
Providence Area Office
Federal Office Building
380 Westminster Mall, Room 543
Providence, RI 02903
(401) 528-4669
Fax: (401) 528-4663

South Carolina

www.llr.state.sc.us/
Columbia Area Office
Strom Thurmond Federal Building
1835 Assembly Street, Room 1472
Columbia, SC 29201-2453
(803) 765-5904
Fax: (803) 765-5591

South Dakota

http://dlr.sd.gov/
There are no area offices in South Dakota. Contact the regional office in Bismarck, ND at:
Bismarck Area Office
Thomas D. Deutscher, Area Director
U.S. Department of Labor
Occupational Safety and Health Administration
521 East Main Avenue, Suite 200
Bismarck, ND 58501
(701) 250-4521
Fax: (701) 250-4520

Tennessee

www.state.tn.us/labor-wfd/tosha.html
Nashville Area Office
51 Century Boulevard Suite 340
Nashville, TN 37214
(615) 232-3803
Fax: (615) 232-3827

Texas

www.twc.state.tx.us/
Austin Area Office
La Costa Green Bldg.
1033 La Posada Drive, Suite 375
Austin, TX 78752-3832
(512) 374-0271
Fax: (512) 374-0086

Corpus Christi Area Office
Wilson Plaza
606 North Carancahua, Suite 700
Corpus Christi, TX 78476
(361) 888-3420
Fax: (361) 888-3424

Dallas Area Office
8344 East RL Thornton Freeway, Suite 420
Dallas, TX 75228
(214) 320-2400
Fax: (214) 320-2598

El Paso Area Office
U.S. Dept. of Labor - OSHA
4849 North Mesa Street, Suite 200
El Paso, TX 79912-5936
(915) 534-6251
Fax: (915) 534-6259

Fort Worth Area Office
North Starr II, Suite 302
8713 Airport Freeway
Fort Worth, TX 76180-7610
(817) 428-2470
Fax: (817) 581-7723

Houston North Area Office
507 North Sam Houston Parkway East, Suite 400
Houston, TX 77060
(281) 591-2438
Fax: (281) 999-7457

Houston South Area Office
17625 El Camino Real, Suite 400
Houston, TX 77058
(281) 286-0583
(800) 692-4202
Fax: (281) 286-6352

Lubbock District Office
1205 Texas Avenue, Room 806
Lubbock, TX 79401
(806) 472-7681/7685
Fax: (806) 472-7686

San Antonio District Office
Washington Square Blvd., Suite 203
800 Dolorosa Street
San Antonio, TX 78207-4559
(210) 472-5040
Fax: (210) 472-5045

Utah

http://laborcommission.utah.gov/ UOSH/Index.html
There are no area offices in Utah. Contact the regional office in Denver, CO at:
Herb Gibson, Area Director
U.S. Department of Labor
Occupational Safety and Health Administration
1391 Speer Boulevard, Suite 210
Denver, CO 80204-2552
(303) 844-5285, Ext. 106
(303) 844-6676

Vermont

www.labor.vermont.gov/
There are no area offices in Vermont. Contact the regional office in Boston, MA at:
JFK Federal Building, Room E340
Boston, MA 02203
(617) 565-9860
Fax: (617) 565-9827

Virginia

www.doli.virginia.gov/
Norfolk Area Office
Federal Office Building, Room 614
200 Granby St.
Norfolk, VA 23510-1811
(757) 441-3820
Fax: (757) 441-3594

Virgin Islands

There are no area offices in the Virgin Islands. Contact the regional office in New York, NY at:
201 Varick Street, Room 670
New York, NY 10014
(212) 337-2378
Fax: (212) 337-2371

Washington

www.lni.wa.gov/wisha
Bellevue Area Office
520 112th Avenue, NE, Suite 200
Bellevue, WA 98004
(425) 450-5480
Fax: (425) 450-5483

West Virginia

www.wvminesafety.org/
Charleston Area Office
405 Capitol Street, Suite 407
Charleston, WV 25301-1727
(304) 347-5937
Fax: (304) 347-5275

Wisconsin

http://dwd.wisconsin.gov/
Appleton Area Office
1648 Tri Park Way
Appleton, WI 54914
(920) 734-4521
Fax: (920) 734-2661

Eau Claire Area Office
1310 West Clairemont Avenue
Eau Claire, WI 54701
(715) 832-9019
Fax: (715) 832-1147

Madison Area Office
4802 East Broadway
Madison, WI 53716
(608) 441-5388
Fax: (608) 441-5400

Milwaukee Area Office
310 West Wisconsin Avenue, Room 1180
Milwaukee, WI 53203
(414) 297-3315
Fax: (414) 297-4299

Wyoming

http://wyomingworkforce.org/Pages/default.aspx
There are no area offices in Wyoming.
Contact the regional office in Denver, CO at:
Herb Gibson, Area Director
U.S. Department of Labor
Occupational Safety and Health Administration
1391 Speer Blvd., Suite 210
Denver, CO 80204-2552
(303) 844-5285, Ext.106

OSHA regional hazard communication coordinators

Current as of **March 18, 2013**.

Region I

Boston Regional Hazard Communication Coordinator
U.S. Department of Labor-OSHA
JFK Federal Building, Room E340
Boston, MA 02203
(617) 565-9860

Region II

New York Regional Hazard Communication Coordinator
U.S. Department of Labor-OSHA
201 Varick Street, Room 670
New York, NY 10014
(212) 337-2378

Region III

Philadelphia Regional Hazard Communication Coordinator
U.S. Department of Labor-OSHA
The Curtis Center, Suite 740 West
170 South Independence Mall West
Philadelphia, PA 19106-3309
(215) 861-4900

Region IV

Atlanta Regional Technical Support-Hazard Communication
U.S. Department of Labor-OSHA
61 Forsyth Street, SW, Room 6T50
Atlanta, GA 30303
(678) 237-0400

Region V

Chicago Regional Hazard Communication Coordinator
U.S. Department of Labor-OSHA
230 South Dearborn Street, Room 3244
Chicago, IL 60604
(312) 353-2220

Region VI

Dallas Regional Hazard Communication Coordinator
U.S. Department of Labor-OSHA
525 South Griffin Street, Room 602
Dallas, TX 75202
(214) 767-4145

Region VII

Kansas City Regional Hazard Communication Coordinator
U.S. Department of Labor-OSHA
Two Pershing Square Building
2300 Main Street, Suite 1010
Kansas City, MO 64105
(816) 283-8745

Region VIII

Denver Regional Hazard Communication Coordinator
U.S. Department of Labor-OSHA
Cesar Chavez Memorial Building
1244 Speer Blvd., Suite 551
Denver, CO 80804
(720) 264-6550

Region IX

San Francisco Assistant Regional Administrator
U.S. Department of Labor-OSHA
90 7th Street, Suite 18100
San Francisco, CA 94103
(415) 625-2547

Region X

Seattle Regional Hazard Communication Coordinator
U.S. Department of Labor-OSHA
300 Fifth Ave., Ste. 1280
Seattle, WA 98104-2397
(206) 757-6700

Hazard communication: State agencies

These state agencies are responsible for implementing a Hazard Communication or Worker Right To Know Standard at the state level. This information is current as of **April 16, 2013.**

Alabama

www.adem.state.al.us/
Department of Environmental Management
1400 Coliseum Blvd.
P.O. Box 301463
Montgomery, AL 36130-1463
(334) 271-7700

Alaska

http://labor.state.ak.us/lss/home.htm
Department of Labor and Workforce Development
Division of Labor Standards and Safety
OSHA Section
1111 W 8th St., Rm. 304
P.O. Box 111149
Juneau, AK 99811-1149
(907) 465-4855

Arizona

http://www.ica.state.az.us
Occupational Safety and Health Department
The Industrial Commission of Arizona
800 W Washington St.
Phoenix, AZ 85007
(602) 542-5795

Arkansas

www.ark.org/labor/
Arkansas Department of Labor
10421 W Markham St.
Little Rock, AR 72205
(501) 682-4500

California

Cal/OSHA Consultation Service
1-(800) 963-9424
For area offices:
www.dir.ca.gov/DOSH/consultation_offices.html

Colorado

www.osha.gov/oshdir/co.html
U.S. Department of Labor/OSHA
1391 N Speer Blvd., Suite 210
Denver, CO 80204-2552
(303) 844-5285

Connecticut

www.ctdol.state.ct.us/osha/osha.htm
Department of Labor, OSHA Division
38 Wolcott Hill Rd.
Wethersfield, CT 06109
(860) 263-6900

Delaware

www.dhss.delaware.gov/dhss/
Department of Health and Social Services
Division of Public Health
Jesse Cooper Bldg.
417 Federal St.
Dover, DE 19901
(302) 744-4700

District of Columbia

www.osha.gov/oshdir/dc.html
U.S. Department of Labor/OSHA
1099 Winterson Rd.
Suite 140
Linthicum, MD 21090
(410) 865-2055/2056

Florida

www.osha.gov/oshdir/fl.html
U.S. Department of Labor/OSHA
Fort Lauderdale Area Office
1000 S Pine Island Rd.
Suite 100
Fort Lauderdale, FL 33324
(954) 424-0242

U.S. Department of Labor/OSHA
Jacksonville Area Office
Ribault Bldg., Suite 227
1851 Executive Center Dr.
Jacksonville, FL 32207
(904) 232-2895

U.S. Department of Labor/OSHA
Tampa Area Office
5807 Breckenridge Pkwy., Suite A
Tampa, FL 33610-4249
(813) 626-1177

Georgia

http://www.oci.ga.gov/FireMarshal/Home.aspx
Office of Insurance and Safety Fire Commissioner
Fire Marshal's Office
2 Martin Luther King Jr. Drive
West Tower, Suite 920
Atlanta, GA 30334
(404) 656-2064

Hawaii

http://labor.hawaii.gov/
Labor and Industrial Relations Department
Occupational Safety and Health Division
830 Punchbowl St.
Honolulu, HI 96813
(808) 586-9100

Idaho

http://labor.idaho.gov/dnn/idl/AboutUs/LocalOfficeDirectory.aspx
U.S. Department of Labor/OSHA
317 W. Main St
Boise, ID 83735
(208) 332-3570

Illinois

http://www.illinois.gov/idol/Pages/default.aspx
Department of Labor
Health and Safety Division
900 S Spring St.
Springfield, IL 62704
(217) 782-6206

Indiana

http://www.in.gov/dol/
Department of Labor
Indiana Occupational Safety and Health Administration
402 W Washington, Rm. W195
Indianapolis, IN 46204
(317) 232-2655

Iowa

www.iowaworkforce.org/labor/index.html
Iowa Division of Labor Services
1000 E Grand Ave.
Des Moines, IA 50319-0209
(515) 281-5387 or (800) 562-4692

Kansas

http://www.osha.gov/oshdir/ks.html
U.S. Department of Labor/OSHA
271 W 3rd St. North, Rm. 400
Wichita, KS 67202
(316) 269-6644

Kentucky

http://www.labor.ky.gov/Pages/LaborHome.aspx
Labor Cabinet
Occupational Safety and Health
1047 U.S. Hwy. 127 South, Suite 4
Frankfort, KY 40601
(502) 564-3070

Louisiana

www.lsp.org/tess.html
Office of State Police
Transportation and Environmental Safety Section
Right to Know Unit
7919 Independence Blvd.
P.O. Box 66168
Baton Rouge, LA 70806
(225) 925-6113

Maine

www.maine.gov/labor/bls/index.shtml
Bureau of Labor Standards
Workplace Safety and Health Division
45 State House Station
Augusta, ME 04333-0045
(207) 623-7900

Maryland

www.dllr.state.md.us/labor/mosh/
Maryland Occupational Safety and Health
Division of Labor and Industry
10946 Golden W Dr., Suite 160
Hunt Valley, MD 21031
(410) 527-4499

Massachusetts

http://www.mass.gov/eohhs/gov/departments/dph/
Massachusetts Department of Public Health
Bureau of Environmental Health
Community Assessment Program
250 Washington St., 7th Fl.
Boston, MA 02108
(617) 624-5757

Michigan

http://www.michigan.gov/lara/0,4601,7-154-61256_11407---,00.html
Michigan Occupational Safety and Health Administration
P.O. Box 30643
7150 Harris Dr.
Lansing, MI 48909-8143
(517) 322-1814

Minnesota

www.dli.mn.gov/main.asp
Department of Labor and Industry
Occupational Safety and Health Division
443 Lafayette Rd., N
St. Paul, MN 55155
(651) 284-5005 or (800) DIAL-DLI (342-5354)

Mississippi

www.osha.gov/oshdir/ms.html
U.S. Department of Labor/OSHA
100 W Capitol St. Suite 749
Jackson, MS 39269-1620
(601) 965-4606

Missouri

www.labor.mo.gov/DLS/
Division of Labor Standards
3315 W Truman Blvd. Rm. 205
P.O. Box 449
Jefferson City, MO 65102-0449
(573) 751-3403

Montana

http://erd.dli.mt.gov/safety-and-health-bureau.html
Department of Labor and Industry
Safety and Health Bureau
P.O. Box 1728
Helena, MT 59624-1728
(406) 444-6401

Nebraska

www.dol.nebraska.gov/
Nebraska Workforce Development
Department of Labor
Safety and Labor Standards
550 S 16th St.
Lincoln, NE 68508
(402) 471-9000

Nevada

www.dirweb.state.nv.us/OSHA/osha.htm
Department of Business and Industry
Division of Industrial Relations
Occupational Safety and Health Enforcement Section
1301 N Green Valley Pkwy., Suite 200
Henderson, NV 89074
(702) 486-9020

New Hampshire

http://www.nh.gov/labor/inspection/safety-training.htm
Safety and Training Division
NH Department of Labor
95 Pleasant St.
Concord, NH 03301
(603) 271-3176

New Jersey

www.state.nj.us/health/eoh/rtkweb/
Department of Health
Right to Know Unit
Environmental & Occupational Health Assessment Program
P.O. Box 368
Trenton, NJ 08625-0368
(609) 984-2202

New Mexico

www.nmenv.state.nm.us/Ohsb_Website/index.htm
New Mexico Environment Department
Occupational Health and Safety Bureau
525 Camino de los Marquez, Suite 3
Santa Fe, NM 87505
(505) 476-8700

New York

www.health.state.ny.us/environmental/phone.htm
New York State Department of Health
Center for Environmental Health
Empire State Plaza-Corning Tower
Albany, NY 12237
(518) 402-7500

North Carolina

www.nclabor.com/osha/osh.htm
North Carolina Department of Labor
Division of Occupational Safety and Health
1101 Mail Service Center
Raleigh, NC 27699-1101
(919) 807-2796

North Dakota

www.workforcesafety.com/
Workforce Safety & Insurance
1600 E Century Ave., Suite 1
Bismarck, ND 58503-0649
(701) 328-3800 or (800) 777-5033

Ohio

http://www.ohiobwc.com/employer/programs/safety/SandHOnSite.asp
Ohio Bureau of Workers' Compensation
OSHA On-Site Consultation
30 W. Spring St.
Columbus, OH 43215-2256
(800) 644-6292

Oklahoma

www.ok.gov/odol/
Department of Labor
3017 N. Stiles, Suite 100
Oklahoma City, OK 73105
(405) 521-6100

Oregon

www.cbs.state.or.us/external/osha/
Department of Consumer and Business Services
Oregon OSHA
350 Winter St., NE, Rm. 430
P.O. Box 14480
Salem, OR 97309-0405
(503) 378-3272

Pennsylvania

http://www.portal.state.pa.us/portal/server.pt/community/health___safety_division/10387/contact_information/552348
Department of Labor and Industry
Health & Safety Division
Bureau of Workers' Compensation
1171 S. Cameron St.
Harrisburg, PA 17104
(717) 772-1917

Rhode Island

www.dlt.state.ri.us/
Rhode Island Department of Labor and Training
Division of Occupational Safety
Right To Know Unit
1511 Pontiac Ave., Building 70-2
P.O. Box 20157
Cranston, RI 02920
(401) 462-8570

South Carolina

http://www.scosha.llronline.com/
South Carolina Department of Labor, Licensing and Regulations
Occupational Safety and Health
110 Centerview Dr.
P.O. Box 11329
Columbia, SC 29211
(803) 896-7665

South Dakota

http://www.sdstate.edu/engr/outreach/extension/index.cfm
Engineering Extension
South Dakota State University
Harding Hall (SHH) 201, Box 2220
907 Harvey Dunn St.
Brookings, SD 57007
(605) 688-4101

Tennessee

www.state.tn.us/labor-wfd/tosha.html
Department of Labor
Division of Occupational Safety and Health
220 French Landing Dr.
Nashville, TN 37243-1002
(615) 741-2793

Texas

www.dshs.state.tx.us/tiertwo/default.shtm
Texas Department of Health
Hazard Communication Branch
P.O. Box 149347
Austin, TX 78714-9347
(800) 452-2791 (Texas residents only)
(512) 834-6603 (for callers outside of Texas)

Utah

www.laborcommission.utah.gov/
Labor Commission of Utah
Occupational Safety and Health Division
160 E 300 South, 3rd Floor
P.O. Box 146650
Salt Lake City, UT 84114-6650
(801) 530-6800

Vermont

www.labor.vermont.gov/
VOSHA
State of Vermont
Department of Labor and Industry
5 Green Mountain Dr.
Montpelier, VT 05601-0488
(802) 828-4000

Virginia

www.doli.virginia.gov
Division of Occupational Health
Virginia Department of Labor and Industry
13 South Thirteenth St.
Richmond, VA 23219-4101
(804) 371-2327

Washington

www.lni.wa.gov/Safety/default.asp
Department of Labor and Industries
P.O. Box 44000
Olympia, WA 98504-4000
(800) 423-7233

West Virginia

www.wvlabor.com/newwebsite/Pages/index.html
West Virginia Division of Labor
749 B Bldg. 6, Capitol Complex
Charleston, WV 25305
(304) 380-9284

Wisconsin

http://dsps.wi.gov/sb/SB-HomePage.html
Department of Safety and Professional Services
201 W Washington Ave., 4th Fl.
Madison, WI 53703
(608) 266-2112

Wyoming

http://www.wyomingworkforce.org/contact/Pages/occupational-health-and-safety.aspx
Wyoming Department of Workforce Services
1510 E Pershing Blvd., West Wing
Cheyenne, WY 82002
(307) 777-7786

Association addresses

Current as of **April 15, 2013.**

Alliance of Hazardous Materials Professionals (AHMP)

www.ahmpnet.org
9650 Rockville Pike
Bethesda, MD 20814
(800) 437-0137 (toll-free)
(301) 634-7430
Fax: (301) 634-7431

American Chemistry Council (ACC)

www.americanchemistry.com
700 2nd Street, NE
Washington, DC 20002
(202) 249-7000
Fax: (202) 249-6100

American Chemical Society (ACS)

www.acs.org
1155 16th Street, NW
Washington, DC 20036
(800) 227-5558 (US only)
(202) 872-4600 (outside the US)

American Conference of Governmental Industrial Hygienists (ACGIH)

www.acgih.org
1330 Kemper Meadow Drive
Cincinnati, OH 45240
(513) 742-2020 (customers/members)
(513) 742-6163 (administrative phone)
Fax: (513) 742-3355

American Industrial Hygiene Association (AIHA)

www.aiha.org
3141 Fairview Park Drive, Suite 777
Falls Church, VA 22042
(703) 849-8888
Fax: (703) 207-3561

American Institute of Chemical Engineers (AICE)

www.aiche.org
3 Park Avenue, 19 Fl
New York, NY 10016-5991
(800) 242-4363
(203) 702-7660 (outside the U.S.)
Fax: (203) 775-5177

American National Standards Institute (ANSI)

www.ansi.org
1899 L Street, NW, 11th Floor
Washington, DC 20036
(202) 293-8020
Fax: (202) 293-9287
or
25 West 43rd Street, 4th Floor
New York, NY 10036
(212) 642-4900
Fax: (212) 398-0023

American Petroleum Institute (API)

www.api.org
1220 L Street, NW
Washington, DC 20005-4070
(202) 682-8000

American Society of Heating, Refrigerating and Air-Conditioning Engineers

www.ashrae.org
1791 Tullie Circle, NE
Atlanta, GA 30329
(800) 527-4723 (U.S. and Canada only)
(404) 636-8400
Fax: (404) 321-5478

American Society for Testing and Materials (ASTM)

www.astm.org
100 Barr Harbor Drive
P.O. Box C700
West Conshohocken, PA 19428-2959
(610) 832-9585

American Society of Agricultural and Biological Engineers (ASAE)

www.asabe.org
2950 Niles Road
St. Joseph, MI 49085
(269) 429-0300
Fax: (269) 429-3852

American Society of Mechanical Engineers (ASME)

www.asme.org
Two Park Avenue
New York, NY 10016-5990
(800) 843-2763 (U.S. and Canada)
001-800-843-2763 (Mexico)
(973) 882-1170 (outside North America)

American Society of Safety Engineers (ASSE)

www.asse.org
1800 East Oakton Street
Des Plaines, IL 60018
(847) 699-2929
Fax: (847) 768-3434

American Welding Society (AWS)

www.aws.org
8669 Doral Blvd., Suite 130
Doral, FL 33166
(800) 443-9353
(305) 443-9353

Chemical Abstract Service (CAS)

www.cas.org
P.O. Box 3012
Columbus, OH 43210
(800) 848-6538 (North America only)
(614) 447-3600 (worldwide)
Fax: (614) 447-3713

Chemical Producers and Distributors Association

www.cpda.com
1730 Rhode Island Avenue, Suite 812
Washington, DC 20036
(202) 386-7407
Fax: (202) 386-7409

Compressed Gas Association (CGA)

www.cganet.com
14501 George Carter Way, Suite 103
Chantilly, VA 20151-2923
(703) 788-2700
Fax: (703) 961-1831

International Agency for Research on Cancer (IARC)

www.iarc.fr
150 Cours Albert Thomas
69372 Lyon CEDEX 08
France
+33 (0) 4 72 73 84 85
Fax: +33 (0) 4 72 73 85 75

International Safety Equipment Association

www.safetyequipment.org
1901 North Moore Street
Arlington, VA 22209-1762
(703) 525-1695
Fax: (703) 528-2148

Medical Waste Institute (National Solid Waste Management Association)

www.environmentalisteveryday.org
4301 Connecticut Avenue, NW, Suite 300
Washington, DC 20008
(800) 424-2869
(202) 244-4700
Fax: (202) 966-4824

National Association of Manufacturers (NAM)

www.nam.org
733 10th Street NW
Washington, DC 20001
(800) 814-8468
(202) 637-3000 (in Washington, DC)
Fax: (202) 637-3182

National Fire Protection Association (NFPA)

www.nfpa.org
1 Batterymarch Park
Quincy, MA 02169-7471
(617) 770-3000
Fax: (617) 770-0700

National Safety Council

www.nsc.org
1121 Spring Lake Drive
Itasca, IL 60143-3201
(800) 621-7615
(630) 285-1121
Fax: (630) 285-1315

Society of Automotive Engineers (SAE)

www.sae.org
SAE World Headquarters
400 Commonwealth Drive
Warrendale, PA 15096-0001
(877) 606-7323 (U.S. and Canada)
(724) 776-4970 (Outside U.S. and Canada)
Fax: (724) 776-0790

Society for Chemical Hazard Communication (SCHC)

www.schc.org
P.O. Box 1392
Annandale, VA 22003-9392
(703) 658-9246
Fax: (703) 658-9247

Society of Chemical Manufacturers & Affiliates (SOCMA)

Formerly known as Synthetic Organic Chemical Manufacturers Association
www.socma.com
1850 M Street NW, Suite 700
Washington, DC 20036-5810
(202) 721-4100
Fax: (202) 296-8120

Other relevant addresses

Current as of **May 7, 2013**.

Occupational Safety and Health Administration (OSHA)

United States Department of Labor
200 Constitution Avenue, NW
Washington, DC 20210
(800) 321-6742

OSHA Enforcement Programs

Directorate of Enforcement Programs (DEP)
U.S. Dept. of Labor, OSHA
200 Constitution Avenue, NW, RM N-3119
Washington, DC 20210
(202) 693-2100

OSHA Training Institute

OSHA Directorate of Training and Education
2020 South Arlington Heights Road
Arlington Heights, IL 60005-4102
(847) 759-7700

National Institute for Occupational Safety and Health (NIOSH)

Education and Information Division (EID)
NIOSH Mailstop C-14
4676 Columbia Parkway
Cincinnati, OH 45226
(513) 533-8302

National Toxicology Program

Office of Liasion, Policy and Review
PO Box 12233, MD K2-03
Research Triangle Park, NC 27709
(919) 541-0530
(919) 541-3419 (Central Data Management)

Cincinnati Technical Center

Formerly Cincinnati Laboratory
(Technical equipment calibration and repair)
435 Elm Street, Suite 500
Cincinnati, OH 45202-2673
(513) 684-3721

Salt Lake City Laboratory

(Chemical analyses of monitoring samples)
Salt Lake Technical Center
8660 South Sandy Parkway
Sandy, UT 84070-6424
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OSHA COMPLIANCE MANUAL

SUBJECT INDEX

This subject index is designed to help you quickly locate information in the OSHA Compliance Manual. Because each chapter is numbered separately, subject categories are referenced by chapter and page number within that chapter.

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