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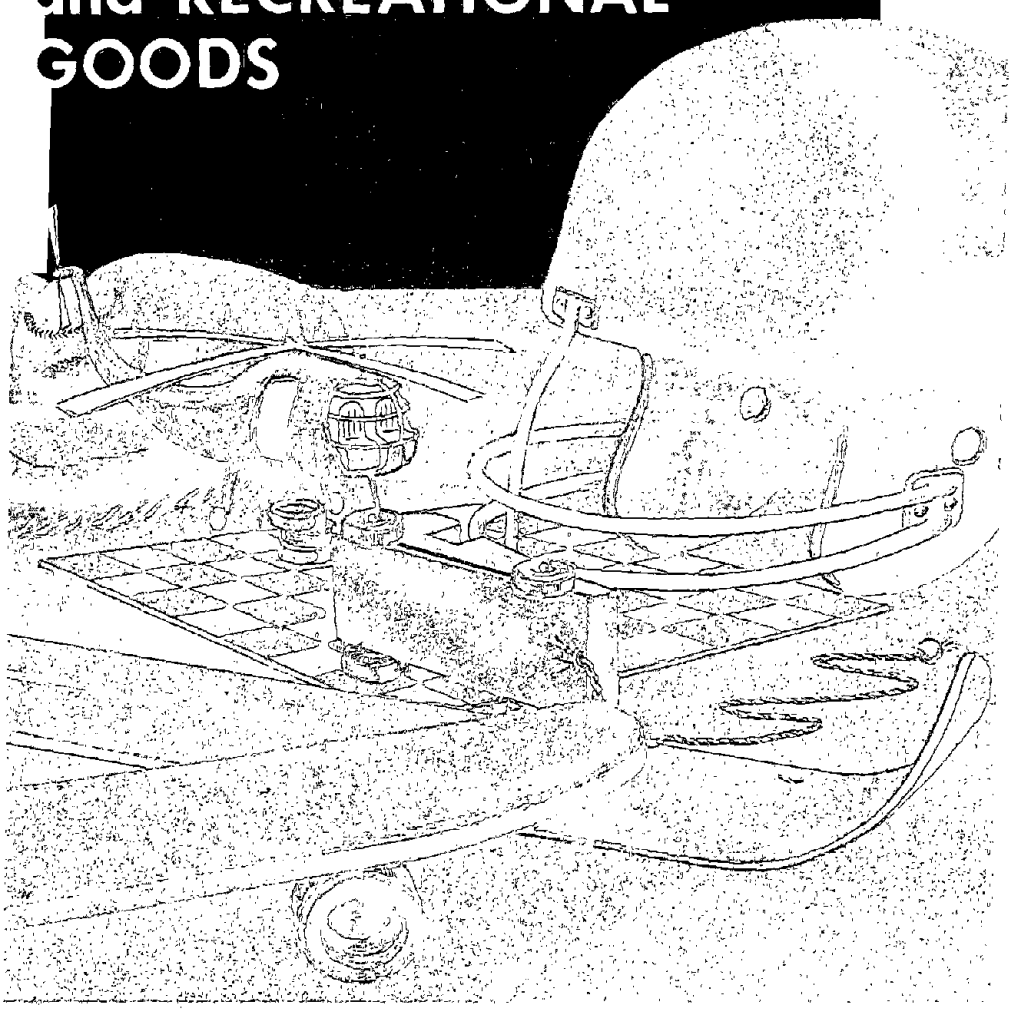

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CONTENTS

INTRODUCTION

The Williams-Steiger "Occupational Safety and Health Act of 1970" was passed into law "to assure safe and healthful working conditions for working men and women . . ." This Act established the National Institute for Occupational Safety and Health (NIOSH) in the Department of Health, Education, and Welfare (DHEW) and the Occupational Safety and Health Administration (OSHA) in the Department of Labor (DOL). The Act provides for research, informational programs, education, and training in the field of occupational safety and health and authorizes the enforcement of standards. As part of these activities, surveys have been made by NIOSH to determine the most common health and safety problems in small businesses. This Guide was developed for distribution throughout the industry and includes a "Guidelines" section and a section on "Frequently Violated Regulations."

While the aim of this Guide is to assist in providing a safe and healthful workplace by describing safe practices and helping to correct some of the more frequently encountered violations of the safety and health standards, it is not intended to provide total information in all areas of compliance. Additional information can be found in the General Industry Standards (Code of Federal Regulations, Title 29, Part 1910 — Occupational Safety and Health Standards).

Words such as "must," "shall," "required," and "necessary," appearing in the text, indicate requirements under the Federal Regulations. Procedures indicated by "should," suggested," constitute generally accepted good practices.

In some states, the federal government has delegated enforcement authority for occupational safety and health to the state government. Although state standards sometimes differ from federal standards, they must be at least as effective as the federal standards.

On the last few pages of the Guide are listed addresses of NIOSH and OSHA regional offices where additional information and materials can be obtained. Consultation resulting from requests for assistance will not precipitate a compliance visit by OSHA.

HEALTH AND SAFETY GUIDELINES

HEALTH AND SAFETY PROGRAM

Hazardous conditions or practices not covered by specific OSHA standards are covered under the general duty clause of the Act which states "Each employer shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees." The employer can meet this requirement by utilizing an ongoing health and safety program as an effective means to recognize, evaluate, and control hazards and potential hazards in the workplace.

Hazards may be identified by performing self-inspections, soliciting employee input (interviews, suggestions, and complaints), promptly investigating accidents, reviewing injury and illness records, and using material from this Guide and other sources.

The "Checklist" in the back of this book is of particular importance in identifying hazards. It should be customized to fit the needs of your program.

Identifying hazards by reviewing injury and illness records

HEALTH AND SAFETY GUIDELINES

Situations that occur frequently or cause severe problems should be given priority for corrective action. This Guide contains many of the requirements and good practices needed to correct hazards. For more complex problems, such as those requiring engineering controls to reduce noise or airborne contamination, outside consultants may be needed.

Management may assign safety and health responsibilities in the areas of both program development and implementation. Regular meetings and informal discussions can be held to discuss safety promotions, hazards, and injury and illness records. To ensure program success, management leadership and support are necessary. The employee assigned responsibility for carrying out the program must be given the necessary authority and must have management support. Likewise, everyone in the establishment should be made aware of the program activities through a systematic interchange of information. Employees cannot take an interest in the program if they are unaware of what is occurring. Conversely, well informed employees will very likely show interest and a desire to participate.

HEALTH AND SAFETY GUIDELINES

EMPLOYEE TRAINING

A safe operation depends largely upon employees who are properly informed and aware of potential hazards. Training needs will vary according to the complexity of the operation. Some suggestions are:

1. Impress upon the employee the need for constant awareness — even during automatically controlled operations.

2. Be sure all employees know when and how to use appropriate personal protective equipment.

3. Develop and maintain check points to be observed as a part of standard and emergency procedures.

4. Post appropriate warning signs and operating procedures.

5. Instruct employees in the use of portable fire extinguishers. (Refer to fold-out chart in this booklet and post in a conspicuous place.)

6. Have at least one employee trained in first aid on each shift.

7. Be sure employees authorized to use motorized equipment are thoroughly instructed in its operation and potential hazards.

8. Develop a "good housekeeping" awareness to reduce accidents and to develop the employees' sense of pride in their surroundings. Responsibilities should be specifically assigned for clean-up.

9. Instruct employees in safe-lifting practices. Such instruction may prevent many injuries. An easily understood chart, "How to Lift Safely," which is included in the back of this book, may be removed and posted where it may be seen by all employees.

HEALTH AND SAFETY GUIDELINES

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL

In the work environment, employees may be exposed to excessive levels of a variety of harmful materials including gases, dusts, mists, vapors, fumes, certain liquids and solids, noise, heat, and cold. Often health hazards are not recognized because materials used are identified only by trade names. A further complication arises from the fact that materials tend to contain mixtures of substances, making identification still more difficult.

To begin identifying occupational health hazards, a materials analysis (product inventory) should be made and all hazardous substances listed and evaluated. If the composition of a material cannot be determined, the information should be requested from the manufacturer or supplier who will often provide Material Safety Data Sheets for the products. These sheets contain information such as toxicity levels, physical characteristics, personal protective equipment requirements, emergency procedures, and incompatibilities with other substances.

A process analysis should be performed to show all chemicals used and all products and by-products formed. When such an analysis is done, allied activities such as maintenance and service operations should be included. Specifics to watch for are:

1. Welding performed around chlorinated materials may cause the formation of toxic gases in addition to welding fumes.
2. If fork lift trucks with internal combustion engines are used for materials handling, then exhaust gases such as carbon monoxide should be included in the analysis.
3. When certain cleaning agents are mixed, poisonous gases, such as chlorine, are sometimes formed.

It should be noted that skin conditions, such as chemical burns, skin rashes, and dermatitis, constitute over half of all occupational health problems. The use of protective creams or lotions, proper protective clothing and equipment, and good personal hygiene practices can often prevent skin problems.

HEALTH AND SAFETY GUIDELINES

AIR CONTAMINANTS

Various control methods can be used to prevent or reduce employee exposure to air contaminants. Some of these methods, which can be used singly or in combination, are:

1. **Substitution of less toxic materials** — e.g., use of methyl chloroform for carbon tetrachloride.

2. **Change of a process** — e.g., a change from gas-operated fork lift trucks to electric lift trucks.

3. **Isolation** — placing the hazardous process in a separate room or in a corner of the building to reduce the number of persons exposed.

4. **Ventilation** — either local exhaust ventilation where contaminants are removed at the point of generation, or general dilution ventilation. (See "Occupational Health and Environmental Control.")

5. **Administrative Controls** — limiting the total amount of time an individual is exposed to a health hazard and rotating two or more workers each day.

6. **Training and education of employees** — telling employees what hazards they are exposed to and how to reduce or limit exposure. (See "Employee Training.")

7. **Personal Hygiene** — this cannot be over-emphasized. Employees should wash their hands before eating and they should not be permitted to eat around toxic chemicals or in contaminated areas. If chemicals such as caustics, epoxies, and resins get on the skin, they should be washed off immediately. Clothing should be changed and washed daily if it becomes contaminated with toxic chemicals, dusts, fumes, or liquids.

8. **Personal Protective Equipment** — use of such items as respirators, hearing protection devices, protective clothing, and protective equipment. (See "Personal Protective Equipment.")

HEALTH AND SAFETY GUIDELINES

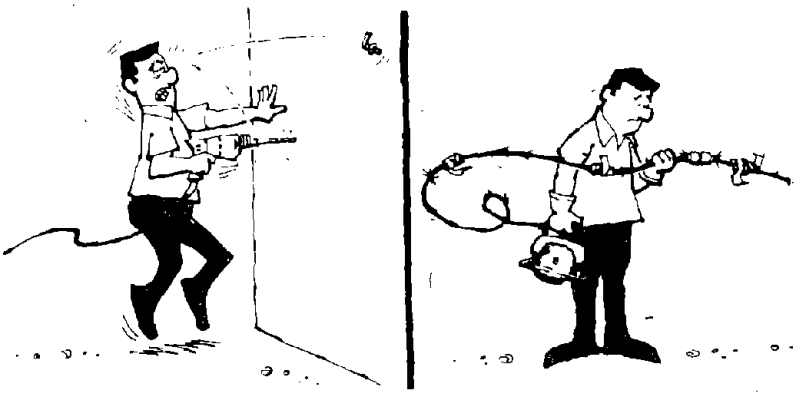
POWER TOOLS

Employees who operate power tools should be instructed to:

1. Know the application, limitation, and potential hazards of the tool used.

2. Select the proper tool for the job.

3. Remove adjusting keys and wrenches before turning on tools.



4. Not use tools with frayed cords or loose or broken switches.

5. Keep guards in place and in working order.

6. Have ground prongs in place or use tools marked "double-insulated."

7. Maintain working areas free of clutter.

8. Keep alert to potential hazards in the working environment such as damp locations or the presence of highly combustible materials.

9. Dress properly to prevent loose clothing from getting caught in moving parts.

10. Use safety glasses, dust or face masks, or other protective clothing and equipment when necessary.

11. Not surprise or distract anyone using a power tool.

HEALTH AND SAFETY GUIDELINES

THE INDUSTRY AND ITS HAZARDS

The Toys and Games industry is a diversified one — involving a wide range of production techniques and processes. While some health and safety problems are common throughout all industry, certain specific problems are unique to the manufacturing procedures and materials used.

Hazards common to all industrial activities are wet or slippery floors and working surfaces, tripping hazards, fire hazards, elevated areas without standard railings and toeboards, electrical hazards, improper materials handling (both manual and mechanical), and improperly maintained aisles and exit ways. Production space is usually at a premium, leading to overcrowded conditions. Congestion seems to aggravate any existing hazards. Aisles must be of sufficient width to accommodate foot and vehicular traffic, must be kept free of obstructions, and exit ways must be marked to indicate direction of travel.

The specific hazards of a workplace will depend on the processes and materials utilized. For example, a plant which produces plastic or synthetic rubber toys may have toxic or irritating fumes which requires the use of ventilation systems and protective clothing and equipment. The same location may also have a high noise level, requiring engineering controls to reduce the noise level and the use of hearing protection by employees.

The moving parts of machinery present a safety problem and require guarding to protect the employees from contact. For example, the hot surfaces of molds require guards that will keep the employees out of the danger zone.

A plant which produces metal toys or other amusements may have metal stamping, forming, or casting as part of its activities. All of these operations require guarding.

There are certain specific requirements which must be met to control the hazards of spray finishing operations. Some of the spray finishes are toxic, many are flammable, others may be a respiratory hazard. Solvents and cleaning agents may also present these same hazards. (See "Hazardous Materials.")

The use of gasoline-powered forklifts for materials handling increases the potential for high concentrations of carbon monoxide. Adequate ventilation throughout the work area will usually eliminate this problem. Some plants use battery-powered forklifts which eliminates the carbon monoxide problem, but the battery charging

area must be adequately ventilated to prevent the buildup of hydrogen gas which is an explosion hazard. Battery servicing also requires the handling of corrosive acids; employees must have eye and face protection, gloves and aprons, and an eye wash and safety shower in the immediate area. Mishandling batteries may cause arcing and sparking and serve as the ignition source for fires.

Maintenance personnel usually have occasion to visit every part of a plant and are thereby exposed to all the hazards in the plant; many of their activities require the use of personal protective equipment. For example, eye protection is required, and respiratory protection may be needed, for grinding operations. The condition of hand tools, proper guarding and grounding of portable power tools, and proper ventilation of welding areas are important considerations.

Machine guarding is of particular importance in woodworking shops. The dust, shavings, and scrap generated in woodworking may be a fire hazard and must be cleaned up promptly and disposed of properly. The presence of high levels of wood dust may also create respiratory problems.

Printing operations may be found in plants which produce items such as parlor games. Unguarded machinery, chemicals in inks, solvents, etchants, and noise are hazards which may be found.

Before a product is ready for delivery it usually goes through some type of packaging process. Modern packaging includes a large amount of plastics and other synthetic material. Heat-sealing and hot-wire cutting can produce irritating fumes. Adequate ventilation is required where fumes are generated. (Cutting and sealing plastic wrap in the meat packing industry has produced a condition known as "meat wrappers' asthma.")

Glues and other sealants may present a hazard to the worker through skin contact or vapor inhalation. Personal protective clothing such as impervious gloves and aprons may be needed and ventilation may be required in gluing areas.

Chemical preparations which are used in production all too often present hazards that neither the employee nor employer is aware of. The employer should know the hazards of all materials and processes used in the plant. Employees must be instructed in the safe ways of eliminating or controlling exposure to these hazards.

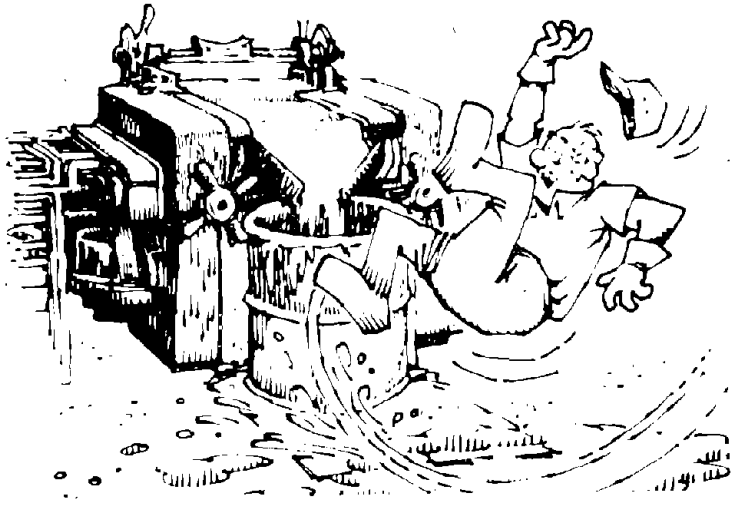
FREQUENTLY VIOLATED REGULATIONS

This section outlines the OSHA regulations which are most applicable to general conditions and operations throughout the industry. The standards are listed and the important parts of each are summarized.

General conditions and controls are discussed. Your particular operation may vary, so some of these standards may not apply or additional standards may also be applicable. The control methods presented are only a brief, general suggestion as to how hazards may be corrected. For detailed information on controls where specific designs must be implemented for such problems as noise, air contaminants, and machine guarding, you may need the services of a professional consultant.

FREQUENTLY VIOLATED REGULATIONS

WALKING AND WORKING SURFACES



GENERAL REQUIREMENTS

1. All work areas, passageways, storerooms, and service rooms must be kept clean, orderly, sanitary, and as dry as possible. All spills should be cleaned up promptly. Floors in work areas must be kept free of scrap, chips, oil spills, and other debris.

2. Areas which are constantly wet should have non-slip surfaces or mats where employees must walk or work.

3. Every floor, working place, and passageway must be maintained free from protruding nails, splinters, holes, and loose boards.

4. Where mechanical handling equipment such as lift trucks is used, sufficient safe clearance must be provided for foot and vehicular traffic.

5. No obstructions that could create a hazard are permitted in the aisles.

6. All permanent aisles must be easily recognizable.

FREQUENTLY VIOLATED REGULATIONS

WALKING AND WORKING SURFACES (cont.)

7. Floorload capacities must be posted in a readily visible location (except for slab floors with no basement). The floorload capacity is the maximum weight which can be safely supported by a floor, expressed in pounds per square foot. If this information is not available, and when floorload capacity is in doubt, a competent engineer should be consulted.

WALKING AND WORKING SURFACES (cont.)

THE STANDARD GUARD RAIL AND TOEBOARD

1. A standard guard railing consists of a top rail, intermediate rail, and posts. The nominal distance from the upper surface of the top rail to the floor, platform, runway, or ramp must be 42 inches. There must be an intermediate rail spaced approximately halfway between the top rail and the floor.

2. A standard guard railing can be of any configuration and construction that meets the basic dimension requirements (42 inches high with midrail), and can withstand 200 pounds applied in any direction at any point on the top rail.

a) For wood railings, the rails and posts must be of at least 2- x 4-inch stock with posts spaced not more than 6 feet apart.

b) For pipe railings, rails and posts must be at least 1½-inch outside diameter pipe with posts spaced not more than 8 feet apart.

c) For structural steel rails, posts and rails must be of 2- x 2- x ⅜-inch angles or other metal shapes of equivalent strength with posts spaced not more than 8 feet apart.

3. The standard toeboard must be approximately 4 inches in height from the floor to the top edge, with no more than a ¼-inch gap between the toeboard and the floor. The toeboard may be constructed of any solid or perforated substantial material, as long as the openings are smaller than 1 inch.

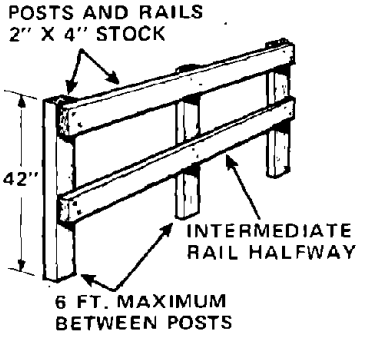
FREQUENTLY VIOLATED REGULATIONS

WALKING AND WORKING SURFACES (cont.)

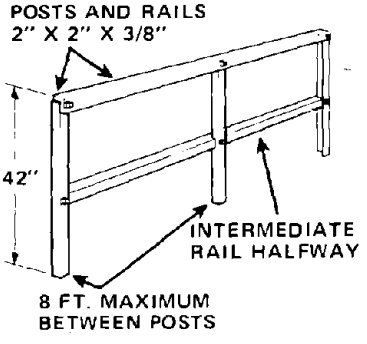
THE STANDARD GUARD RAILING AND TOEBOARD

As a general condition, a standard toeboard and guard railing are required wherever people walk beneath the open sides of a platform or under similar structures or where things could fall from the structure (for example, into machinery below).

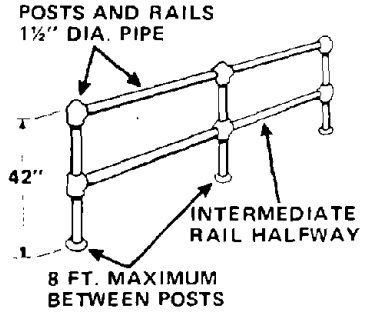
WOOD RAILS



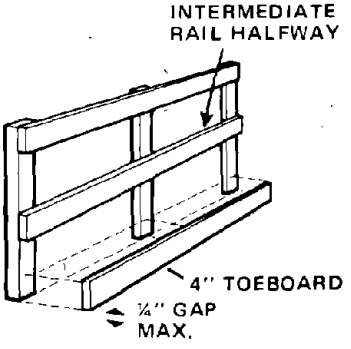
STRUCTURAL STEEL



PIPES



TOEBOARDS



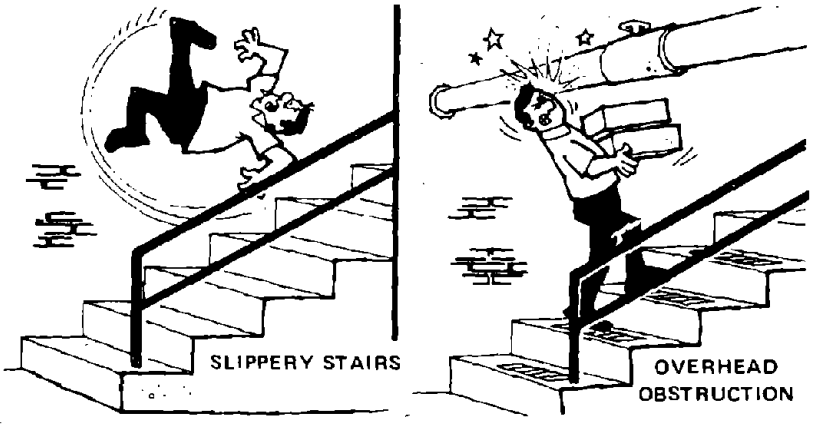
FREQUENTLY VIOLATED REGULATIONS

WALKING AND WORKING SURFACES (cont.)

FIXED INDUSTRIAL STAIRS

1. Riser height and tread width must be uniform throughout any flight of stairs.

2. All treads must be reasonably slip resistant.



3. Vertical clearance above any stair tread to any overhead obstruction must be at least 7 feet, measured from the leading edge of the tread.

4. The minimum permissible width of a stairway is 22 inches. If the stairway is a means of exit access, it must be at least 28 inches wide.

5. The angle to the horizontal made by the stairs must be between 30° and 50°.

6. All stairs should be adequately lighted.

7. If the tread is less than 9 inches wide, the risers should be open.

8. The following requirements apply to flights of stairs having four or more risers

a) A stair railing is required on each open side.

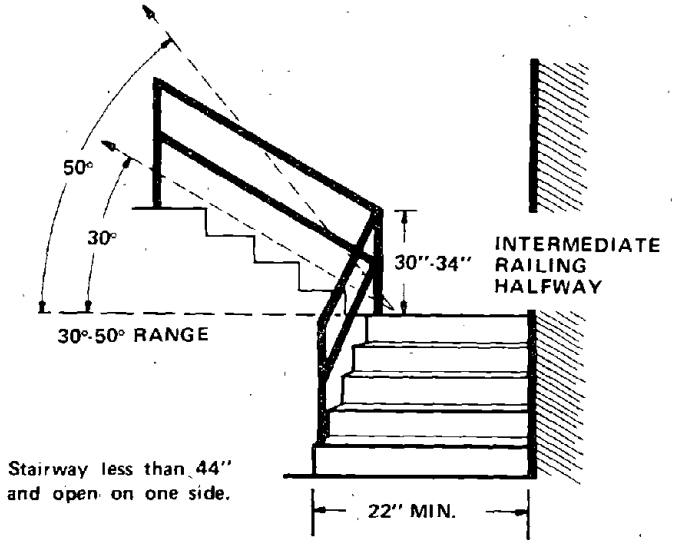
b) If the stairway is less than 44 inches wide and both sides are enclosed, at least one handrail is required, preferably on the right side descending.

WALKING AND WORKING SURFACES (cont.)

c) If the stairway is greater than 44 inches wide, a handrail is required on each enclosed side.

d) If the stairway is greater than 88 inches wide, an intermediate stair railing located midway is required.

9. The vertical height of a stair railing must be 30 to 34 inches, and it must be of construction similar to the standard guard railing.



PORTABLE LADDERS

1. Portable ladders must be maintained in good condition at all times with tight joints, securely attached hardware and fittings, and freely operating movable parts. They should be kept coated with a suitable protective material.

2. They must be inspected frequently. Defective ladders must be tagged "Dangerous — Do Not Use" and removed from service for repair or destruction. Ladders with broken or missing steps, rungs, or cleats, cracked or broken side rails, or other faulty equipment must not be used.

3. Ladders should be stored where they will not be exposed

WALKING AND WORKING SURFACES (cont.)

to the elements; wood ladders should be stored where there is good ventilation.

4. Metal ladders must not be used near energized electrical equipment.

5. All ladders must be placed so that they have a secure footing. They may not be placed on boxes, barrels, boards, bricks, or other unstable bases to obtain additional height. Nonslip bases should be used.

FIXED LADDERS

1. Fixed ladders must be designed to withstand a single concentrated load of at least 200 pounds.

2. Rungs of metal ladders must have a minimum diameter of ¾ inch. Rungs of wood ladders must have a minimum diameter of 1⅛ inches.

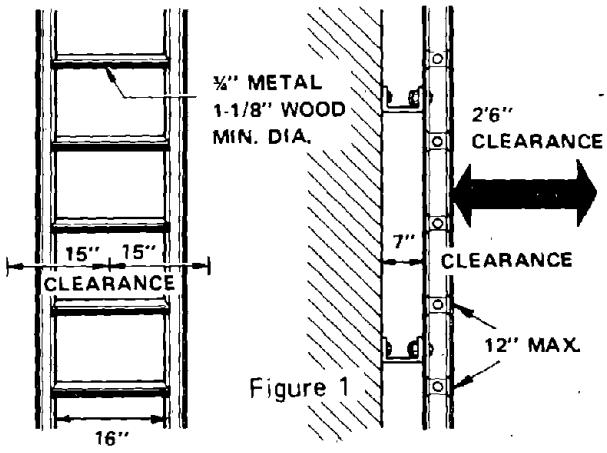


Figure 1

3. Rungs must be at least 16 inches wide, be spaced no more than 12 inches apart, and be free of splinters and burrs.

4. Ladders, when their location so demands, must be painted or treated with a preservative to resist deterioration.

5. The preferred pitch for safe descent is 75° to 90° unless caged, ladders with 90° pitch must have a 2½ foot clearance on

WALKING AND WORKING SURFACES (cont.)

the climbing side. There must be a 3 foot clearance on ladders with a 75° pitch.

6. There must be at least a 7 inch clearance in back of the ladder to provide adequate toe space.

7. Ladders must have cages if they are longer than 20 feet.

8. Landing platforms must be provided on ladders greater than 20 feet long. A platform is required every 30 feet for caged ladders and every 20 feet for unprotected ladders.

9. Side rails must extend at least 3½ feet above landings.

FREQUENTLY VIOLATED REGULATIONS

EXITS AND EXIT MARKINGS

SIZE AND PLACEMENT OF SIGNS

1. Every exit must have the word "EXIT" in plain, legible letters not less than 6 inches high with the strokes of the letters not less than ¾ inch wide.

2. The visibility of the sign must not be impaired by decoration, furnishings, or other signs.

3. Doors, passageways, or stairways which are neither exits nor ways to an exit, but may be mistaken for an exit, must be clearly marked "NOT AN EXIT" or with a sign indicating their actual use; e.g., "STORAGE ROOM" or "TO BASEMENT."

4. In areas where the direction to the nearest exit may not be apparent to an occupant, an exit sign with a directional arrow must be used.

5. Exit signs must be illuminated by a reliable light source if occupancy is permitted at night, or if normal lighting levels are reduced at times during working hours.

FREQUENTLY VIOLATED REGULATIONS
EXITS AND EXIT MARKINGS (cont.)

GENERAL REQUIREMENTS

1. The exit route must lead to a public way.

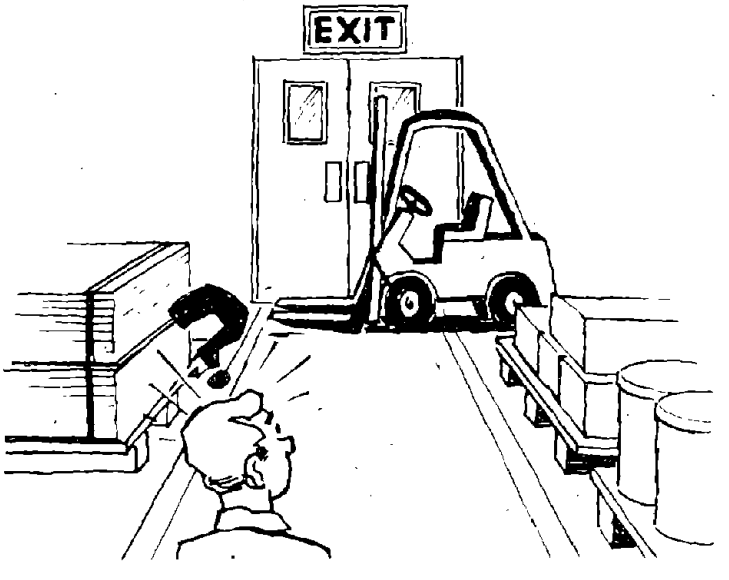
2. Areas around exit doors and passageways leading to and from the exit must be kept free of obstructions.

3. Exit access must be arranged so that it is unnecessary to travel toward any area of high hazard potential in order to reach the nearest exit (unless the path of travel is effectively shielded by suitable partitions or other barriers).

4. A door from a room to an exit, or to a way of exit access, must be of the side-hinged, swinging type. It must swing out in the direction of travel if 50 or more persons occupy the room or it is an exit from an area of high hazard potential.

5. No lock or fastening may be used which prevents escape from inside the building.

6. There must be at least two means of exit remote from each other where occupants may be endangered by the blocking of any single exit due to fire or smoke.



FREQUENTLY VIOLATED REGULATIONS

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL

It is the responsibility of the employer to ensure that employees are not exposed to toxic (or otherwise harmful) levels of airborne contaminants or physical agents. There are many potentially irritating or toxic materials used in the various processes involved in the production of games, toys, amusements, and recreational goods. Some examples of these are:

SOLVENTS

Solvents have many applications, and exposure presents a potential threat to the health of the worker. All organic solvents have some effect on the central nervous system and skin. The principal modes of exposure are through inhalation of vapors and skin contact. Excessive inhalation of vapors of some solvents may cause lack of coordination and drowsiness, which have no discernible effects on health, but which may increase the risk of accidents. In other cases, exposure may result in serious damage to the blood, lungs, liver, kidneys, and gastrointestinal system.

Skin contact may cause dermatitis, ranging in severity from a simple irritation to actual skin damage. Even the most inert solvents can dissolve the natural barriers of fats and oils, leaving the skin unprotected. When natural oils are removed, the skin becomes subject to disabling and possibly disfiguring dermatitis.

Employees must be instructed to avoid all skin contact with solvents, and to avoid breathing solvent vapors. Ventilation systems may be needed to control the levels of solvent vapor.

RESINS

Wet or uncured resins and the chemicals used to harden, thin, strengthen, or make the resin more flexible should be regarded and handled as hazardous materials. Dermatitis may be a problem for workers who handle resins if prolonged skin contact is allowed. When resins are washed off immediately following skin contact, there are usually no after effects. Hand washing facilities should be located close to areas where resins are handled. Soft or liquid soaps should be used, not harsh or abrasive cleaning agents or solvents.

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (cont.)

Nose and throat irritation, headache, nausea, intestinal upsets, and other conditions may result from breathing the dusts or vapors of various resin manufacturing processes.

Chemicals used with resins may also be harmful. Toluene-2, 4-diisocyanate (TDI) and methylene bisphenyl isocyanate (MDI) are used in the manufacture of synthetic foams. **Isocyanates** are irritating to the skin, eyes, and respiratory tract. Asthma-like symptoms are produced from very low levels of contaminants. TDI and MDI must be used only in areas with adequate ventilation; other isocyanates must also be used with the same degree of care. Protective clothing, particularly impermeable gloves, is required for employees who handle isocyanates.

Styrene is used in the manufacture of fiberglass reinforced products and in a number of processes. Styrene is highly flammable, and adequate controls must be exercised to eliminate fire and explosion hazards. Styrene in low concentrations is irritating to the eyes and lungs. Prolonged exposure may cause nausea, headache, and dizziness. Adequate ventilation is necessary where styrene is used.

Acrylics such as methyl or ethyl acrylate and methyl methacrylate are widely used. Respiration of the vapors and skin contact are the chief methods of exposure. Overexposure to the acrylics may lead to liver and kidney damage. Fire and explosion precautions are necessary as the acrylics are also highly flammable.

Adhesives such as methyl chloride may be a respiratory hazard.

Organic peroxides such as MEK peroxide used as catalysts with some resins are strong oxidizers. They readily damage the skin and eyes on contact, and must not be ingested. Peroxides, as catalysts, are generally used at strengths of about 60% and may also be fire and explosion hazards. It is highly recommended that written procedures be developed for storage, handling, mixing, and disposal of organic peroxides, and that emergency procedures be outlined and explained to employees.

Polyvinyl chloride (PVC) is used in many products, including containers and packaging films. Heat-sealing and hot-wire cutting of PVC films produces irritating vapors that produce a condition

called "meat wrappers' asthma." Although vinyl chloride, now considered a carcinogen (cancer-causing agent), is used in the production of PVC resin, exposure to vinyl chloride gas is not a hazard associated with heat-sealing or hot-wire cutting of PVC film. However, because of the irritating effects of PVC vapors, these activities must be performed in well-ventilated areas.

PAINTS

Paints and thinners may have a narcotic effect on the worker. Long-term exposures may cause liver and lung damage. Some of the pigments used in the paints may be toxic (e.g., metallic oxides). Adequate ventilation is required in paint spray areas and spray booths. Water soluble paints may solve the problem of flammability of paints, but they do not reduce the respiratory problems.

LEAD

Lead is still used for cast toys. Wherever molten lead is used there is the possibility of lead fumes. Lead dusts generated by grinding and finishing are also harmful. Lead poisoning may occur through the inhalation and/or accidental ingestion of lead fumes or dust. The symptoms of lead poisoning include loss of appetite, metallic taste in the mouth, anemia, headache, nervous irritability, muscle and joint pains, and abdominal cramps. Adequate ventilation is required in all areas where lead is used. Employees must be instructed that they must not take any food or beverages into a work area where lead is present, and good personal hygiene practices must be emphasized.

ELECTROPLATING

Electroplating is used extensively to provide tarnish resistant finishes and for decorative purposes. The chief hazards of electroplating are exposures to toxic chemicals, and strong acids and alkalies. Emergency eye wash and shower facilities are required where corrosive materials are handled and used.

Chrome plating requires the use of **chromic acids.** Breathing chromic acid vapor or mist may cause irritation of the respiratory tract; skin contact causes dermatitis and burns known as "chrome

holes." Local exhaust ventilation should be used with all chromic acid tanks. The recommended exhaust volume is a minimum of 150 cubic feet per minute, per square foot of tank surface. Employees who work with chromic acids must have periodic medical examinations of the mouth, nose, and other parts of the body to detect the first stages of ulceration produced by contact with chromic acid.

Copper plating baths are both acid and alkaline types. The **cyanide** salts in the alkaline bath are the greatest hazard in copper plating. These salt particles may become airborne when the tanks are charged. Cyanide solutions are readily absorbed, and skin contact must be avoided. Local exhaust ventilation systems are required to draw off the vapors, respirators may be needed, and employees must limit skin contact through the use of impervious gloves. Good personal hygiene practices must be stressed, including frequent washing of exposed skin areas, particularly before eating or smoking.

If a cyanide salt solution is mixed with acid, deadly hydrogen cyanide gas can result. All traces of acid must be rinsed away from parts before they are immersed in the cyanide vat. An extra rinse step between the acid and cyanide tanks is strongly recommended. Local exhaust ventilation is necessary.

Zinc and Cadmium plating operations also use cyanide baths. As with copper plating, care must be exercised to avoid contact with the cyanide solution and to prevent a cyanide/acid mix. Local exhaust ventilation is required. It is recommended that zinc and cadmium plating baths be operated at room temperature and low current density, which will lessen the air flow rate required for effective exhaust ventilation.

WOOD DUST

Some wood dusts are toxic, others may cause allergic reactions in those exposed to them. Excessive dust makes good housekeeping difficult and also increases the fire potential. Wood dust should be removed at the point of generation by local exhaust ventilation and collected by cyclone or bag house.

FREQUENTLY VIOLATED REGULATIONS

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (cont.)

NIOSH has published Health and Safety Guides on Electroplating and Metal Coating. See the inside front cover for information on how to order these publications. Employee-oriented booklets which explain health and safety hazards and good practices covering solvents, epoxies, spray painting, urethane foams, and fiberglass layup and sprayup are also available from NIOSH.

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (cont.)

VENTILATION

Mechanical exhaust ventilation is, in most cases, the first choice for control of air contaminants which are potential health hazards. A properly designed local exhaust or dilution ventilation system will either remove air contaminants which may be present, or lower the concentration of fumes, vapors, dusts, mists, or other contaminants generated in the working environment to reduce or eliminate health or fire hazards.

Local exhaust ventilation removes the hazardous materials at or near their point of origin, and prohibits them from being drawn through the breathing zone of the worker. Local exhaust ventilation is the preferred type as it usually performs more efficiently and prevents air contaminants from being circulated through the entire work area.

General dilution ventilation depends upon pulling a sufficient volume of air through the work area to dilute the contaminants to a lower, or non-hazardous, level. Dilution ventilation requires a greater volume of air movement for efficient operation than does a local exhaust system.

Local exhaust systems should be installed wherever a large volume of air contaminant is generated, or where a particularly hazardous substance is used. Some operations which usually require the use of local exhaust ventilation are plating, welding, spray painting, and processes involving the use of lead, mercury, resins, asbestos, beryllium, and flammable liquids.

General dilution ventilation is an effective control for areas generating low concentrations of hazardous substances. It may effectively be used in some flammable liquid storage areas or with low hazard potential substances.

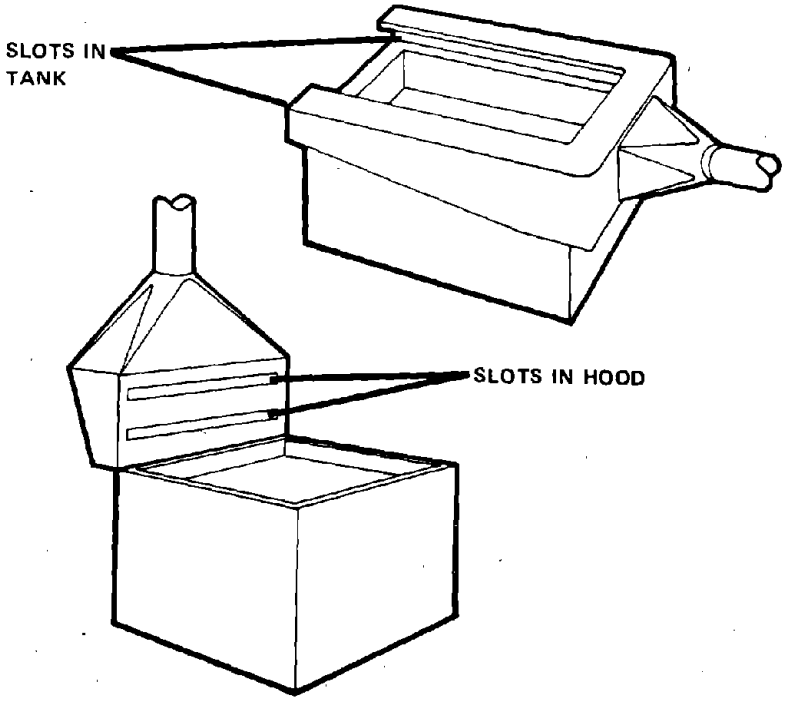
The design of ventilation systems is somewhat detailed, involving determination of the volume of air which needs to be moved, the type of fan which will adequately exhaust the air volume, the placement of the exhausts; makeup air, and the positioning of the system. A mechanical engineer should be consulted to assist in providing an effective environmental control through the use of a ventilation system.

FREQUENTLY VIOLATED REGULATIONS

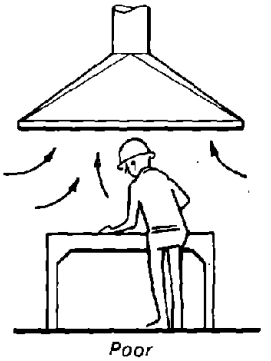
OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (cont.)

VENTILATION SYSTEMS

LOCAL EXHAUST FOR PLATING TANK.
HOOD DRAWS VAPORS FROM TANK
SURFACE TO EXHAUST.




Good


Poor

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (cont.)

OCCUPATIONAL NOISE EXPOSURE

Excessive noise can cause permanent hearing damage; yet the noise standard is one of the most commonly violated standards. It is management's responsibility to make sure employees are not exposed to noise levels in excess of the standard.

The current standard is 90 decibels, A-weighted (dBA), for an 8-hour exposure. Even at this noise level, hearing damage can be expected in some individuals. It may soon be a requirement, and it is considered good practice to have hearing checked (audiometric testing) on an annual basis, for all employees exposed to 85-90 dBA noise levels for 8 hours daily. If no hearing loss is observed, ear protection is not required.

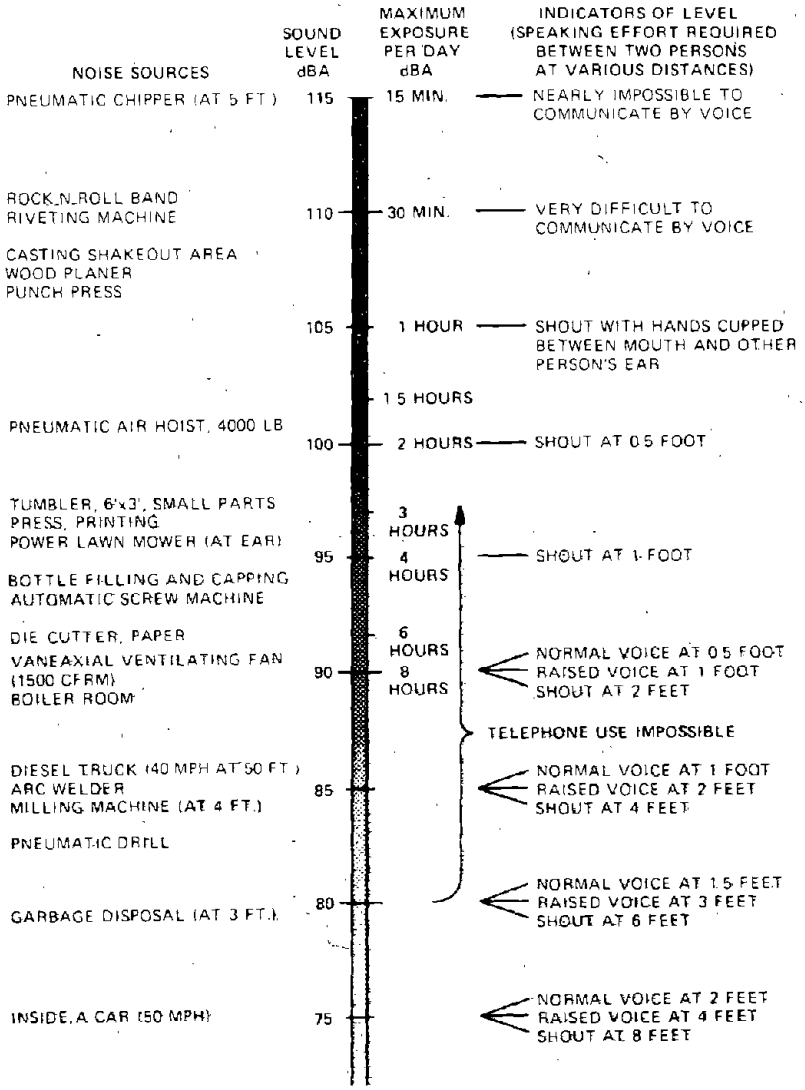
At greater than 90 dBA exposure (8 hours per day) or for higher noise levels in excess of the allowable time (e.g., 100 dBA for more than 2 hours) a continuing, effective hearing conservation program must be administered. Reference to the following table gives estimates of noise levels and the maximum allowable exposure times. It is required that either engineering controls such as enclosing noisy equipment, or administrative controls, such as limiting time of exposure, be utilized to reduce noise levels or the exposure times to comply with the standard. If these control measures are not feasible, then effective personal protective equipment is required. There are many forms and types of ear protection that can be used such as ear muffs or ear plugs. Some are more useful than others, depending on the noise level, the frequency of the noise, and how well they fit the individual. It is necessary to provide protection that is effective and yet reasonably comfortable to the wearer.

The following table is provided to assist in the evaluation of the noise levels in the workplace. If referral to the table indicates that levels and time of exposure are such that corrective action is needed, it is recommended that professional help be sought to correct the problem. A noise survey by adequately equipped and trained personnel should be made before engineering and administrative controls are implemented or a hearing conservation program is established.

FREQUENTLY VIOLATED REGULATIONS

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (cont.)

PERMISSIBLE NOISE EXPOSURES



FREQUENTLY VIOLATED REGULATIONS

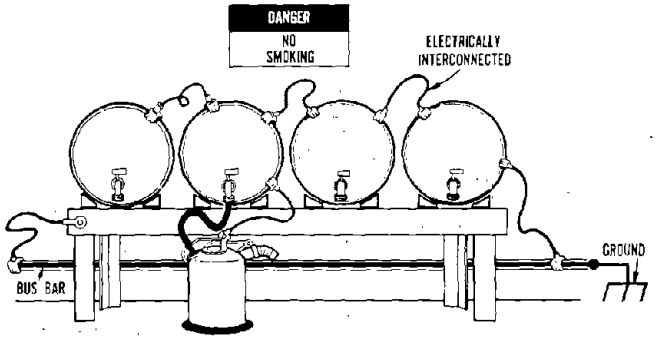
HAZARDOUS MATERIALS

FLAMMABLE AND COMBUSTIBLE LIQUIDS

The category of flammable and combustible liquids is determined by how easily they ignite (the flash point). Flammable liquids ignite more readily than combustible ones. Examples of flammables are gasoline, acetone, and lacquer thinner; examples of combustibles are kerosene, fuel oil, and Stoddard solvent.

1. Connections on all drums and piped systems of flammable and combustible liquids must be vapor and liquid tight.

2. When flammable liquids are transferred from one container to another (e.g., from a bulk container to a portable container), the containers must be effectively bonded and grounded. This practice prevents electrical discharge (i.e., sparks) from the accumulation of static charge because of the transfer process.



3. All spills of flammable and combustible liquids must be cleaned up promptly. Cleanup personnel must use appropriate personal protective equipment. If a major spill occurs, remove all ignition sources and ventilate the area. These liquids must never be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

4. Supplies of flammable and combustible liquids must be stored in approved, fire-resistant safety containers equipped with self-closing lids. These containers can be purchased from an industrial supply house.

5. All flammable liquids must be kept in closed containers when not in use.

HAZARDOUS MATERIALS (cont.)

6. Combustible waste material, such as oily shop rags and paint rags, must be stored in covered metal containers and be disposed of daily.

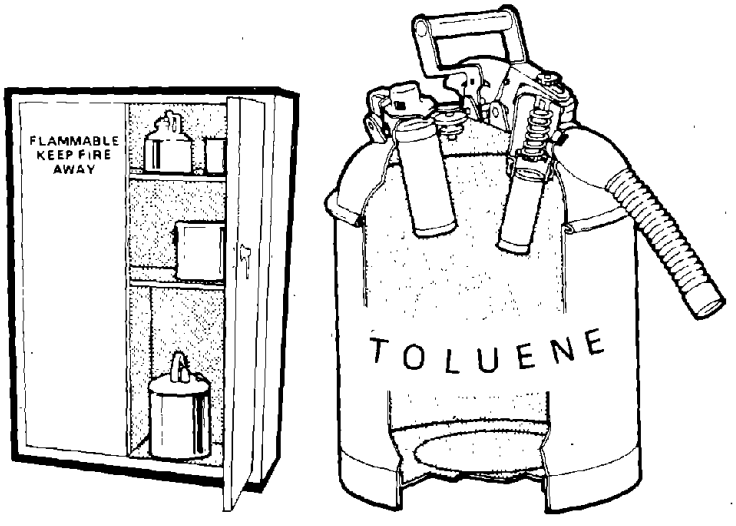
7. All storage areas must be posted as "NO SMOKING" areas.

STORAGE CABINETS

Storage cabinets must be distinctly labeled "FLAMMABLE — KEEP FIRE AWAY."

Metal cabinets must be constructed of at least no. 18 gauge sheet iron, double-walled with a 1½-inch air space and tight joints. Doors must have three-point locks and the sill must be at least 2 inches above the bottom of the cabinet.

Wooden cabinets must be constructed of at least 1-inch plywood. All joints must be rabbetted and fastened two-directionally with flathead screws.



INSIDE STORAGE AREAS

Each inside storage area must be prominently posted as a "NO SMOKING" area. Openings to other rooms or buildings must be provided with noncombustible, liquid-tight raised sills or ramps at least 4 inches in height. An open-grated trench inside the room

HAZARDOUS MATERIALS (cont.)

which drains to a safe location is a permissible alternative to a sill or ramp. General exhaust ventilation (either gravity or mechanical) which provides for a complete change of air within a room at least six times each hour is required. All lights, electrical equipment, and wiring must be of the type approved for hazardous locations.

A fire extinguisher must be available (12B minimum) located within 10 feet of the door.

OUTSIDE STORAGE AREAS

If flammable and combustible liquids are stored outside, the storage area must be graded to divert spills away from buildings. The storage area must be posted as a "NO SMOKING" area, and must be kept free of weeds, debris, and other combustible material. There must be a fire extinguisher available at the storage area.

FREQUENTLY VIOLATED REGULATIONS

SPRAY PAINTING

GENERAL SPRAY OPERATIONS

1. Portable lamps must be removed during spraying.

2. Low flash point thinners (less than 100°F) may be used for cleaning purposes only in a well ventilated area such as a spray booth.

3. The fire control sprinkler heads must be kept clean and free of overspray.

4. "NO SMOKING" signs must be posted wherever flammable liquids are sprayed or stored.

SPRAY AREAS

1. Spray areas must be at least 20 feet from flames, sparks, non-explosion-proof electric motors or other ignition sources.

2. Spray areas must be free from hot surfaces such as heat lamps.

3. Electric lights in a spray area must be covered and guarded from accidental breakage.

4. Spray areas must be kept clean and free of combustible residue.

5. Mechanical ventilation must be provided and used to remove vapors during spraying operations. Fumes and vapors must not be drawn through the breathing zone of the operator.

SPRAY BOOTHS

1. Spray booths must be made of metal, masonry, or other suitable noncombustible material and be smooth on the inside to aid in cleaning.

2. The floors and baffles must be noncombustible and easily cleaned.

3. Spray booth lights must be explosion-proof or enclosed in sealed panels.

4. Mechanical ventilation must be operated during spraying. The ventilation rate must be at least 100 linear feet per minute

SPRAY PAINTING (cont.)

(average air velocity over the open face of the booth). (60 linear feet per minute for electrostatic spraying operations.)

Electric motors for the exhaust fans must be placed outside the booth or ducts and the belts and pulleys fully enclosed. Air exhausted from the paint booth must be discharged outside where it cannot re-enter the work area.

5. Air supply for spray booths:

a. Overspray filters must have pressure gauges to indicate when the filters are clogged and need replacement.

b. When temperatures are below 55°F, the make-up air must be heated to at least 65°. The heater for the make-up air must be located outside the spray booth.

6. Paint drying apparatus:

a. Mechanical ventilation must be left on while paint is drying. A warning sign to this effect must be attached to the drying apparatus.

b. Spray areas used for drying, where portable heaters or lights are used, must be kept clean of overspray. The heaters or lights must be removed before spraying again in the area.

c. Electrically operated drying apparatus must be properly grounded.

7. There must never be a supply of flammable and combustible liquids in the vicinity of spray operations greater than the amount needed for one day or one shift.

FREQUENTLY VIOLATED REGULATIONS

PERSONAL PROTECTIVE EQUIPMENT

GENERAL

Personal protective equipment may not be used as a substitute for feasible engineering or administrative controls. If these control methods are not feasible, or while they are being implemented, personal protective equipment is required whenever employees are exposed to harmful levels of physical agents or toxic substances. Personal protective clothing and equipment must be of safe design and construction for the work to be performed, and they must be maintained in a sanitary and reliable condition.

EYE AND FACE PROTECTION

Eye protection and/or face shields are required where there is a possibility of any injury from flying particles, chips, sparks, and splashes from liquids such as caustics and solvents. Employees must wear this equipment when they use grinders, power drills, or other equipment which produces dust and chips.

Eye and face shields must be designed to provide adequate protection against the particular hazards to which the employee is exposed. The equipment must be easy to clean and be capable of being disinfected. If goggles must be worn by employees whose vision requires corrective lenses, the goggles must fit over the glasses or the corrective lenses can be mounted behind the protective lenses.

HEAD PROTECTION

Protective head covering (hard hats) is required in situations where workers may be subjected to impact or penetration from falling or flying objects.

FOOT PROTECTION

Safety shoes are recommended to prevent injury to the feet from falling objects and other hazards. They should be worn particulary where heavy stock is handled. They should also be worn where there are parts-handling, shipping, and receiving operations.

PERSONAL PROTECTIVE EQUIPMENT (cont.)

GLOVES, APRONS, AND LEGGINGS

Aprons and leggings may be necessary for some operations (e.g., welding) depending on the nature of the hazard generated by the operations. Gloves and arm protectors should be used to prevent lacerations from handling objects with sharp edges, to prevent contact with chemicals, or to prevent burns.

HEARING PROTECTION

Noise levels in some manufacturing areas may be above the 90 dBA limit. While noise controls are being implemented, employees must be provided, and directed to wear, hearing protection. (See "Occupational Health and Environmental Controls.")

RESPIRATORY PROTECTION

NIOSH - approved respirators must be provided by the employer when the workplace air is contaminated with excessive concentrations of harmful dusts, fumes, mists, gases, or vapors. Respirators may be used as a control only when engineering or administrative controls are not feasible, or while they are being implemented.

If respirators are used, a written respirator program must be established and must include the following requirements:

1. The respirators selected for use must be designed to protect against the specific hazards to which the employees are exposed.

2. Written instructions covering the selection and use of respirators must be available.

3. Employees must be trained in the use and limitations of respirators as well as their proper fitting and maintenance.

4. Respirators should be cleaned at the end of each use. They should be taken apart, washed, dried, and defective parts replaced.

5. If a respirator is used by two people, it must be cleaned and disinfected after each use.

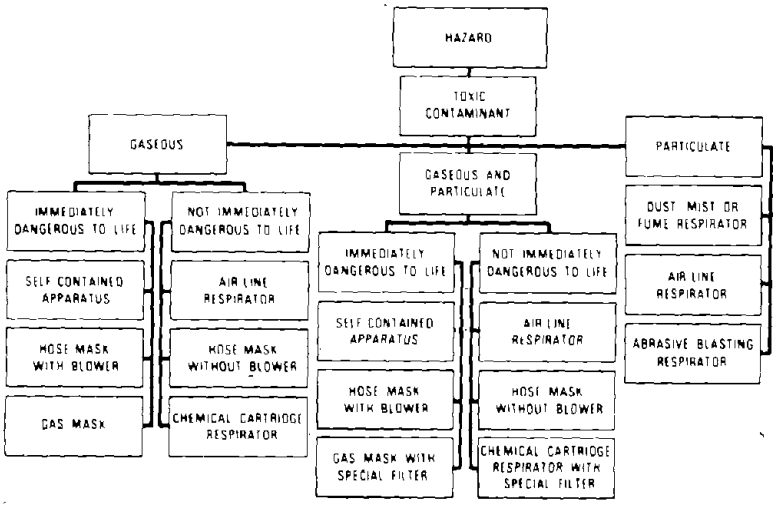
6. When the respirator is worn, all straps must be adjusted and tied.

FREQUENTLY VIOLATED REGULATIONS

PERSONAL PROTECTIVE EQUIPMENT (cont.)

7. To ensure proper function of the respirator, a good face seal is necessary. Beards, long sideburns, and glasses may interfere with the fit.

8. Filters must be replaced when the respirator has been used for the specified lifetime of the cartridge, when an employee can smell vapors in the mask, or if breathing becomes difficult.



FREQUENTLY VIOLATED REGULATIONS

GENERAL ENVIRONMENTAL CONTROLS

SANITATION

1. Safe drinking water must be provided in all places of employment. The use of a common drinking cup is forbidden.

2. Receptacles for waste food must be covered and kept in a clean and sanitary condition.

3. Restrooms must be kept in a clean and sanitary condition.

4. Separate toilet facilities must be provided for each sex. If only one person at a time uses a toilet room and the door can be locked from the inside, separate facilities are not required.

5. One toilet and one lavatory must be provided for approximately every 15 employees.

6. Each lavatory must have hot and cold or tepid running water, hand soap, and individual hand towels or warm air blowers.

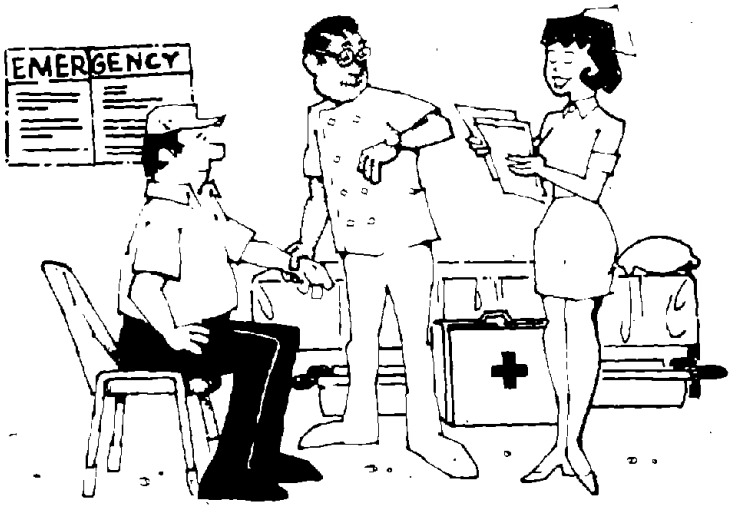
7. Beverages or food must not be stored or consumed in a toilet room or in any area exposed to toxic materials.

8. Employees working with toxic substances should wash and, where necessary, change from contaminated clothing before eating, drinking, or smoking.

FREQUENTLY VIOLATED REGULATIONS

MEDICAL AND FIRST AID

The employer who is interested in maintaining production, preventing loss of work time, and receiving efficient work performance and good morale from his employees should adopt ways to maintain the health of the employees. A good practice is to require pre-placement medical examinations to insure that prospective employees are physically able to do the specific work. Periodic health evaluations for hazardous jobs and early treatment of any illness or injury should also be encouraged. Medical personnel must be readily available by phone or on-site for advice and consultation.



Emergency phone numbers must be posted near telephones. The Emergency Information Chart (printed inside the back cover of this guide) may be helpful. Stretchers and blankets should be available for prompt transportation of injured or ill employees to a hospital.

In the absence of an infirmary, clinic, or hospital which is used for treatment of all injured employees in near proximity to the workplace the following are required:

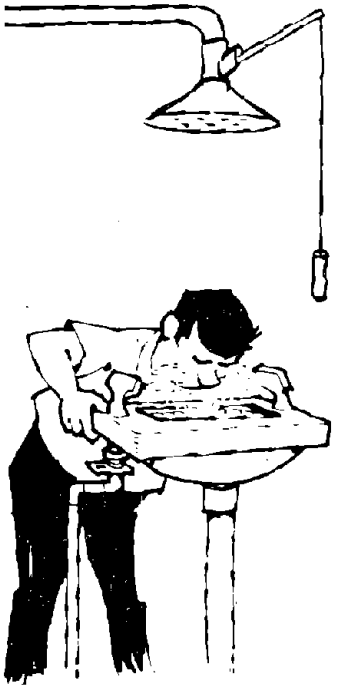
1. At least one and preferably more employees on each shift must be adequately trained to render first aid. The American Red Cross, the U.S. Bureau of Mines, some insurance carriers, local

FREQUENTLY VIOLATED REGULATIONS

MEDICAL AND FIRST AID (cont.)

safety councils, and others with OSHA-approved programs provide acceptable training.

2. First aid supplies approved by a consulting physician must be readily available. The supplies should be in sanitary containers with individually sealed packages for material such as gauze, bandages, and dressings that must be sterile. Other items often needed are adhesive tape, triangular bandages (to be used as slings), inflatable plastic splints, scissors, and mild soap for cleansing of wounds or cuts.



3. Suitable facilities for quick drenching or flushing the eyes and body must be provided within the work area when a person may be exposed to corrosive material.

Some states have laws concerning medical practice which establish limits on first aid given by the lay person. Trained employees should understand where first aid ends and treatment by a physician begins.

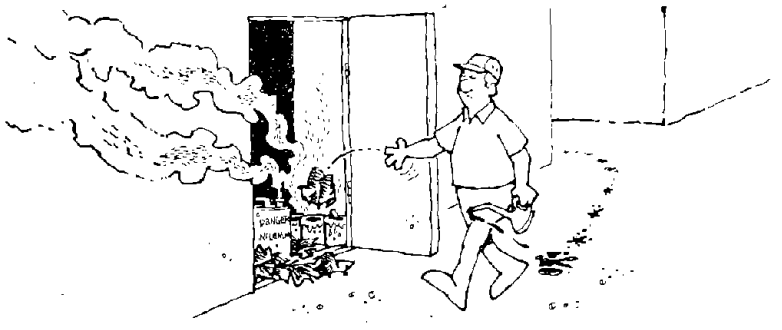
NOTE: First aid is immediate, temporary treatment given in the event of accident or illness — before the doctor arrives. Immediate first aid (within four minutes) may be the difference between complete recovery, permanent impairment, or death.

FREQUENTLY VIOLATED REGULATIONS

FIRE PROTECTION

GOOD HOUSEKEEPING HELPS PREVENT FIRES

Maintaining a clean and orderly workplace reduces the danger of accidents and fires. Rubbish should be disposed of regularly. If it is necessary to store combustible waste materials, a covered metal receptacle is required.



Cleaning materials can create fire and tripping/slipping hazards. Combustible sweeping compounds such as oil-treated sawdust can be a fire hazard. Floor coatings containing low-flash-point solvents can be dangerous, especially near sources of ignition. All oily mops and rags must be stored in closed metal containers.

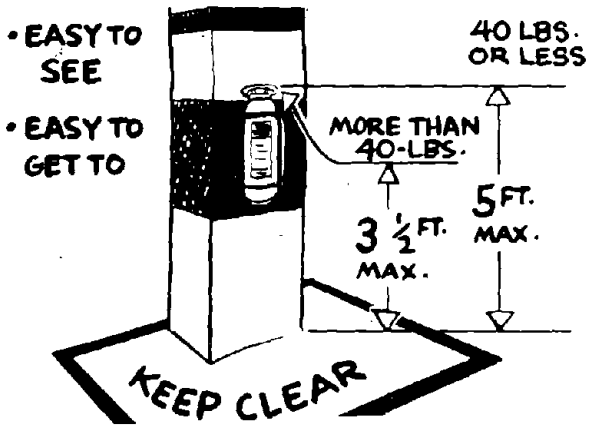
Some common causes of fires in all businesses are:

- electrical malfunctions
- friction
- open flames
- sparks
- hot surfaces
- smoking

Proper maintenance and periodic inspections of the facility through a safety program can reduce these hazards.

FREQUENTLY VIOLATED REGULATIONS

FIRE EXTINGUISHERS



Fire extinguishers must meet the following requirements:

1. Be kept fully charged and in their designated places.

2. Be located along normal paths of travel.

3. Not be obstructed or obscured from view.

4. Not be mounted higher than five feet (to the top of the extinguisher) if 40 pounds or less. If heavier than 40 pounds, they must not be mounted higher than 3½ feet.

5. Be inspected by management or a designated employee at least monthly to insure that they

- are in their designated places;
- have not been tampered with or actuated; and
- do not have corrosion or other impairments.

6. Be examined at least yearly and/or recharged or repaired to insure operability and safety. A tag must be attached to show the maintenance or recharge date and signature or initials of the person performing the service.

7. Be hydrostatically tested. Extinguisher sales representatives usually will perform this service at appropriate intervals.

8. Be selected on the basis of type of hazard, degree of hazard, and area to be protected.

FREQUENTLY VIOLATED REGULATIONS

FIRE EXTINGUISHERS (cont.)

9. Be placed so that the maximum travel distances, unless there are extremely hazardous conditions, do not exceed 75 feet for Class A or 50 feet for Class B.

A chart showing fire extinguishers by class, and how to use them, is located in the back of this booklet.

Type of hazard	Basic minimum extinguisher rating	Maximum travel distance to extinguishers (feet)
Light	4B	50
Ordinary	8B	50
Extra	12B	50

Basic minimum extinguisher rating for area specified	Maximum travel distance to extinguishers (feet)	Areas to be protected per extinguisher		
		Light hazard occupancy (square feet)	Ordinary hazard occupancy (square feet)	Extra hazard occupancy (square feet)
1A	75	3,000	.....	.....
2A	75	6,000	3,000	Note 1
3A	75	9,000	4,500	3,000
4A	75	11,250	6,000	4,000
6A	75	11,250	9,000	6,000

FREQUENTLY VIOLATED REGULATIONS

AUTOMATIC SPRINKLER SYSTEMS

When automatic sprinkler systems are provided, they must meet design requirements of the National Fire Protection Association's Standard for the Installation of Sprinkler Systems NFPA No. 13-1969 as well as OSHA requirements.

1. Every automatic sprinkler system must have at least one automatic water supply of adequate pressure, capacity, and reliability.

2. One or more fire department connections through which the fire department can pump water is required. No shut-off valve is allowed in this connection.

3. The employer is responsible for the condition of the sprinkler system and must keep it in good operating order. Functional tests are required at least once each year.

4. The clearance between sprinkler deflectors and the top of combustible storage normally must be at least 36 inches. If the material is in solid piles less than 15 feet high or in piles less than 12 feet high with horizontal channels, a minimum clearance of 18 inches is allowed. Also, commodities containing only small amounts of combustible material may be stored up to 18 inches from the sprinkler deflectors.

5. Alarm systems, audible to all employees, must be provided on all automatic sprinkler installations.

FREQUENTLY VIOLATED REGULATIONS

COMPRESSED AIR EQUIPMENT

Employees should be familiar with the air compressor's operating and maintenance instructions.

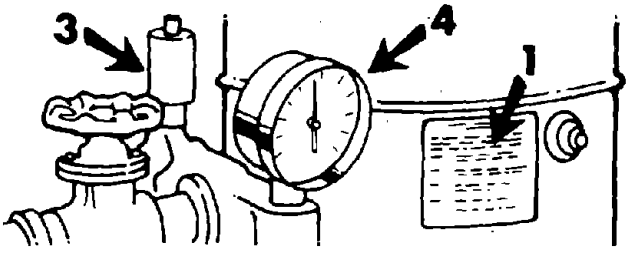
1. New air tanks must be constructed in accordance with the American Society of Mechanical Engineers (A.S.M.E.) Boiler and Pressure Vessel Code, Section VIII. The A.S.M.E. Code requires this information to be permanently stamped on the air tank.

2. The drain valve on the air tank should be opened frequently to prevent excessive accumulation of liquid.

3. Air tanks must be protected by adequate safety-relief valve(s). These valves must be tested at regular intervals to be sure they are in good operating condition.

4. The pressure controller and gauge must be maintained in good operating condition.

5. There must be no valves between the air tank and the safety valve.



FREQUENTLY VIOLATED REGULATIONS

MATERIALS HANDLING AND STORAGE

MATERIALS HANDLING — GENERAL

The storage of materials must not, of itself, create a hazard. Materials stored in tiers (bags, containers, bundles, pallets) must be stacked, strapped, blocked, or interlocked and limited in height so that they are stable and secure against sliding or collapse. Stored material must not obstruct fire extinguishers, alarm boxes, sprinkler system controls, electrical switch boxes, emergency lighting, first aid equipment, or exits.

All containers should be kept closed, and drums sealed. If any leakage occurs, the damaged container must be removed and any resultant fire or slipping hazard eliminated.

Aisles in the storage area must be kept free of obstructions and sufficient clearance maintained for foot and vehicular traffic. Where limited clearance exists (e.g., low overhead clearance), the clearance limit warning signs must be posted. Proper drainage must be maintained throughout the storage area.

HYDRAULIC LIFT TRUCKS AND HAND TRUCKS

A hydraulic lift truck that leaks must be taken out of service until it has been repaired. The leaking can cause the truck to settle after the load has been raised.

Operators of hand trucks should wear gloves and safety shoes. Knuckle guards installed on the handles will prevent jamming the hands into obstructions.

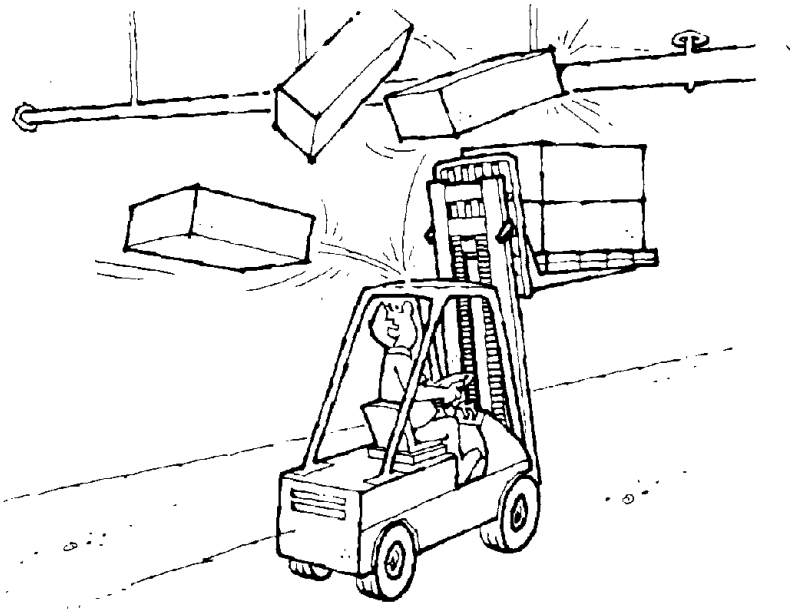
POWERED INDUSTRIAL TRUCKS

Powered industrial trucks are classified into categories for the purpose of determining what type of truck may be used in a certain location. The type of hazard in a location determines whether diesel, electric, gasoline, or LP-gas powered trucks may be used and what additional safeguards must be present. Suppliers can assist in the proper selection.

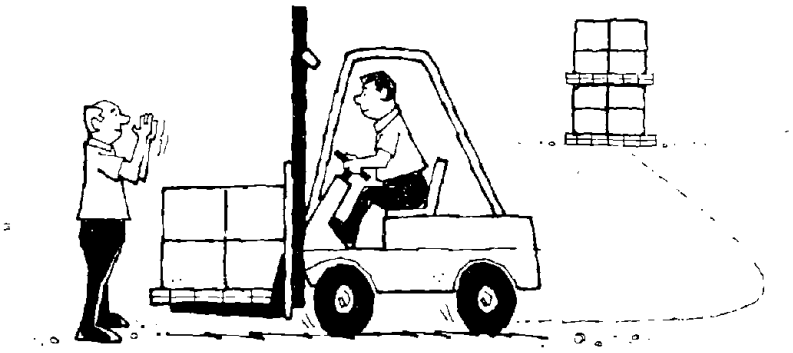
1. High-lift rider trucks must be fitted with an overhead guard to protect the operator from falling objects.

FREQUENTLY VIOLATED REGULATIONS

MATERIALS HANDLING AND STORAGE (cont.)

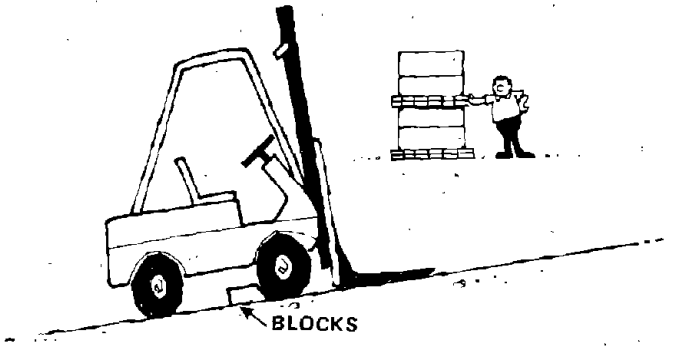


2. Methods must be developed and used to effectively train operators in the safe operation of powered industrial trucks, and only trained and authorized employees may operate the truck. Truck manufacturers and suppliers may provide training courses.



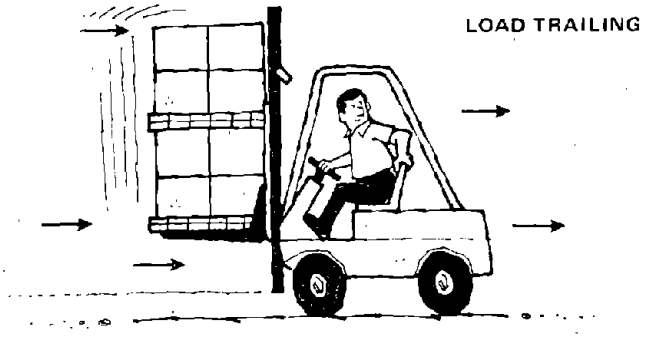
FREQUENTLY VIOLATED REGULATIONS

MATERIALS HANDLING AND STORAGE (cont.)



3. When a powered industrial truck is left unattended (operator 25 feet or more away or the truck is not in view), the forks must be fully lowered, the control lever positioned in neutral, the power shut off, and the brakes set. The wheels must be blocked if parked on an incline.

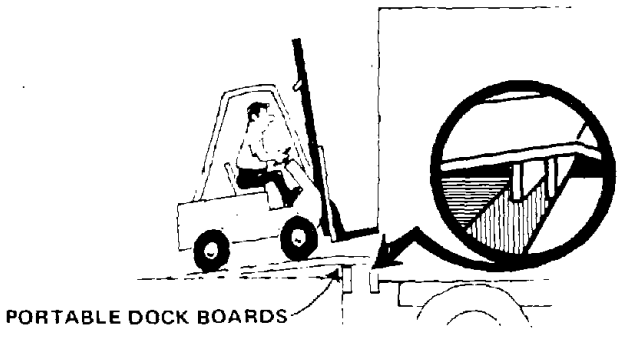
4. Industrial trucks must be examined daily for any conditions adversely affecting the safety of the vehicle before being placed into service. If the truck is used around the clock, it must be inspected after each shift.



MATERIALS HANDLING AND STORAGE (cont.)

5. If the load being carried obstructs forward view, the operator is required to travel with the load trailing.

6. When unloading or loading from trucks, trailers, or railroad cars with forklift trucks, provision must be made for securing the truck, trailer, or railroad car by setting the brakes and placing wheel chocks under the rear wheels. Portable dock boards must be secured in position with devices which will prevent their slipping during loading and unloading.



7. If battery-operated equipment is used, the battery charging area is to be designated with a "NO SMOKING" sign due to the hydrogen gas emitted during the charging process.

HOISTS

Although the information provided in this section on hoists pertains specifically to cranes, these requirements should be applied to all hoisting equipment.

1. The rated load must be legibly marked on each side of the hoist. Employees should be made aware of the weight of the loads to be carried.

2. The hoist must be equipped with a self-setting brake applied to the motor shaft or some part of the gear train.

3. For powered hoists, holding brakes must be applied automatically when the power is off.

FREQUENTLY VIOLATED REGULATIONS

MATERIALS HANDLING AND STORAGE (cont.)

4. Hooks, chains, and all functional operating mechanisms must be visually inspected daily for any indication of damage and wear, and monthly inspection records must be maintained.

5. Loads must not be carried over the heads of people.

6. The operator must test the brakes each time a near-capacity load is handled. This test is done by raising the load a few inches and applying the brakes.

7. The hoist rope or chain must be free from kinks or twists and must not be wrapped around the load.

FREQUENTLY VIOLATED REGULATIONS

MACHINERY AND MACHINE GUARDING

GENERAL REQUIREMENTS FOR MACHINE GUARDING

One or more methods of machine guarding must be provided to protect the operator and other employees in the machine area from hazards such as those created by the point of operation, in-running nip points, rotating parts, flying chips, and sparks. All such hazards located seven feet or less above the ground, floor, or working platform, must be guarded to prevent accidental contact. Guards must be attached to the machine if possible, or secured elsewhere if attachment to the machine is not possible. The guard must prevent the operator from having any part of the body in the danger zone during the operating cycle of the machine. Guards must not offer an accident hazard in themselves. Machines designed for fixed locations must be securely anchored to prevent "walking" or tipping.

The most common methods of machine guarding are

- enclosing the operation (preferred)
- interlocking devices
- remote control
- two-hand tripping devices
- electronic safety devices
- removal devices
- moving barriers.

Certain guarding methods are preferable to others. The type of operation, the size of shape of stock, the method of handling stock, the physical layout, the type of material, and the production requirements or limitations are important considerations. A certain flexibility in operations may also determine the method to be used. As a general rule, however, power transmission apparatus can be protected by fixed enclosure guards.

A booklet entitled "The Principles and Techniques of Mechanical Guarding," OSHA 2057, can be obtained by writing to OSHA Regional Offices listed in the back of this book. Many equipment representatives can assist in obtaining the necessary protective devices.

FREQUENTLY VIOLATED REGULATIONS

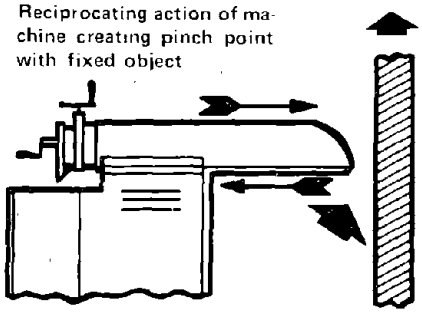
MACHINERY AND MACHINE GUARDING (cont.)

The following pages contain examples of specific equipment that must be guarded. This listing is not intended to include all equipment that may require guarding, nor are the guarding methods suggested the only ones that may be effective.

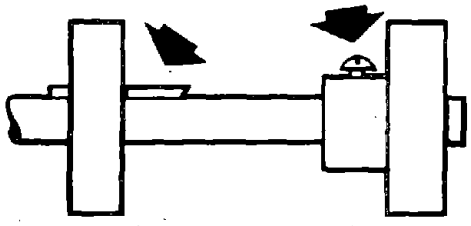
MACHINERY AND MACHINE GUARDING (cont.)

ROTATING AND RECIPROCATING MOTION

Collars, couplings, cams, clutches, flywheels, shaft ends, spindles, lead screws, and horizontal or vertical shafting are typical examples of common rotating mechanisms which are hazardous. The danger increases when bolts, oil cups, nicks, abrasions, and projecting keys or screw threads are exposed when rotating.



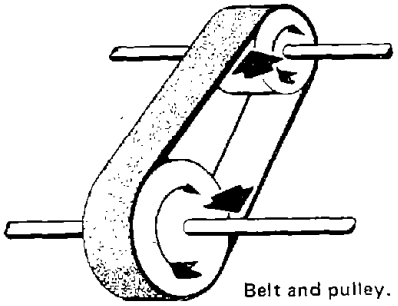
Reciprocating action of machine creating pinch point with fixed object



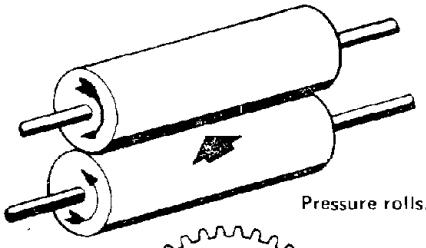
Rotating shaft and pulleys with projecting key and set screw

IN-RUNNING NIP POINTS

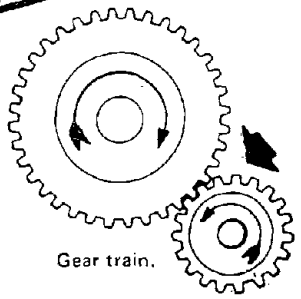
In-running nip points are a special danger created by the action of rotating objects. Whenever machine parts rotate toward each other or where one rotates toward a stationary object, an in-running nip point is formed. Objects or parts of the body may be drawn into this nip point and be bruised or crushed. Gears, feed rolls, conveyor terminals, forming rolls, and printing press rolls are examples of nip points.



Belt and pulley.



Pressure rolls.



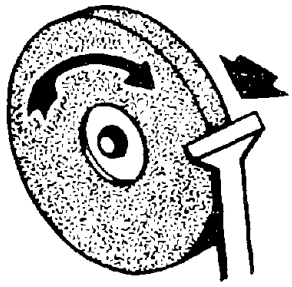
Gear train.

MACHINERY AND MACHINE GUARDING (cont.)

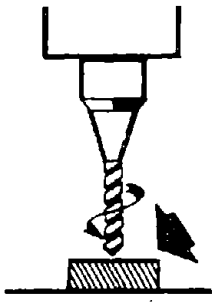
CUTTING ACTIONS

Cutting action results when rotating, reciprocating, or transverse motion is imparted to a tool so that the material removed is in the form of chips. The danger of cutting action exists at the movable cutting edge of the machine as it approaches or comes in contact with the material being cut. Such action takes place at the point of operation in cutting materials as differentiated from punching, shearing, stamping, or bending.

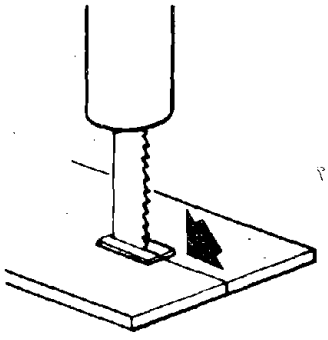
Typical examples of cutting action are band and circular saws, milling machines and grinders.



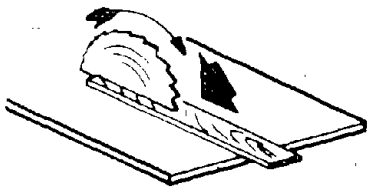
Abrasive wheel



Drill



Band saw



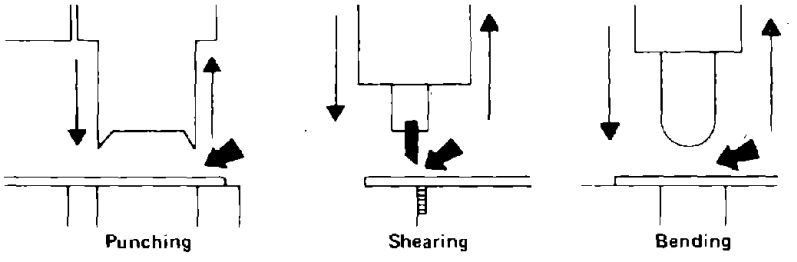
Circular saw

MACHINERY AND MACHINE GUARDING (cont.)

PUNCHING, SHEARING, AND BENDING ACTION

Punching, shearing, or bending action results when power is applied to a ram (plunger) or knife for the purpose of blanking, trimming, drawing, punching, shearing, or stamping material as differentiated from removing the material in the form of chips. The danger of punching, shearing, or bending action lies at the point of operation where stock is actually inserted, maintained, and withdrawn.

Typical examples of equipment involving punching, shearing, or bending action include power presses, shears, embossing presses and stamping presses.



CLASSIFICATION OF GUARDS

The methods of machine guarding may be grouped under four main classifications:

ENCLOSURE GUARDS

Fixed enclosure guards should be used in preference to all other types. They always prevent access to dangerous parts by completely enclosing a hazardous operation, and can also be effective in controlling dust or chips generated by the operation. Because of limited feed-size openings, enclosure guards admit

MACHINERY AND MACHINE GUARDING (cont.)

stock, but will not admit an employee's hand into the danger zone. They may be constructed so as to be adjustable to different sets of tools and dies, or varying thicknesses of stock, but once adjusted, they must be fixed. As a general rule, power transmission apparatus can be protected by enclosure guards.

INTERLOCKING GUARDS

When a fixed enclosure guard is not practicable, an interlocking enclosure or barrier should be considered as the first alternative.

An interlocking enclosure guard is not fixed; it may be opened to feed stock and adjusted as the operation requires. These guards utilize an electrical or mechanical interlocking connection with the operating mechanism which prevents the operation of the machine until the guard is returned to a closed position and the operator can no longer reach the point of danger.

AUTOMATIC GUARDS

When neither an enclosure guard nor an interlocking guard is practicable, an automatic guard may be used. An automatic guard acts independently of the operator, repeating its cycle as long as the machine operates. This type of guard removes the operator's hands, arms, or body from the danger zone as the machine cycles. It is operated by the machine itself through a system of linkages connected to the operating mechanism.

Common types of automatic guards are sweep and push-away devices which create a moving barrier across the danger zone and push the operator's hand away from the area.

TWO-HANDED OPERATING DEVICES

Two-handed operating devices, another category of guarding mechanism, are also designed to protect a machine operator from point of operation hazards. Although they are not guards in the technical sense, they accomplish the same effect.

These devices may be used to activate the machine cycle. They require simultaneous action of the operator's hands on electrical switch buttons, air control valves, mechanical levers, etc. The

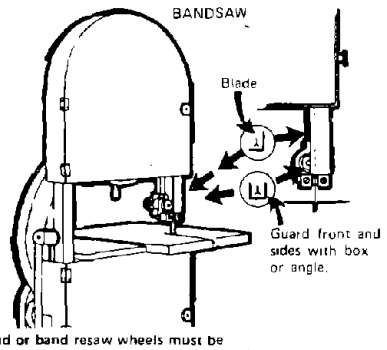
MACHINERY AND MACHINE GUARDING (cont.)

actuating controls must be located so as to make it impossible for the operator to move his hands from the controls to the danger zone before the machine has completed its closing cycle. The two-handed controls must be so designed as to prevent the blocking, tying down, or holding down of one control to allow one hand free access to the danger zone.

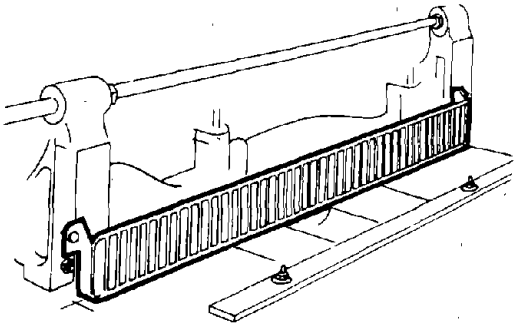
FREQUENTLY VIOLATED REGULATIONS

MACHINERY AND MACHINE GUARDING (cont.)

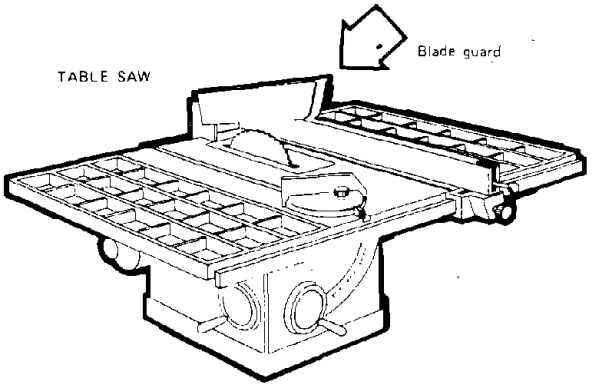
EXAMPLES OF GUARDING HAZARDS



Band or band resaw wheels must be completely enclosed and all portions of the blade must be guarded, except that portion between the guide rolls and the table.



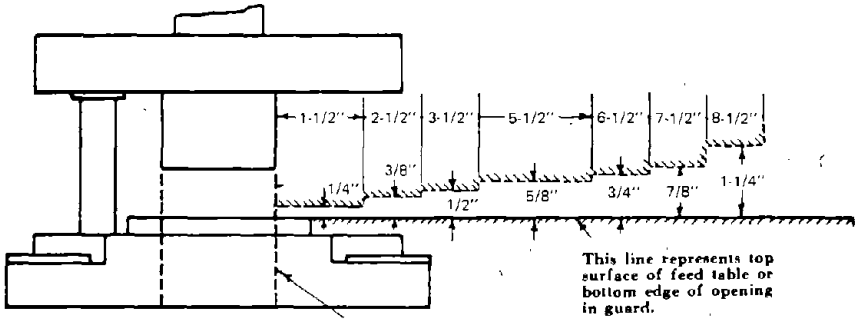
Adjustable barrier guard for feed side of shear



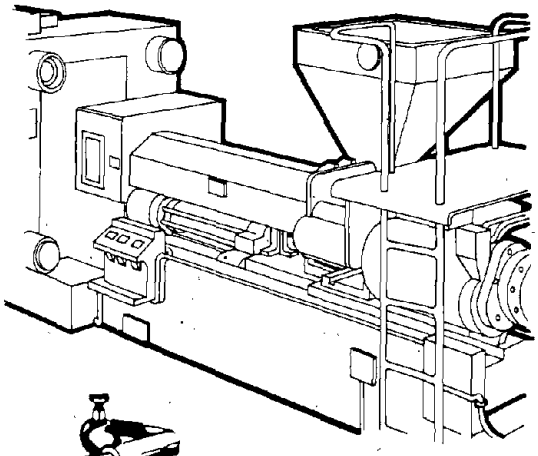
FREQUENTLY VIOLATED REGULATIONS

MACHINERY AND MACHINE GUARDING (cont.)

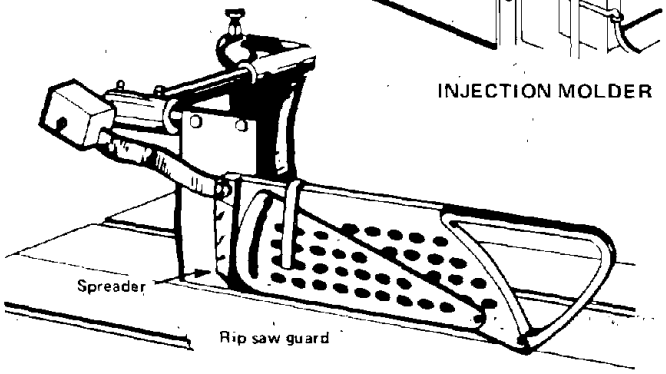
EXAMPLES OF GUARDING HAZARDS



Guarding punch press by limitation of ram stroke. If ram stroke is limited to ¼ inch, enclosure is unnecessary. When enclosure of die is necessary, size of openings should not exceed that shown for various distances.



INJECTION MOLDER



MACHINERY AND MACHINE GUARDING (cont.)

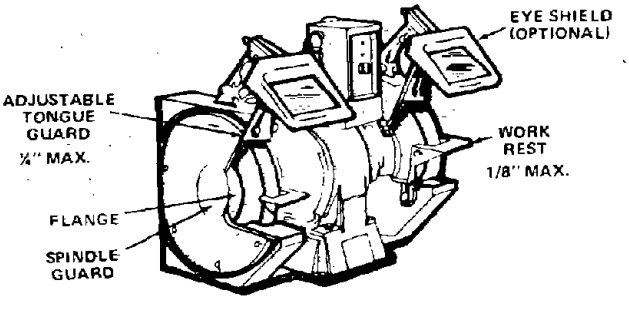
GRINDERS

1. Wheel safety guards must cover the spindle end, nut, and flange projections. The exposed area of the grinding wheel should not exceed more than one-fourth of the area of the entire wheel. When the guard opening is measured, the visors and other accessory equipment are not included as part of the guard unless they are as strong as the guard.

2. Work or tool rests must be of strong construction and must be adjustable to compensate for wheel wear. Work rests must be kept closely adjusted to the wheel to prevent the work from becoming jammed between the wheel and the work rest. The maximum clearance allowed is ⅛-inch.

3. Tongue guards (upper peripheral guards) must be constructed so that they adjust to the wheel as it wears down. A maximum clearance of ¼-inch is allowed between the wheel and the tongue guard.

4. Goggles or a face shield must be worn by grinder operators.



FANS

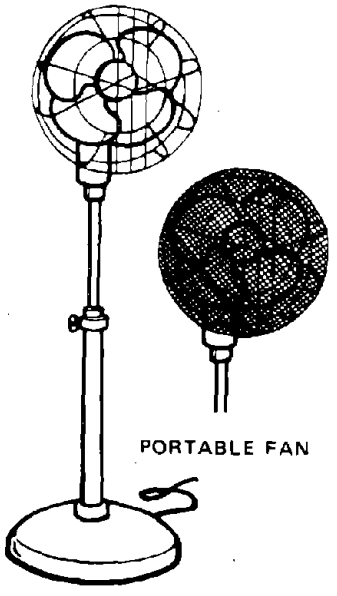
If fans are located within 7 feet of the floor, they must be guarded with grille or mesh, limiting openings to not more than ½-inch (least dimension).

FREQUENTLY VIOLATED REGULATIONS

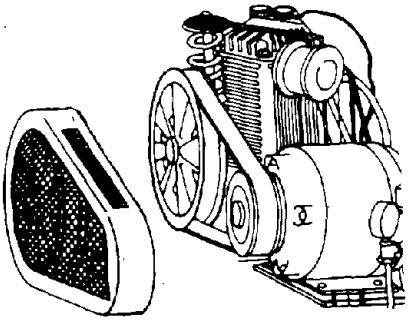
MACHINERY AND MACHINE GUARDING (cont.)

AIR COMPRESSORS

The pulleys and drive belts of air compressors must be fully enclosed.



PORTABLE FAN



AIR COMPRESSOR

FREQUENTLY VIOLATED REGULATIONS

HAND AND PORTABLE POWERED TOOLS

The following is a list of general requirements governing the use of hand tools:

1. Each employer is responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

2. Hammers with broken or cracked handles, chisels and punches with mushroomed heads, wrenches with sprung jaws, or bent or broken wrenches should not be used.

3. Most hand-held electrical tools must be equipped with a "dead man" or "quick release" control, so that power is shut off automatically whenever the operator releases the control.

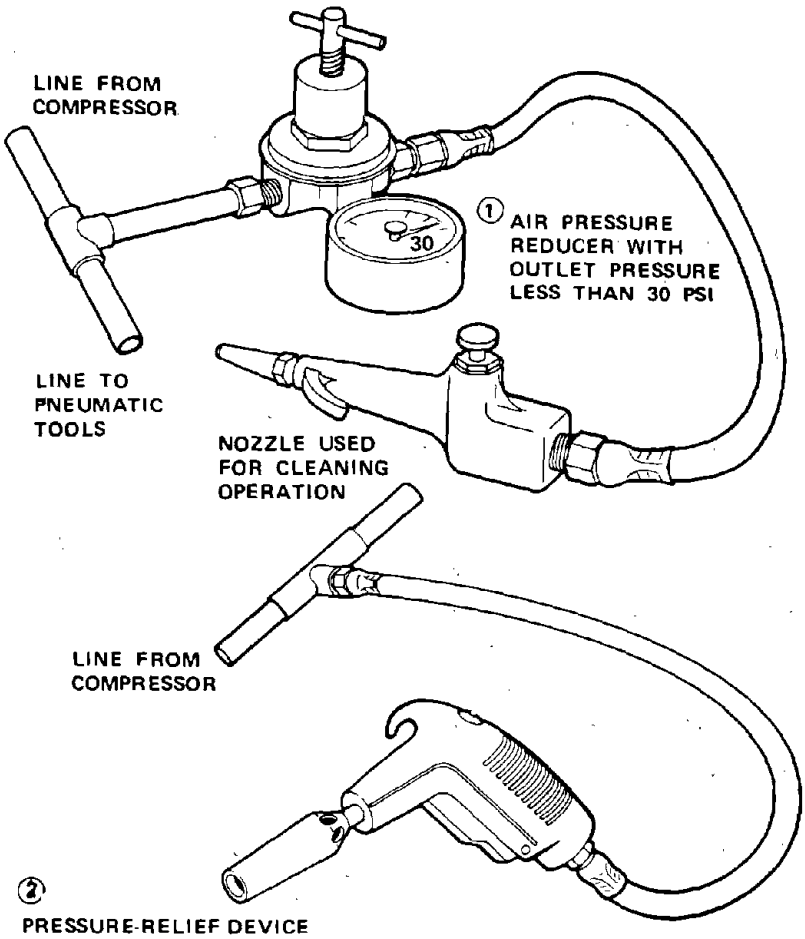
4. Portable circular saws must be equipped with guards above and below the base plate or shoe. The lower guard must retract when the blade is in use, and automatically return to the guarding position when the tool is withdrawn from the work.

5. All hand-held portable electrical equipment must have its frame grounded or be double-insulated and identified as such.

FREQUENTLY VIOLATED REGULATIONS

HAND AND PORTABLE POWERED TOOLS (cont.)

Beware of compressed air, it can be dangerous. Alternate methods of cleaning surfaces should be sought. Compressed air must never be used to blow debris from a person. Compressed air may be used for cleaning surfaces if there is no other acceptable method. The downstream pressure of compressed air must remain below 30 psi whenever the nozzle is dead-ended; effective chip guarding and personal protective equipment must be used. Two acceptable methods of meeting the 30 psi requirement are illustrated.



FREQUENTLY VIOLATED REGULATIONS

WELDING, CUTTING, AND BRAZING

GENERAL

1. Management must establish areas for cutting and welding operations based on the fire potentials of the plant. Special procedures must be established for welding and cutting in high hazard locations. Preferably, cutting or welding should be done in an area with no surrounding combustible material. If combustibles in the immediate vicinity are unavoidable, guards must be used to protect against the fire hazards from heat and sparks. Suitable fire extinguishing equipment (pails of water, buckets of sand, hose, or portable extinguisher) must be maintained for instant use.

2. Torch cutters and welders must be suitably trained in the safe operation of their equipment. Printed rules and instructions (supplied by the manufacturers) covering operation of equipment must be strictly enforced.

WELDING, CUTTING, AND BRAZING (cont.)

3. No welding, cutting, or other hot work may be performed on used drums, barrels, tanks, or other containers until they have been cleaned so thoroughly as to make absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which, when subjected to heat, might produce flammable or toxic vapors.

4. The atmosphere in the welding area must be free of flammable gases, liquids, and vapors.

5. Goggles or other suitable eye protection (helmets, hand shields) must be used during welding or cutting operations as a protection against sparks and debris.

6. Employees adjacent to the welding areas must be protected from ultraviolet rays by noncombustible or flameproof screens or shields, or they must be required to wear appropriate goggles.

7. Employees exposed to hazards created by cutting and welding must be protected by personal protective equipment. For example:

- Flameproof gauntlet gloves (except when engaged in light work) should be worn.
- Flameproof aprons (leather for example) may be desirable as protection against sparks and radiant heat.
- Fire resistant leggings or high boots should be worn.

8. The potential health hazard to a welder or cutter from gases or metal fumes depends on the toxicity of the materials involved (types of metals, fluxes, coatings, etc.) the duration and location of the process, and ventilation.

9. There are specific requirements concerning ventilation and respirators when welding or cutting is performed on the following:

- stainless steel, lead, zinc, or cadmium
- metals coated with lead or mercury-containing materials such as paint
- fluxes or other materials containing fluorides

WELDING, CUTTING, AND BRAZING (cont.)

REQUIREMENTS FOR VENTILATION AND RESPIRATORS WHEN WELDING OR CUTTING

Welding and Cutting on Materials Containing or Coated With	*Location of Operation*		
	Confined Spaces	*Indoors*	*Outdoors*
Lead	A	B	E
Zinc	A	B	
Fluorine	A	C	C
Cadmium	C	C	F
Beryllium	D	D	D
Mercury	C	C	F

Stainless Steel = mechanical ventilation adequate to remove the fumes generated.

A = Adequate ventilation to prevent the accumulation of toxic materials or possible oxygen deficiency. Where it is impossible to provide such ventilation, approved airline respirators must be used.

B = Mechanical local exhaust by means of hoods or booths with sufficient airflow to maintain a velocity, away from the worker, of at least 100 linear feet per minute.

C = If conditions warrant, mechanical local exhaust (B) *or* approved airline respirators.

D = If conditions warrant, mechanical local exhaust (B) *and* approved airline respirators.

E = Approved respirators.

F = If conditions warrant, approved respirators (E).

10. Mechanical ventilation must be provided when welding or cutting is done on metals not covered in the table when

(a) the volume of space per welder is less than 10,000 cubic feet,

(b) the ceiling is less than 16 feet high, or

(c) work is done in confined spaces.

Such mechanical ventilation must be at the minimum rate of 2,000 cubic feet per minute per welder, unless hoods or booths are provided with sufficient airflow to maintain a velocity, away

WELDING, CUTTING, AND BRAZING (cont.)

from the worker, of at least 100 linear feet per minute. Alternatively, NIOSH approved supplied-air respirators must be used.

GAS WELDING

General requirements governing gas welding:

1. All cylinders must be away from radiators and other sources of heat.

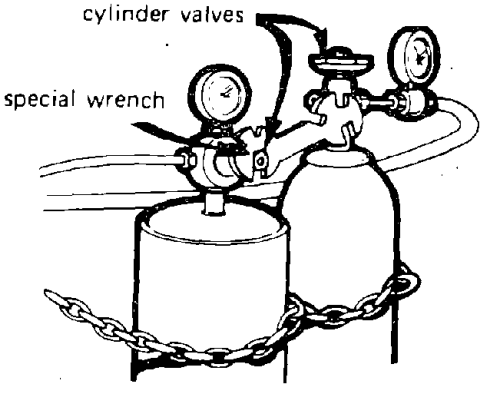
2. All cylinders stored inside buildings must be located in a well-protected, well-ventilated, dry location at least 20 feet from highly combustible materials and away from elevators, stairs, or gangways. They must not be kept in unventilated enclosures such as lockers and cupboards.

3. Valve protection caps must be utilized where the cylinder is designed to accept a cap except when cylinders are in use or connected for use.

FREQUENTLY VIOLATED REGULATIONS

WELDING, CUTTING, AND BRAZING (cont.)

4. Stored oxygen cylinders must be kept separated from stored fuel gas cylinders or combustible materials (especially oil or grease) by a minimum distance of 20 feet or by a non-combustible barrier at least 5 feet high and having a ½ hour fire resistance rating. A sheet metal partition is not an acceptable method of separating cylinders.



5. All cylinder valves must be closed when work is finished. Where a special wrench is required it must be left in position on the stem of the valve while the cylinder is in use so that the fuel-gas flow can be quickly turned off in case of emergency. In the case of manifolded or coupled cylinders, at least one such wrench must always be available for immediate use.

6. All cylinders must be legibly marked to identify contents.

7. No cylinder should be permitted to stand alone without being secured with lashing or chain to prevent it from toppling over.

8. Acetylene must not be utilized at a pressure in excess of 15 psi gauge (or 30 psi absolute). Above this pressure acetylene may become unstable.

FREQUENTLY VIOLATED REGULATIONS

WELDING, CUTTING, AND BRAZING (cont.)

9. Indoor storage of fuel gas is limited to a total capacity of 2,000 cubic feet or 300 pounds of liquified petroleum gas.

10. Hoses showing leaks, burns, or worn places which render them unfit for service must be replaced or repaired.

ELECTRIC ARC WELDING

Wherever electric arc welding is done, it is required that:

1. If the welding machine is wet, it must be thoroughly dried and tested before it is used again.

2. Coiled welding cable must be spread out and the ground lead must be firmly attached to the work.

3. Cables must be inspected for damage and loss of insulation and be repaired immediately.

4. Ground and electrode cables may only be joined together with connectors specifically designed for that purpose.

FREQUENTLY VIOLATED REGULATIONS

WELDING, CUTTING, AND BRAZING (cont.)

5. Cables with splices within 10 feet of the operator may not be used; neither may the operator coil cables around his body.

6. Welding helmets or hand shields must be worn by the operator. Persons close by must wear eye protection.

7. Shields or screens must protect others in the vicinity from arc welding rays.

8. Arc welders should wear clean, fire-resistant gloves and clothing with collars and sleeves buttoned.

9. Electrode holders which are not in use must be placed in a safe place away from conductive objects.

FREQUENTLY VIOLATED REGULATIONS

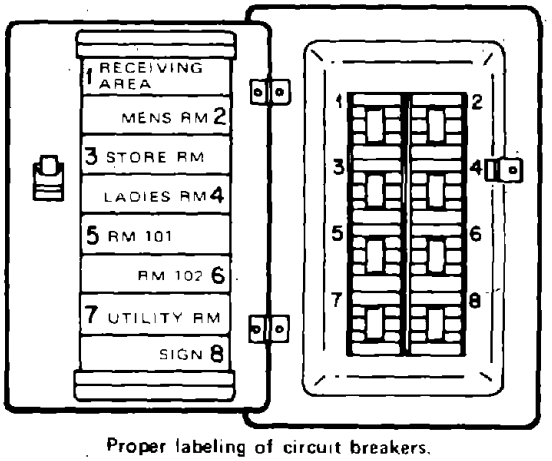
THE NATIONAL ELECTRICAL CODE (NEC)

ELECTRICAL REQUIREMENTS

More fires are caused by electrical malfunction than any other cause, and standards pertaining to electrical equipment and its use in all industries have been cited as violations more frequently than any others.

The National Electrical Code, NFPA 70-1971; ANSI C1-1971 has been adopted as a national consensus standard by OSHA (refer to "Information Sources"). The purpose of the NEC is the practical safeguarding of persons, and buildings and their contents from hazards arising from the use of electricity. The code contains basic minimum provisions considered necessary for safety. The electrician should be familiar with these requirements. For example:

1. Each disconnecting means (e.g., circuit breaker or fuse box) must be legibly marked to indicate its purpose unless its purpose is evident.



Proper labeling of circuit breakers.

FREQUENTLY VIOLATED REGULATIONS

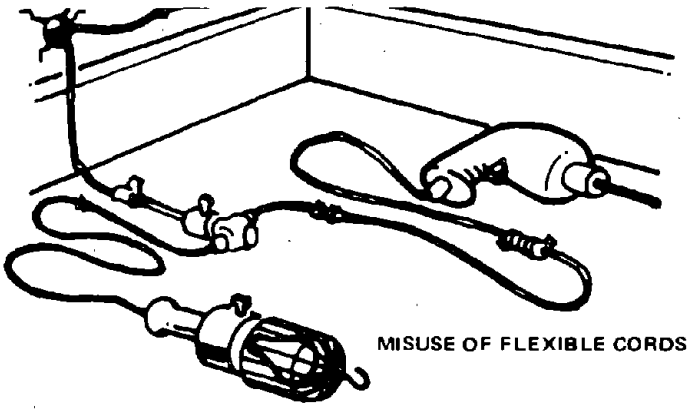
THE NATIONAL ELECTRICAL CODE (NEC) (cont.)

2. Frames of electrical motors, regardless of voltage, must be grounded.

3. Exposed noncurrent-carrying metal parts of fixed equipment that may become energized under abnormal conditions must be grounded under any of the following circumstances:
   - in wet or damp locations
   - if in electrical contact with metal
   - if operated in excess of 150 volts to ground
   - when in a hazardous location

4. Exposed noncurrent-carrying metal parts of the following plug-connected equipment, which are liable to become energized, must be grounded or double-insulated and distinctly marked:
   - portable hand-held motor-operated tools
   - appliances
   - any equipment operated in excess of 150 volts to ground

5. Outlets, switches, junction boxes, etc., must be covered.



MISUSE OF FLEXIBLE CORDS

6. Flexible cords may not be
   - used as a substitute for fixed wiring
   - run through holes in walls, ceilings, or floors
   - run through doors, windows, etc.
   - attached to building surfaces

FREQUENTLY VIOLATED REGULATIONS

THE NATIONAL ELECTRICAL CODE (NEC) (cont.)

7. Flexible cord must be fastened so that there is no pull on joints or terminal screws. It must be replaced when frayed or when the insulation has deteriorated.

8. All splices in flexible cord must be executed by brazing, welding, or soldering, or by joining the conductors with suitable splicing devices. Any splices, joints, and the free ends of conductors must be properly insulated.

RECORDKEEPING REQUIREMENTS

Recordkeeping requirements under OSHA compile factual information about accidents that have happened. These records provide employers with a measure for evaluating the success of their safety and health activities and of identifying high risk areas of their businesses to which attention should be directed. Employers must report within 48 hours to OSHA (or a state agency in states which have operational safety and health plans) any incident or accident which results in hospitalization of five or more employees or a fatality.

Federal regulations require that employers with 11 or more employees at any time during the preceding calendar year are required to complete OSHA Forms 100, 101 (or equivalent), and 102. The following cases must be recorded on the OSHA Form 100 (Log of Occupational Injuries and Illnesses): every death, every illness, and any injury which results in loss of consciousness, loss of time, restriction of work or motion, temporary or permanent transfer to another job, or medical treatment other than first aid. Illnesses and injuries are classified as to lost workdays, restriction of duties or "light duty," and no lost time.

A supplementary record must be completed for each recordable case. OSHA Form 101 may be used; a state workers' compensation report or other form is acceptable if it contains the equivalent information as the OSHA 101. Forms 100 and 101 must be kept current to within six days.

An annual summary, OSHA Form 102 must be posted for the entire month of February in a place where all employees are likely to see it. All of these forms (100, 101, and 102) must be retained for five years, excluding the current calendar year.

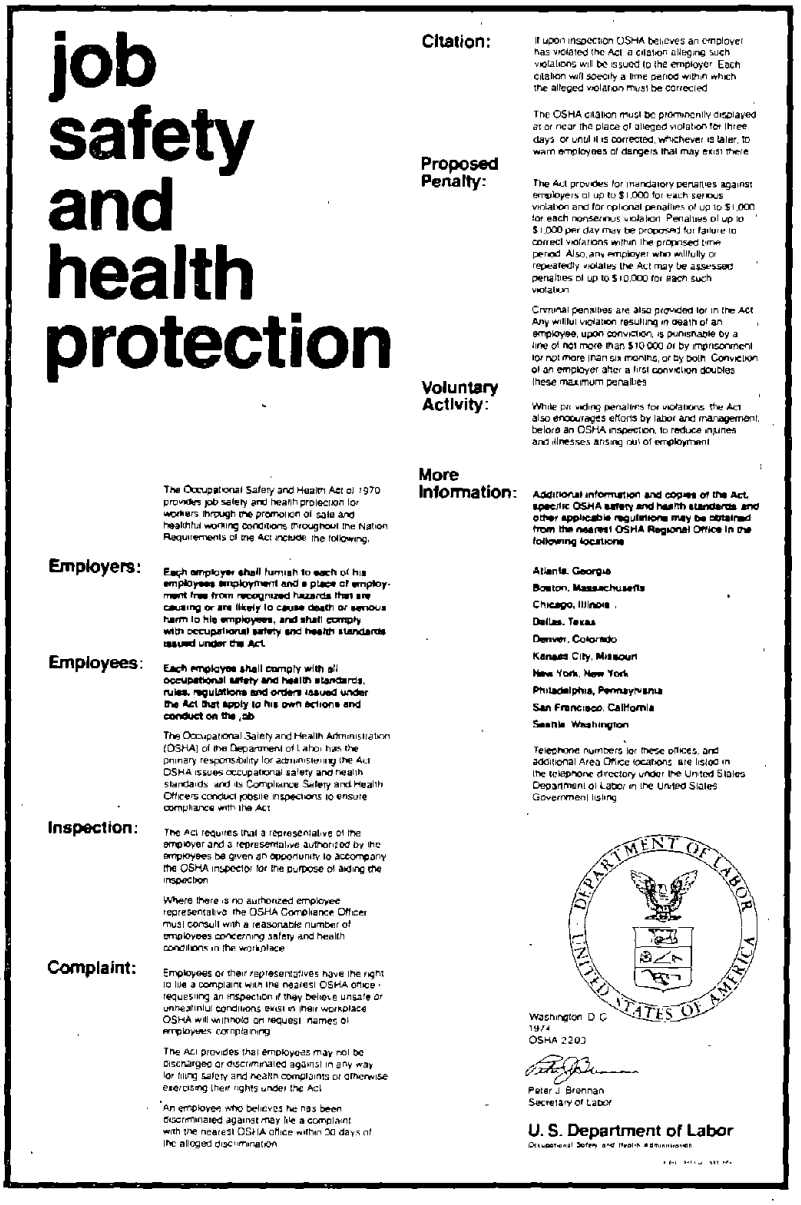
A booklet "Recordkeeping Requirements Under the Williams-Steiger Occupational Safety and Health Act of 1970" which provides a supply of forms and more detailed information is available from OSHA regional or area offices or from the regional offices of the Bureau of Labor Statistics.

Employers are also required to maintain accurate records of certain potentially toxic or harmful physical agents which must be monitored or measured and to promptly advise employees of any excessive exposure and the corrective action taken. In certain

RECORDKEEPING REQUIREMENTS (cont.)

cases, physical examinations and testing are required. Examples of these agents are asbestos, ionizing radiation, etc. Any OSHA office can supply a list of these hazardous substances and explain what records may be required.

RECORDKEEPING REQUIREMENTS (cont.)



job safety and health protection

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers through the promotion of safe and healthful working conditions throughout the Nation. Requirements of the Act include the following:

Employers: Each employer shall furnish to each of his employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to his employees, and shall comply with occupational safety and health standards issued under the Act.

Employees: Each employee shall comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to his own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards and its Compliance Safety and Health Officers conduct jobsite inspections to ensure compliance with the Act.

Inspection: The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint: Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or otherwise exercising their rights under the Act.

An employee who believes he has been discriminated against may file a complaint with the nearest OSHA office within 30 days of the alleged discrimination.

Citation: If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty: The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each nonserious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of not more than $10,000 or by imprisonment for not more than six months, or by both. Conviction of an employer after a first conviction doubles these maximum penalties.

Voluntary Activity: While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce injuries and illnesses arising out of employment.

More Information: Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from the nearest OSHA Regional Office in the following locations:

Atlanta, Georgia
Boston, Massachusetts
Chicago, Illinois
Dallas, Texas
Denver, Colorado
Kansas City, Missouri
New York, New York
Philadelphia, Pennsylvania
San Francisco, California
Seattle, Washington

Telephone numbers for these offices, and additional Area Office locations, are listed in the telephone directory under the United States Department of Labor in the United States Government listing.

DEPARTMENT OF LABOR · UNITED STATES OF AMERICA

Washington, D.C.
1974
OSHA 2203

Peter J. Brennan
Secretary of Labor

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

Employers must post one of the full size versions (10x16) of this type of OSHA poster or a state approved poster where required.

CHECKLISTS

Since the success of a safety and health program depends on identifying hazards and taking immediate remedial action, periodic inspections of the plant are a necessity.

A checklist, such as the one presented on the following pages, can be helpful to management in performing a self-inspection of the facility. Because businesses vary, it is best that each business develop a customized list from the information in this booklet and a walk-through inspection.

Using this checklist, the manager, supervisor, or employee representative can make periodic inspections (preferably at least once each month) and identify problem areas so that corrective action may be taken.

References made in the "Checklist" subtitles refer to appropriate sections of Occupational Safety and Health Standards Code of Federal Regulations, Title 29, Part 1910, which are the OSHA "General Industry Standards."

CHECKLISTS (cont.)

	Yes	No
WALKING AND WORKING SURFACES AISLES AND FLOOR (29 CFR 1910.22, .23)		
Are all places of employment kept clean and orderly?	☐	☐
Are floors, aisles, and passageways kept clean and dry and all spills cleaned up immediately?	☐	☐
Are floor holes, such as drains, covered?	☐	☐
Are permanent aisles appropriately marked?	☐	☐
Are wet surface areas covered with nonslip materials?	☐	☐
Are signs showing floor load capacity present?	☐	☐
Are platforms, storage lofts, balconies, etc. that are more than four feet above the floor protected with standard guardrails?	☐	☐
Are all platforms, lofts, and balconies (where people or machinery could be exposed to falling objects) guarded with standard four inch toeboards?	☐	☐
STAIRS (29 CFR 1910.24)		
Are there standard stair rails or handrails on all stairways having four or more risers?	☐	☐
Are all stairways at least 22 inches wide?	☐	☐
Do stairs have at least a seven foot overhead clearance?	☐	☐
Do stairs angle no more than 50° and no less than 30°?	☐	☐
LADDERS (29 CFR 1910.25, .26, .27)		
Have defective ladders (e.g., broken rungs or side rails) been tagged as "DANGEROUS, DO NOT USE" and removed from service for repair or destruction?	☐	☐
Is it prohibited to use the top of an ordinary step ladder as a step?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Do fixed ladders have at least 3½ feet of extension at the top of the landing?	☐	☐
Is the distance between the centerline of rungs on a fixed ladder and the nearest permanent object in back of the ladder at least seven inches or more?	☐	☐
Do all fixed ladders have a preferred pitch of 75°-90°?	☐	☐

EGRESS (29 CFR 1910.36, .37)

Are all exits marked with an exit sign and illuminated by a reliable light source?	☐	☐
Is the lettering at least six inches high with the principal letter strokes at least ¾ of an inch wide?	☐	☐
Is the direction to exits, when not immediately apparent, marked with visible signs?	☐	☐
Are doors or other passageways, that are neither exits nor access to an exit, and located where they may be mistaken for exits, appropriately marked "NOT AN EXIT," "TO BASEMENT," "STOREROOM," etc.?	☐	☐
Are exit doors side-hinged?	☐	☐
Are all doors that must be passed through to reach an exit or way to an exit, always free to access with no possibility of a person being locked inside?	☐	☐
Are all exit routes always kept free of obstructions?	☐	☐

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL (29 CFR 1910.1000)

Is management aware of the possible chemical hazards caused by various materials used in the plant?	☐	☐
Is employee exposure to these chemicals kept within the acceptable levels?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Are eye wash fountains and safety showers provided in areas where chemicals, such as caustics, are used?	☐	☐
Are all containers, such as vats, storage tanks, etc. labeled as to their contents?	☐	☐
Is vacuuming used wherever possible rather than blowing or sweeping dust?	☐	☐
Are employees required to wear personal protective equipment when handling solvents, resins, pigments, etc. to avoid eye or skin contact?	☐	☐

OCCUPATIONAL NOISE EXPOSURE (29 CFR 1910.95)

If a noise problem is suspected, have noise levels been accurately measured?	☐	☐
If a noise problem exists, have plans to reduce noise levels by engineering methods been formulated (e.g., enclosure, maintenance, different processing methods)?	☐	☐
If engineering controls cannot reduce the noise to safe levels:		
1. Have administrative controls, such as limiting worker-exposure in a given area, been started?	☐	☐
2. If necessary, are affected employees given annual audiometric tests?	☐	☐
3. Do all employees in high-noise areas wear hearing protection?	☐	☐
4. Are annual noise surveys made to re-evaluate the problem?	☐	☐

HAZARDOUS MATERIALS

FLAMMABLE AND COMBUSTIBLE LIQUIDS (29 CFR 1910.106)

Are all connections on drums and combustible liquid piping vapor and liquid tight?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Are flammable liquids kept in closed containers when not in use (e.g., parts cleaning tanks, or pans)?	☐	☐
Are all spills of flammable or combustible liquids cleaned up promptly?	☐	☐
Is combustible waste material (oily rags, etc.) stored in covered metal receptacles and disposed of daily?	☐	☐
Are bulk drums of flammable liquids grounded and bonded to containers during dispensing?	☐	☐
Are gasoline and other flammable liquids stored in approved containers?	☐	☐
Do storage rooms for flammable and combustible liquids have explosion-proof lights?	☐	☐
Do inside storage rooms for flammable and combustible liquids have mechanical or gravity ventilation (at least six air changes per hour)?	☐	☐
Are storage cabinets for flammable liquids labeled "FLAMMABLE—KEEP FIRE AWAY?"	☐	☐
Are storage areas for flammables prominently posted as a "NO SMOKING" area?	☐	☐
Is the ventilation rate across the face of the paint spray booth at least 100 linear feet per minute?	☐	☐
Are spray booth lights explosion proof?	☐	☐

UNDERGROUND STORAGE TANKS

Does the vent pipe extend at least 12 feet above grade?	☐	☐
Is the vent pipe located so vapors do not discharge inside buildings or become trapped under eaves, etc.?	☐	☐

PERSONAL PROTECTIVE EQUIPMENT (29 CFR 1910.132-.137)

Is personal protective equipment provided, used, and maintained wherever it is necessary?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Is employee-owned personal protective equipment, such as gloves and protective shoes, adequate and properly maintained?	☐	☐
Is eye protection available where debris or flying objects could be a hazard?	☐	☐
Are ear plugs or muffs provided and worn during noisy conditions?	☐	☐
Is slip-resistant footwear worn?	☐	☐
Are hard hats or safety shoes available where falling objects could be a hazard?	☐	☐

RESPIRATORY PROTECTION DEVICES (29 CFR 1910.134)

Are respirators provided when and where necessary?	☐	☐
Are there written standard operating procedures for the selection and use of respirators?	☐	☐
Is the user instructed and trained in the proper use of respirators?	☐	☐
Where practicable, are respirators assigned for use by employees individually?	☐	☐
Are respirators cleaned and disinfected after use?	☐	☐
Are respirators stored in a convenient, clean, and sanitary location?	☐	☐
Are routinely-used respirators inspected during cleaning?	☐	☐

GENERAL ENVIRONMENTAL CONTROLS

SANITATION (29 CFR 1910.141)

Are restrooms and washrooms kept in clean and sanitary condition?	☐	☐
Are covered receptacles for waste food kept in clean and sanitary condition?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Are covered receptacles for sanitary napkins provided in the women's restroom?	☐	☐
Is all water that is provided for drinking, washing, and cooking, suitable for drinking?	☐	☐
Are all outlets for water that is not suitable for drinking, clearly posted as "UNSAFE FOR DRINKING, WASHING, OR COOKING?"	☐	☐
Are employees prohibited from eating in areas where toxic materials are present?	☐	☐
Has pest control been exercised?	☐	☐
If employees are permitted to eat on the premises, are they provided with a suitable space for that purpose?	☐	☐

MEDICAL AND FIRST AID (29 CFR 1910.151)

Are first aid supplies readily available, inspected, and replenished?	☐	☐
Is at least one employee on each shift currently qualified to render first aid in the absence of a nearby clinic or hospital? (Some states require first aid trained persons regardless of nearby clinics or hospitals.)	☐	☐
Are first aid supplies approved by a consulting physician, indicating that they are adequate?	☐	☐
Are medical personnel readily available for advice and consultation on matters of employee health?	☐	☐
Is there a first aid kit easily accessible to the work area?	☐	☐
Are emergency phone numbers posted?	☐	☐
Where employees may be exposed to injurious corrosive materials, are they provided with quick-drenching and flushing facilities for immediate emergency use?	☐	☐

CHECKLISTS (cont.)

	Yes	No
FIRE PROTECTION (29 CFR 1910.157-.161)		
Are extinguishers selected for the types of combustibles and flammables in the areas where they are to be used? Class A. Ordinary combustible material fires Class B. Flammable-liquid or grease fires Class C. Energized-electrical-equipment fires	☐	☐
Are extinguishers fully charged and in their designated places?	☐	☐
Are extinguishers located along normal paths of travel?	☐	☐
Are extinguisher locations free from obstruction or blockage?	☐	☐
Are extinguishers not mounted too high? If not exceeding 40 pounds, the top must not be higher than five feet above floor. If greater than 40 pounds, the top must not be higher than 3½ feet above floor.	☐	☐
Have all extinguishers been serviced, maintained, and tagged at intervals not to exceed one year?	☐	☐
Are all extinguishers checked by management or designated employee monthly to see if they are in place or if they have been discharged, etc.?	☐	☐
Automatic sprinkler (if applicable) Is there at least one automatic water supply of adequate pressure, capacity, and reliability?	☐	☐
Is combustible material never piled within 36 inches of the sprinkler system except as mentioned below? 1. Solid piles 15 feet high or in piles 12 feet high with horizontal channels. 2. Commodities containing only small amounts of combustible material.	☐	☐

CHECKLISTS (cont.)

	Yes	No
Is the storage of material, mentioned in No's. 1 and 2 above, never piled next to lights or within 18 inches of the sprinkler system?	☐	☐
Are water flow alarms provided on all sprinklers?	☐	☐
Are the sprinkler systems periodically inspected and continuously maintained?	☐	☐
Dry chemical systems (if applicable) Does a competent inspector make annual inspections and perform tests on all dry chemical systems?	☐	☐
Are the inspector's reports kept on file?	☐	☐
Are visual inspections regularly made?	☐	☐
Are all dry chemical systems maintained in full operating condition at all times?	☐	☐

COMPRESSED AIR (29 CFR 1910.169)

Are pulleys and belts on compressors and motors completely guarded?	☐	☐
Are flexible cords or plugs on electric motors periodically checked and replaced if in a deteriorated condition?	☐	☐
Do the relief valves operate properly?	☐	☐
Are air tanks drained regularly?	☐	☐
Is the pressure-relief device and gauge in good operating condition?	☐	☐

MATERIALS HANDLING AND STORAGE (29 CFR 1910.176-.181)

Is there safe clearance for equipment through aisles and doors?	☐	☐
Is stored material stable and secure?	☐	☐
Are storage areas free from tripping hazards?	☐	☐
Are only trained operators allowed to operate powered industrial trucks?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Are appropriate overhead guards installed on powered lift trucks?	☐	☐
Is battery charging on electric units performed only in designated areas?	☐	☐
Are "NO SMOKING" signs posted near electric battery charging units?	☐	☐
Are all vehicles shut off prior to loading?	☐	☐
Are dock boards (bridge plates) used when loading or unloading from dock to truck or dock to rail car?	☐	☐
Is all storage secured against sliding or collapsing?	☐	☐
Have aisles been designated and kept clear to allow unhindered passage?	☐	☐
Are containers of combustibles or flammables, when stacked one upon the other, always separated by dunnage sufficient to provide stability?	☐	☐
Are racks and platforms loaded within the limits of their capacity?	☐	☐
If motorized equipment, such as lift trucks, is used, are aisles permanently marked, providing sufficient clearance for passage of the equipment?	☐	☐
Are specifications posted for maximum loads which are approved for floors (except slabs with no basements), roof of a building, or some other structure?	☐	☐

MACHINERY AND MACHINE GUARDING (29 CFR 1910.212-.215)

Are belts, pulleys, and rotating shafts (air compressor, drill presses, etc.) properly guarded?	☐	☐
Are chains, sprockets, and gears properly guarded?	☐	☐
Are all in-going nip points properly guarded?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Are rotating shafts that are not smooth properly guarded?	☐	☐
Are all rotating parts (lubrication, fittings, etc.) recessed or covered with collars?	☐	☐
Are all pieces of equipment with an electric motor or any electrical connection effectively grounded?	☐	☐
Are sprockets and belt drives within reach of platforms and passageways or less than seven feet from the floor completely enclosed?	☐	☐
Are fans less than seven feet above floor guarded, having openings ½ inch or less?	☐	☐

ABRASIVE WHEEL MACHINERY (Grinders) (29 CFR 1910.215)

Is the work rest used and kept adjusted to within ⅛ inch of wheel?	☐	☐
Is the adjustable tongue on top side of grinder used and kept adjusted to within ¼ inch of wheel?	☐	☐
Do side guards cover the spindle, nut, and flange and 75% of the wheel diameter?	☐	☐
Are bench and pedestal grinders permanently mounted?	☐	☐
Are goggles or face shields always worn when grinding?	☐	☐

HAND AND PORTABLE POWER TOOLS (29 CFR 1910.242-.244)

Are tools and equipment (both company and employee-owned) in good condition?	☐	☐
Have mushroomed heads on chisels, punches, etc. been reconditioned or replaced if necessary?	☐	☐
Have broken hammer handles been replaced?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Have worn or bent wrenches been replaced?	☐	☐
Have employees been instructed that the use of compressed air to blow debris from clothing or body is prohibited because it can enter the body and cause serious harm?	☐	☐
Have deteriorated air hoses been replaced?	☐	☐
Are portable abrasive wheels appropriately guarded?	☐	☐
Have employees been made aware of the hazards caused by faulty or improperly used hand tools?	☐	☐

NATIONAL ELECTRICAL CODE (1910.308, .309)

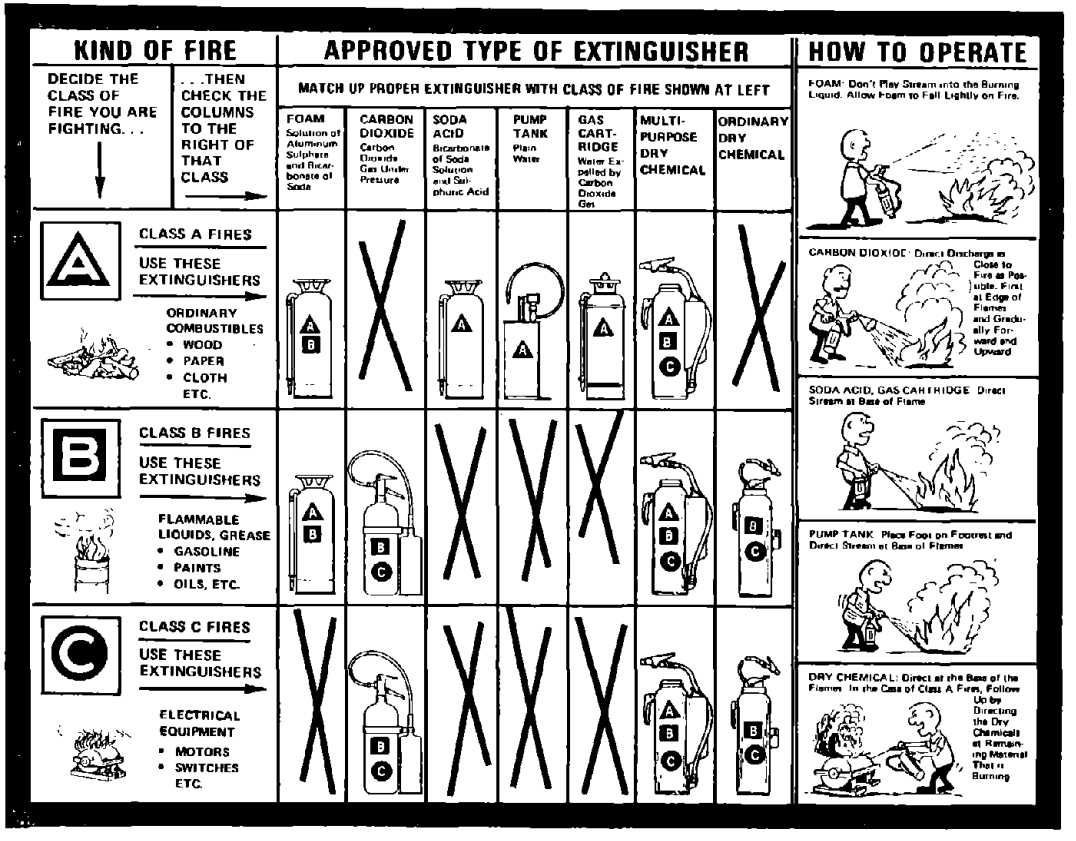
Have exposed wires, frayed cords, and deteriorated insulation been repaired or replaced?	☐	☐
Are junction boxes, outlets, switches, and fittings covered?	☐	☐
Is all metal fixed electrical equipment grounded?	☐	☐
Are flexible cords and cables fastened so that there is no direct pull on joints or terminal screws?	☐	☐
Are flexible cords and cables never substituted for fixed wiring?	☐	☐
Are flexible cords and cables not attached to building surfaces?	☐	☐
Do flexible cords and cables not run through holes in wall or ceiling or through doorways or windows?	☐	☐
Does all equipment connected by cord and plug have grounded connections?	☐	☐
Are electrical appliances such as vacuums, polishers, vending machines, etc. grounded?	☐	☐

CHECKLISTS (cont.)

	Yes	No
Are all portable electrical hand tools grounded? (Double-insulated tools are acceptable without grounding.)	☐	☐
Are breaker switches identified as to their use?	☐	☐

RECORDKEEPING (29 CFR 1903.2-1904.8)

Is employee poster (OSHA or equivalent state poster) prominently displayed?	☐	☐
Has a summary of all occupational injuries and illnesses been compiled at the conclusion of each calendar year and been recorded on OSHA Form No. 102? Was it posted during the month of February?	☐	☐
Have all OSHA records been retained for a period of five years, excluding the current year?	☐	☐
Have occupational injuries or illnesses, except minor injuries requiring only first aid, been recorded on OSHA Form Nos. 100 and 101, or equivalent?	☐	☐



NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

89a

INFORMATION SOURCES

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1430 Broadway, New York, N.Y. 10018

☐	A12.1	Floor and Wall Openings
☐	A58.1	Minimum Design Load
☐	B15.1	Mechanical Power Transmission
☐	B31.1	Pressure Piping-Power Piping
☐	C1	National Electric Code
☐	S21.3	Gas Appliances and Gas Piping
☐	Z4.1	Sanitation in Places of Employment
☐	Z9.2	Local Exhaust Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

470 Atlantic Ave.
Boston, Mass. 02210

☐	NFPA-10-1970	Installation of Portable Fire Extinguishers
☐	NFPA-101-1970	Life Safety Code
☐	NFPA-70-1971	National Electric Code

NATIONAL SAFETY COUNCIL

425 North Michigan Avenue
Chicago, Illinois 60611

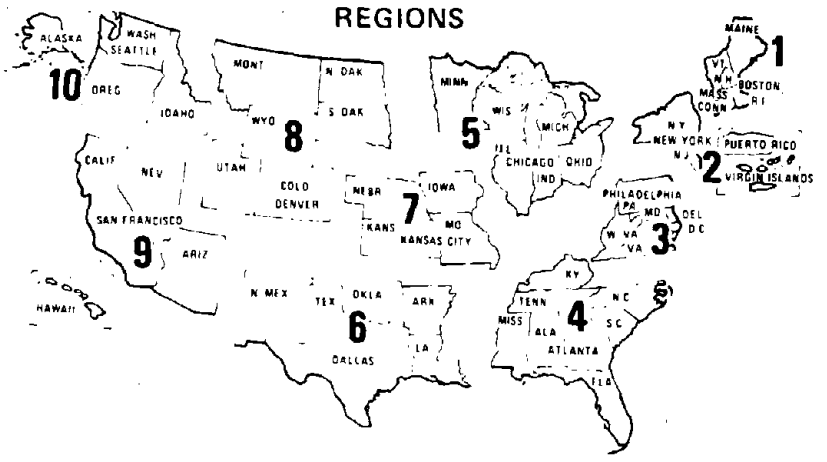
NIOSH Certified Personal Protective Equipment
Pub. No. 75-119 available from:
Publications Dissemination
NIOSH-DTS
4676 Columbia Pkway
Cincinnati, Ohio 45226

NIOSH AND OSHA REGIONAL DIRECTORS

Trade associations and insurance companies can also provide useful information. The Small Business Administration will provide information concerning procedures for securing economic assistance for compliance with the OSHA Standards (if needed).

NIOSH AND OSHA REGIONAL OFFICES

The following pages list NIOSH and OSHA regional offices which can provide information on the OCCUPATIONAL SAFETY AND HEALTH ACT including questions on standards interpretations, voluntary compliance information, copies of the *OSHA Standards, OSHA Act, Employee Rights Posting Notice*, and publications.



NIOSH REGIONAL OFFICES

DHEW, Region I
Government Center (JFK Fed. Bldg.)
Boston, Massachusetts 02203
Tel.: 617, 223-6668/9

DHEW, Region II — Federal Building
26 Federal Plaza
New York, New York 10007
Tel.: 212 264-2485/8

DHEW, Region III
1525 Market Street, P.O. Box 13716
Philadelphia, Pennsylvania 19101
Tel.: 215, 596-6716

DHEW, Region IV
50 Seventh Street, N.E.
Atlanta, Georgia 30323
Tel.: 404 526-5474

DHEW, Region V
300 South Wacker Drive
Chicago, Illinois 60607
Tel.: 312/886-3651

DHEW, Region VI
1200 Main Tower Building, Room 1700-A
Dallas, Texas 75245
Tel.: 214/655-3081

DHEW, Region VII
601 East 12th Street
Kansas City, Missouri 64106
Tel.: 816-374-5332

DHEW, Region VIII
19th & Stout Streets
9017 Federal Building
Denver, Colorado 80202
Tel.: 303/837-3979

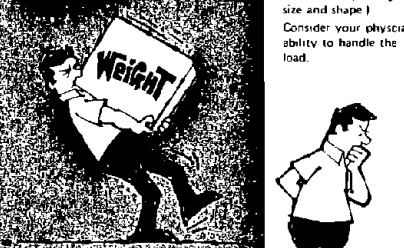
DHEW, Region IX
50 Fulton Street (223 FOB)
San Francisco, California 94102
Tel.: 415/556-3781

DHEW, Region X
1321 Second Avenue (Arcade Bldg.)
Seattle, Washington 98101
Tel.: 206/442-0530

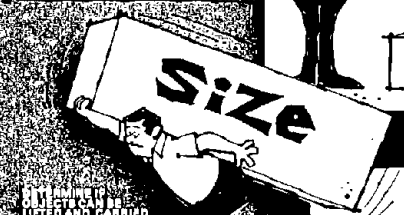
HOW TO LIFT SAFELY

The following safe practices should be observed in order to avoid injury.

The factors that contribute to safe lifting are...



Consider your physcial ability to handle the load.

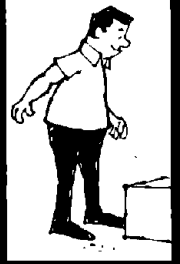


Stack material in such a manner as to permit full view while carrying.

BY KNOWING HOW AN OBJECT CAN BE LIFTED AND CARRIED SAFELY.

1 Approach the load and size it up (weight, size and shape)

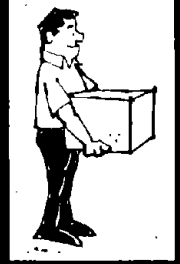
2 Place the feet close to the object to be lifted 8 to 12 inches apart for good balance.



3 Bend the knees to the degree that is comfortable and get a good handhold. Then using both leg and back muscles

4. Lift the load straight up—smoothly and evenly. Pushing with your legs, keep load close to your body.

5 Lift the object into carrying position, making no turning or twisting movements until the lift is completed



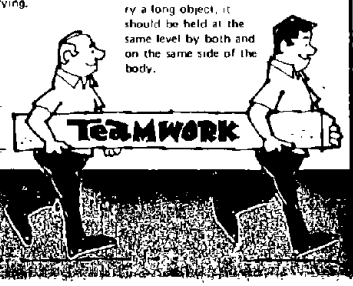
6. Turn your body with changes of foot position after looking over your path of travel making sure it is clear

7 Setting the load down, is just as important as picking it up. Using leg and back muscles, comfortably lower load by bending your knees. When load is securely positioned, release your grip.

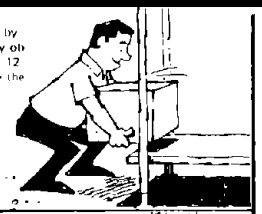
When lifting and carrying with another person—teamwork is important

The load should be equally distributed. Movements must be coordinated so you both start and finish the lift action at the same time and perform turning movements together.

When two persons carry a long object, it should be held at the same level by both and on the same side of the body.



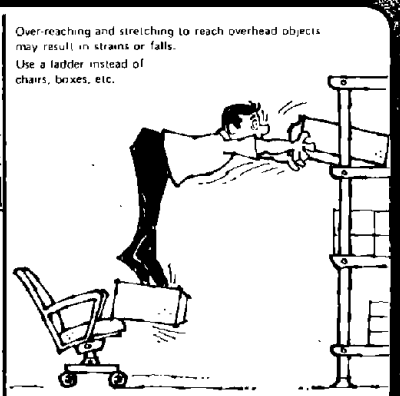
Avoid strain by storing heavy objects at least 12 inches above the floor.



Avoid awkward positions or twisting movements while lifting.

Over-reaching and stretching to reach overhead objects may result in strains or falls.

Use a ladder instead of chairs, boxes, etc.



92

OSHA REGIONAL OFFICES

Region I
U.S. Department of Labor
Occupational Safety and Health Administration
JFK Building, Room 1804
Boston, Massachusetts 02203 ..... Telephone: 617/223-6712/3

Region II
U.S. Department of Labor
Occupational Safety and Health Administration
1515 Broadway (1 Astor Plaza), Room 3445
New York, New York 10036 ..... Telephone: 212/971-5941/2

Region III
U.S. Department of Labor
Occupational Safety and Health Administration
15220 Gateway Center, 3535 Market Street
Philadelphia, Pennsylvania 19104 ..... Telephone: 215/596-1201

Region IV
U.S. Department of Labor
Occupational Safety and Health Administration
1375 Peachtree Street, N.E., Suite 587
Atlanta, Georgia 30309 ..... Telephone: 404/526-3573/4 or 2281/2

Region V
U.S. Department of Labor
Occupational Safety and Health Administration
230 S. Dearborn, 32nd Floor
Chicago, Illinois 60604 ..... Telephone: 312/353-4716/7

Region VI
U.S. Department of Labor
Occupational Safety and Health Administration
555 Griffin Square Building, Room 602
Dallas, Texas 75202 ..... Telephone: 214/749-2477/8/9 or 2567

Region VII
U.S. Department of Labor
Occupational Safety and Health Administration
Federal Building, Room 3000, 911 Walnut Street
Kansas City, Missouri 64106 ..... Telephone: 816/374-5861

Region VIII
U.S. Department of Labor
Occupational Safety and Health Administration
Federal Building, Room 15010, 1961 Stout Street
Denver, Colorado 80202 ..... Telephone: 303/837-3883

Region IX
U.S. Department of Labor
Occupational Safety and Health Administration
9470 Federal Building, 450 Golden Gate Avenue
Post Office Box 36017
San Francisco, California 94102 ..... Telephone: 415/556-0584

Region X
U.S. Department of Labor
Occupational Safety and Health Administration
6048 Federal Office Building, 909 First Avenue
Seattle, Washington 98174 ..... Telephone: 206/442-5930

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