INDIAN AFFAIRS
OCCUPATIONAL SAFETY HANDBOOK

25 IAM 3-H, Volume 1

Deputy Assistant Secretary - Management
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FOREWORD

Due to the extensive content covered by Indian Affairs' (IA) Occupational Safety and Health Program (OSHP) policy, as documented in 25 IAM 3, several handbooks have been created that tie to the original policy, but which cover a very specific procedural aspect of the program. These handbooks refer to the original policy (i.e., 25 IAM 3) but include a volume reference as well (e.g., 25 IAM 3-H, Volume 1).

This handbook documents the procedures required to implement the IA occupational safety portion of the OSHP policy. Although this handbook is intended to primarily assist IA Safety Offices who administer the IA OSHP policy, it may also be informative for IA employees.

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Chapter 1: Overview

Occupational safety is a multidisciplinary field concerned with the safety, health, and welfare of people at work. It is commonly referred to as occupational health and safety or workplace health and safety.

Chapter 2: Job Hazard Analysis

A Job Hazard Analysis (JHA) is a technique that focuses on job tasks to identify hazards and hazard management strategies *before* incidents occur. It concentrates on the relationship between the worker, the task, the tools, and the work environment. After identifying uncontrolled hazards in the work stream, steps can be taken to eliminate or reduce them to an acceptable risk level.

JHAs are developed by employees and supervisors working together using the IA Job Analysis Form to ensure all characteristics of the job are identified, and the safest and most efficient means of performing the job are used.

Supervisors and employees are responsible for discussing job hazards before beginning new projects or when changing work sites. Together they should identify any hazards not noted on the JHA and discuss ways to reduce these hazards, including using personal protective equipment (PPE). Supervisors ensure JHAs are reviewed and signed at the beginning of the field season or fire season, and before starting any non-routine task.

Bureau of Indian Affairs (BIA) Regional Safety Managers (RSMs) and the Bureau of Indian Education (BIE) Safety Program Manager (SPM) should ensure the JHA process is implemented within their respective regions and at school facilities and site operations. They should also provide technical support to develop or review JHAs, when requested. The IA Division of Safety and Risk Management (DSRM) performs this role for Assistant Secretary-Indian Affairs (AS-IA) offices and programs.

2.1 Procedures to Develop a JHA

A JHA is required to be completed for the following:

- Jobs or work practices that have potential hazards.
- New, non-routine, or hazardous tasks performed where potential danger exists.
- Jobs that require employees to use PPE.
- Changes in equipment, work environment, conditions, practices, policies, or materials that create potential risks for employees.

These steps should be followed to develop a JHA:

1) **Select a job, task, or work activity for analysis.** When selecting a job, task, or work activity for analysis, review injury and illness records, then consider the accident history, potential for an incident, complexity, and changes to processes or personnel.

2) **Observe the job, task or work activities and list steps.** Observe employees performing the job, task, or work activity and list the steps to perform it. Include start-up, shutdown, and maintenance in the observations.

3) **Describe the hazards.** Describe the hazards produced during each step of the job, task, or work activity, as well as the hazards resulting from the work environment (e.g., cold or heat stress).

4) **Develop corrective measures.** Identify corrective measures for each of the hazards identified. The corrective measures should follow this hierarchy of controls:
   a. Elimination or substitution that includes rethinking the job to see if tasks can be avoided or substituted with less hazardous tasks or materials (e.g., replacing a toxic paint with a non-toxic paint).
   b. Engineering controls that may include physical enclosures or ventilation to minimize the hazard (e.g., local exhaust ventilation).
   c. Administrative controls that can include altering the process or work assignments (e.g., mandating safety training as part of job qualification).
   d. PPE to provide a personal barrier for the employee (e.g., a respirator, safety glasses, and gloves).

5) **Write safe job procedures for each of the identified hazards.** Working with affected employees, describe safe job procedures for each of the hazardous activities and identify any special equipment, operations, or PPE required. Periodically review the procedures with employees to ensure they remain current and relevant.

6) **Certify, document, and record.** The JHA should be dated and signed by the person assigned the responsibility for certifying the assessment was performed. When employees are beginning a task that requires reviewing the JHA, each employee should sign the JHA certifying they have reviewed it and understood the procedures before beginning work.

2.2 JHA Review

JHA review and approval will be completed by the Line Officer or Official-in-Charge (OIC), and the BIA RSM for BIA and Office of Justices Services (OJS) programs or the BIE SPM for BIE programs. This review is done to ensure IA and Occupational Safety and Health Administration (OSHA) standards are integrated into the JHA, and that the PPE required is properly selected and meets the appropriate American National Standards Institute (ANSI) standards.

The Line Officer or OIC and the designated Safety Manager will sign the JHA after review and return the form to the supervisor.

2.3 JHA Reevaluation and Recordkeeping

Established JHAs should be reevaluated at least every three years to ensure they reflect the latest, safest, and most efficient way to perform the task.

New equipment, tools, methods, and changes in safety standards should require existing JHAs to be reviewed and potentially modified.

Supervisors are responsible for maintaining JHA records within their areas of responsibility.

Chapter 3: Collateral Duty Safety Officer (CDSO)

CDSOs are required at locations with 15 or more employees. CDSOs are the local point of contact advising management in the development and implementation of an effective OSH program. CDSOs also work with safety and health committees to ensure that safety and health is incorporated within their respective locations.

3.1 Functions of the CDSO

CDSOs will devote a minimum of 10 percent of duty time to OSH program responsibilities. However, if local safety and health program needs require additional time to achieve program compliance, managers must ensure that the CDSO is authorized necessary duty time for that purpose.

CDSOs will be adequately equipped and competent to recognize and evaluate hazards of the working environment and to suggest general abatement procedures. Competent, in this case, is defined as possessing the skills, knowledge, experience, and judgement to perform assigned tasks or activities satisfactorily, as determined by the organization. Experience and/or up-to-date training in OSH hazard recognition and evaluation should be considered in meeting this requirement. Additional information on CDSO training is discussed in Chapter 4 of this handbook.

A CDSO's assigned duties will be appropriately described in the employee's official position description.

3.2 CDSO Duties and Responsibilities

In addition to their primary job duties, CDSOs are also tasked with carrying out additional responsibilities on management's behalf. See 25 IAM 3 for a comprehensive list of CDSO responsibilities.

Chapter 4: Training

Safety training provides an opportunity to communicate safety principles; management's commitment to a safe workplace; and to develop and enhance a safety and health culture that values employees' safety.

Supervisors are responsible for establishing when, where, and how to do each job safely. Supervisors should ensure that employees receive appropriate safety and health training, and document that employees have completed the necessary required training courses.

All employees must complete the minimum OSH training requirements, including offices reporting to the AS-IA, the BIA, and the BIE as described in the IA Occupational Safety and Health Training Plan.

Within six months of appointment, CDSOs will be provided training that includes: Departmental and IA safety and health programs; Section 19 of the OSHA Act; Executive Order 12196; 29 CFR 1960; procedures for reporting, evaluation, and abatement of hazards; procedures for reporting and investigating allegations of reprisal; the recognition of hazardous conditions and environments; identification and use of OSH standards; and other appropriate rules and regulations.

CDSOs will also take courses in the basic elements of organizing, planning, and managing an effective OSH program. An exception is when the CDSO has had the required training/experience within the previous three years.

As summarized below, mandatory and optional training requirements are based on assigned tasks. Employees and supervisors should consult with their BIA RSM or BIE SPM for specific requirements.

Mandatory Safety Training Dependent on Position or Job Hazard Analysis

Position/Task	***Authority***	***Frequency***
Safety Training for Managers	29 CFR 1960.54	Once
Safety Training for Supervisors	29 CFR 1960.55	Once
Safety Training for CDSOs	29 CFR 1960.56	Yearly
Safety Personnel	29 CFR 1960.58	Once within 6 months of appointment
Safety Committee Training	29 CFR 1960.58	Once within 6 months of appointment
Safety Orientation Training for Employees	29 CFR 1960.59	Once
Hazard Communication (employee right-to-know)	29 CFR 1910.1200	Once, unless job change, or new chemical added (all employees)
Job Hazard Analysis (JHA)	485 DM Chapter 14	Once, recurrent review as job hazards change
Bloodborne Pathogen Level 1	29 CFR 1910.1030	Upon initial assignment, whenever a new or modified task or procedure affects employee exposures, and at least annually thereafter

Forklift Safety	29 CFR 1910.178	Once, or as determined by JHA
Respiratory Protection	29 CFR 1910.134	Annually, or more often if determined by JHA
First aid/Cardiopulmonary Resuscitation (CPR)	29 CFR 1910.151	Every two years for CPR, every 3 years for first aid or as determined by JHA
Fire Extinguisher	29 CFR 1910.157	Upon initial assignment and at least annually thereafter
Evacuation/Fire Drill	29 CFR 1910.38	Once yearly
Hearing Conservation	29 CFR 1910.95	Upon initial assignment and annually thereafter for employees exposed to time weighted average of >85 decibels
Welding	29 CFR 1910.252	Once, or as determined by JHA
Sign and Tag Recognition	29 CFR 1910.145	Once, or as determined by JHA
Lockout/Tagout	29 CFR 1910.147	Once, or as determined by JHA
Confined Spaces	29 CFR 1910. 146	Each space, or as determined by JHA
OSHA Personal Protective Equipment Standard Personal Protective Measures	29 CFR 1910.132 and 29 CFR 1926.21	Once, or as determined by JHA
Power-Operated Hand Tools	29 CFR 1926.302	Once, or as determined by JHA
Woodworking Tools	29 CFR 1926.304	Once, or as determined by JHA
Gas Welding	29 CFR 1926.350	Once, or as determined by JHA
Arc Welding	29 CFR 1926. 351	Once, or as determined by JHA
Commercial Driver's License	49 CFR 383-395	5 years, or as determined by JHA
Fall Protection	29 CFR 1926.500	As determined by JHA
Telecommunication	29 CFR 1910.268	As determined by JHA

Online training is available on the DOI Talent Management System website here: https://doitalent.ibc.doi.gov/ and on the IA Safety Management System SharePoint site here: https://doimspp.sharepoint.com/sites/bia-ems/iasafety.

Chapter 5: Field Work

The IA DSRM provides guidance to managers and supervisors to help ensure employee risks related to field work are identified and managed. Managers and supervisors ensure employees involved in field activities have mandatory safety orientations. This chapter covers the following topics:

- Checking in and out
- Field attire
- Foot travel
- Vehicle travel
- Winter travel
- Desert and arid conditions
- Camping safety and sanitation
- Aviation camp
- Lightning storms
- Potentially violent personal encounters

Assessing field hazards is a continual process. The JHA process (see Chapter 2 of this handbook) helps supervisors and employees minimize or eliminate those hazards.

5.1 Check-Out/Check-In System

IA, BIA, and BIE activities sometimes require employees to travel and work alone in remote and hazardous areas. Managers and supervisors must ensure at least two employees are assigned to work in such areas whenever possible, and that they have dependable communication. The IA check-out/check-in system requires maintaining a written record containing the following:

- Itinerary
- Name of employee(s)
- Work area
- Time of departure
- Estimated time of return
- Miscellaneous pertinent information such as names of other crew members

In the event an employee does not return or contact the office, camp, or other designated location at the designated times, search and rescue procedures should begin. In the event of an emergency, all field camps must have communications capable of requesting assistance.

5.2 Field Attire

Managers and supervisors determine safe field attire based on employee input, JHAs, or as required by specific activity. For general working conditions, recommended attire includes the following:

- Hard hat (where overhead hazards exist)
- Goggles or safety glasses (as appropriate)

- Gloves (as appropriate)
- Long-sleeved shirt
- Long trousers
- Six- to eight-inch-high protective footwear (bottom of the heel to the top of the boot) with nonslip soles and heels

5.3 Foot Travel

Employees must ensure the intended route is included in the check-out/check-in itinerary, and other workers in the area are notified of the intended route and destination. Employees should ensure they are close enough to other employees to permit a quick response to a call for assistance.

Employees in the field should avoid travel, resting, or camping in snag or high windfall areas when windy weather or lightning may endanger life and property.

Employees in the field should always have secure footing and avoid using rotten or loose-barked logs as foot logs over creeks or gullies. Rocky slopes, especially slide rock and steep country, can be treacherous. Employees should have one hand free to protect against falls or obstructions and carry hand tools on their lower side when walking along contours or slopes.

Employees should always be on guard against injury from falling trees, snags, limbs, rolling logs, or rocks, and guard against twigs or branches striking the face, and to protect co-workers from similar whiplashes.

When possible, employees should detour around hazardous areas such as rockslides, lava flows, rim rock, sand dunes, steep or undercut riverbanks, quicksand, dense brush, deep gullies, canyons, bear dens, hornet nests, poison ivy, and poison oak.

5.4 Vehicle Travel

The vehicle driver must ensure the intended driving route is included in the check-out/check-in itinerary, and other workers on location are notified of the intended route and destination.

If a vehicle becomes stuck or disabled, the driver and occupants should remain with the vehicle. The vehicle can more easily be located by search and rescue than a person can alone; the vehicle also provides shelter from the sun and/or the cold.

If the driver and vehicle occupants are lost and without radio contact, they should sweep the horizon during the daytime by reflecting the sun with a signal mirror. This reflection is visible over a great distance and may be seen by someone. Vehicle headlights should also be flashed (three rapid flashes) at night, especially if aircraft can be heard.

5.5 Winter Travel

To minimize the hazards associated with winter driving, both the vehicle and the driver must be prepared. Before beginning any winter travel, follow office check-out/check-in procedures and carry winter survival equipment. Before departing, check the following vehicle systems:

- Tires and wheels
- Window defrosters
- Antifreeze levels
- Engine oil
- Brakes
- Battery
- Headlights
- Turn signals and flashers
- Windshield wipers
- Car jack
- Spare tire

To see and be seen by others, the driver should clean all snow and ice from the entire vehicle hood, roof, trunk, lights, and windows. Snow left on any of these areas increases the possibility that visibility will be affected when the vehicle is in motion.

The driver should follow manufacturer's recommendations when operating a vehicle equipped with studded tires or chains. Snow tires are recommended, but chains provide the best starting and stopping performance in severe snow and on icy surfaces. Radial tires are not snow tires unless they have a snow-tread configuration and are marked "M&S" for mud and snow.

The driver should always drive at a speed that matches visibility, traffic, and road conditions, even if the operating speed is below the posted speed limit.
On any winter trip the driver must be prepared for any vehicle-related emergency. This is especially important when traveling in remote areas should the vehicle break down or become stuck. If the driver and/or occupants become stranded, it is best to stay with the vehicle and perform the following tasks:

- Run the heat in the vehicle for 10 minutes every hour or so to conserve fuel.
- Keep the exhaust pipe clear of snow.
- Open a window occasionally to let in fresh air.

The driver should also ensure that a winter survival kit is kept in the car that contains the following:

- Jumper cables
- Tool kit
- Tire chains or cables
- Flares and emergency signals
- Ice and snow scrapers
- Tire sealant and portable compressor
- Flashlight
- Shovel
- Cat litter or sand
- Fire extinguisher
- Duct tape
- Tarp
- Food and water
- Blankets or sleeping bag
- Extra winter clothing
- Phone charger(s)
- First-aid kit

5.6 Desert and Arid Conditions

Before going into the desert, the driver must ensure the intended route is included in the check-out/check-in itinerary and other workers in the area are notified of the intended route and destination. The driver must also ensure the vehicle is in good condition.

In addition to materials and equipment for the intended work, the vehicle should have onboard at least one gallon of water per person per day of the trip.

The driver needs to watch for changing weather conditions. Flash floods may occur whenever employees are working downslope from "thunderheads," even though it may not be raining where they are.

If the vehicle becomes stuck or breaks down, the driver and occupants need to stay near it. The following emergency supplies must be in the vehicle:

- Water
- Shovel

- Car jack
- Traction mat
- Wool blanket
- Reflective blanket
- Portable battery booster
- Hose repair kit
- Tire repair kit
- Compressor
- Signal mirror
- Flares
- Distress flags or reflective markers
- Fuel can
- Radio

If water is limited, employees should breathe through their noses—not their mouths—to reduce water loss and drying mucous membranes. Do not talk, eat, smoke, drink alcohol, or take salt.

Stranded employees should not sit or lie directly on the ground if possible. It may be more than 30 degrees hotter than the air.

Desert clothing should be lightweight, light colored, and cover the whole body. This includes appropriate eyewear to protect eyes from sun glare. Desert nights can be very cold, and additional clothing should be packed accordingly.

5.7 Camping Safety and Sanitation

This section covers a few standards for camp operations; not every situation that may be encountered in a remote camp setup is covered. Guidance for field sites often comes from disaster preparedness, such as the Centers for Disease Control and Prevention training, which can be found here: https://www.cdc.gov/nceh/ehs/elearn/ehter.htm. This online resource provides additional safety and sanitation considerations for remote camps and shelters.

A. Camp Layout and Construction.

All camp sites must be:

- Adequately drained and free of depressions where water may accumulate.
- Located so the drainage from and through the camp will not pollute any domestic or public water supply.
- Large enough to prevent overcrowding of tents, structures, and facilities.

Campsites should not be:

- Subject to periodic flooding.
- Located within 200 feet of swamps, pools, sinkholes, or other surface water unless mosquitoes can be controlled.

Additionally, the principal camp area where food is prepared and served and where sleeping quarters are located must be at least 500 feet from any area in which livestock are kept.

B. Gray Water Disposal.

Gray water refers to domestic wastewater generated in households or office buildings from streams without fecal contamination. Gray water should be disposed of in the following manner:

- Pits should be constructed to permit leaching within 24 hours.
- If leaching does not occur because of the water table, a series of shallow small canals should be constructed for evaporation and leaching.
- A gray water disposal area will be located at least 50 feet downgradient from a water source; strive for 200 feet if the water gradient is not clear.

C. Potable Water.

Potable water is also known as drinking water and comes from surface water and groundwater sources. This water is treated to levels that meet state and federal standards for consumption. The following applies to potable water:

- Transported potable water must be obtained from a treated source or chlorinated if obtained from a non-treated source.
- Potable water must be kept pure and free from contamination using proper handling and storage procedures.
- Avoid using surface water such as lakes, springs, rivers, or streams as potable water unless as a last resort. Surface water is susceptible to contamination from microbes (e.g., bacteria) and chemicals (e.g., fuel). If surface water must be used, local health departments should be contacted to ask for any known contamination issues and for guidance on properly treating/disinfecting the water.
- Canteens must be emptied, disinfected, and dried when not in use.

D. Toilet Facilities.

Approved toilet facilities must be provided and adequate for the capacity of the camp. They also must be located 200 feet or more from any water source. 29 CFR 1910.142(d) may be consulted for a description of toilet facilities requirements.

E. Kitchen Tents.

Kitchen tents are designed as a small shelter, ideal for cooking outdoors and are made of fire-resistant fabric consisting of a roof, walls, and a front enclosure with a door flap. Additionally:

- Kitchen tents must be kept clean and tidy.
- Foodstuffs must be kept away from cleaning supplies.
- Two fire extinguishers should be present and ready.
- Foodstuffs should be stored in rodent/pest-proof containers.
- Pots and pans must be kept clean and inverted for dust and germ control.
- Silverware should be clean and covered.
- Freezer temperatures should be set at zero degrees or below.
- Refrigerators should be set at 40°F.
- Temperature measuring devices should be available to verify cold-holding (i.e., refrigerator) and hot-holding temperatures. The temperature "danger zone" is 41°F to 135°F—food must be held outside these temperatures.

Consult the Food and Drug Administration (FDA) Food Code for more guidance.

F. Propane Tanks and Generators.

Propane tanks must be properly anchored, and propane tanks and other fuel storage containers should be at least 50 feet away from the camp with properly posted "No Smoking" signs clearly visible.

Generators should be placed downwind with plywood noise control. Generators can create carbon monoxide that can cause harmful health effects and even death. Therefore, keep generators at least 20 feet away from the tent or building structure where employees are sleeping. Electrical panel boxes, cords, and connections should be protected from the weather and from vehicle/foot traffic.

5.8 Aviation Camp

IA, BIA, and BIE employees flying as passengers on charter aircraft have rights and responsibilities regarding their safety. Charter aircraft passengers should know the details of their trip including the aircraft and the pilot. Good flight risk management involves the passenger in

the decision-making process and if any part of the trip plan is not satisfactory to everyone, the flight should be postponed.

On every trip, passengers should know the following:

- **The weather.** Know current weather conditions and forecasted weather along the fight path, and if the flight will use visual flight rules (VFR) or instrument flight rules. A VFR flight must have clear weather for the pilot to see and navigate.

- **The pilot.** Is the pilot in a hurry? Is the pilot well rested? Is the pilot aware of the weather and related hazards along the intended route?

- **The plane.** Learn the weight limit for passengers and cargo on the flight. Learn the location and use of safety equipment such as radios, emergency locator transmitters, fire extinguishers, flotation devices, and first-aid kits. Know how to operate the emergency exits and seat belts.

- **The flight plans.** Ask if a flight plan has been filed. Ask about procedures if inclement weather is encountered during the flight.

Camp aircraft refueling must be done by trained employees at sites properly set up for refueling operations. Refueling operations must consider the following:

- The refueling site must be large enough for operations and have a clearly marked aircraft parking area for refueling.

- The site must be located a minimum of 100 feet from personnel quarters and must be kept tidy with no loose articles allowed in the area that might be blown into helicopter rotors or aircraft propellers.

- The area should be cleared of loose sticks, stones, and other debris that might cause aircraft damage.

- The fueling site must have the proper fuel containment that includes both fuel bladders and barreled fuel being kept in secondary containment (diked) in case of a fuel spill.

- The system should be checked for proper operation, pressure, and leaks before it is placed in operation.

- A daily fuel log must be kept.

- No smoking is allowed within 50 feet of a fueling site.

- A windsock should be installed.

- The fuel tank pump must have a remote switch.

Passengers should ensure the following are in place before an aircraft is refueled:

- Sufficient staff should be assigned to the equipment. This includes a fire guard, a person to operate the pump, and another person to operate the nozzle at the aircraft.
- A fire extinguisher should be positioned near the side of the aircraft next to the refueling port.
- Fuel sources must be grounded and bonded through machinery (filters, pumps) and then to aircraft.

Employees refueling the aircraft should be trained to safely refuel the aircraft, and adhere to and be able to respond to the following:

- Ground fueling vehicles, equipment, and aircraft to dissipate static electricity
- Safely respond to a spill
- Suspend operations when there is lightning in the area
- Refuel outside only
- Do not refuel when passengers are on board the aircraft
- Be familiar with emergency fire and rescue procedures

The following protective equipment will be worn by fuel-servicing personnel:

- Fire retardant clothing with the shirt sleeves rolled down
- Hard hat if there are potential head impact hazards
- Splash-proof goggles
- Hearing protection—both earplugs and ear protectors should be worn
- Gloves should always be worn during refueling operations
- Approved fire-retardant boots must also be worn

Fuel-servicing personnel should also adhere to the following refueling operation safety requirements:

- Fire extinguishers must be present at the pump assembly and each refueling nozzle.
- Sufficient water must be available to wash fuel spills from personnel or to wet fuel-soaked clothing before removing the clothing.
- Explosion-proof flashlights are required for night operations.

- “No smoking” and “danger” signs must be posted and visible when approaching the site.
- Grounding rods are required at the pump filter separator and each dispensing point nozzle.
- Lighting must be installed for night operations.

5.9 Lightning Storms

Lightning seeks the easiest route (not necessarily the shortest) between positive and negative regions within a cloud, or between positive charges on the ground and negative charges in the cloud. The hazard of lightning occurs in two ways, either as a direct hit or as a ground current. The human body offers lightning a path of low resistance. The following are general guidelines for employees caught in the field during a lightning storm:

- Seek shelter inside a building.
- Select fiberglass or plastic hard hats rather than metal ones.
- Do not work on fences, electrical lines, pipelines, or structural steel fabrication.
- Do not use metal objects like fishing rods, soil augers, or well-logging equipment that are in contact with the ground.
- Automobiles provide a safe shelter because the metal body creates a pathway for the lightning around your body. Avoid contact with metal objects in the car where your body could become a pathway.

Lightning tends to strike the highest electrically conductive object in the area such as peaks, ridges, towers, trees, isolated sheds (especially with metal roof or siding), and wire fences. Employees should:

- Seek a lower elevation such as a valley or canyon.
- Avoid streams and lakes. If in a low area, be aware of flash floods and sloughing from earthen or rock materials from above.
- Sit on some insulating material, if possible, such as coiled rope, wood, a folded sleeping bag, or a wool shirt.
- A crouched position sitting on your feet with the knees drawn up and feet close together seems best to minimize the distance spanned by your contact points. Avoid any position with a hand, shoulder, or head touching a surface.

5.10 Horse Travel

Only experienced employees should ride, handle, saddle, or pack horses. Before using horses for work, experienced riders must demonstrate their ability to ride on all types of terrain and handle, saddle, and pack horses. Before using personally owned horses and equipment on official business, experienced riders must have authorization from their supervisor.

Inexperienced employees who use horse transportation must always be supervised by experienced riders and be provided with specific step-by-step instructions during each phase of activity. Inexperienced personnel should consider the following guidelines:

- Speak to the animal upon approach.
- Avoid quick movements.
- Never approach a horse from the rear.
- Lead animals around gently after saddling.
- Check cinch for tightness before mounting and frequently when riding.
- Never wrap the reins or lead rope around your hand.
- Avoid excess lead rope to prevent entanglement.
- Avoid carrying too much gear and equipment on a saddle horse. Balance the weight on both sides.
- When tying an animal, avoid slack that might entangle a person or animal. Never tie to a barbed wire or woven wire fence.
- When tying an animal, use a halter, not the bridle and reins.
- Tie animals to objects that they cannot walk completely around.
- Take special precautions with animals that might panic easily.

Employees riding horses should consider the following suggestions:

- Wear shoes or boots with a heel that will not hang up in the stirrup.
- Wear snug-fitting clothing.
- Use chaps (leather pants worn to protect the legs) or tapaderos (stirrup covers) when riding in brush.
- Never hit, beat, or abuse an animal.
- Always mount and dismount from the left side, keeping near rein tight.
- On slopes, mount from the upper side.
- Never wrap the rein around the saddle horn.
- Do not gouge a horse with a spur or heel.

- Dismount horse when lightning is near or overhead. A clap of thunder might stampede an unpredictable animal.
- Avoid running a horse on pavement, frozen ground, or up and down hills.
- Never shoot a firearm while on horseback.
- Do not force an animal into an uncomfortable situation.
- Get off the horse and lead it across areas where there is poor footing or clearance.
- Picket or hobble animals, when necessary, but be aware of hazards such as mud holes, obstructions, and other animals.

5.11 Potentially Violent Personal Encounters

A violent personal encounter is any act or threat of physical violence, harassment, intimidation, or other threatening disruptive behavior that occurs at a work site. It can range from threats and verbal abuse to physical assaults and even homicide.

Employees must be aware of the potential for personal violence directed against them while they are in the field and be alert to the warning signs during personal encounters with other individuals.

Potential or actual violent situations can escalate if not defused. Violence and the warning signs that typically occur usually fall within three levels:

1) **Level one (early warning signs):** The person is intimidating or bullying, discourteous or disrespectful, uncooperative, and/or verbally abusive.

2) **Level two (situation escalates):** The person is argumentative; refuses to listen; sabotages, throws, or breaks equipment; verbalizes their wishes to hurt employees or others; and/or sees themselves as victimized by the government or other authority figures.

3) **Level three (further escalation):** The person displays intense anger resulting in suicidal threats, physical fights, property destruction, displays extreme rage, and/or uses weapons to harm others.

Most public land users are courteous and friendly and want to use public lands properly and legally. Most employees' contacts with them will be friendly and educational to both parties. However, there are exceptions to this rule, and employees should cultivate a situational awareness when they are out in the field. Specifically:

- If an employee meets a member of the public who is hostile, the employee should be polite and non-threatening and leave the area as soon as possible.

- In any situation where an employee is concerned about the behavior of another, they should stay where other employees can see and hear what is going on.

- After any hostile encounter, the employee should notify their supervisor and law enforcement as soon as possible.

- All threats should be documented.

Employees must request permission in advance from landowners to ensure they are not trespassing on private lands, which could cause an angry response. If advance permission is not obtained from the landowner, an employee must find another way around the property or must wait until permission is granted.

Employees need to be aware of potential criminal activity (e.g., illegal dumping on public lands, clandestine drug labs, marijuana cultivation) in remote areas of public lands and be prepared to leave the area immediately, if necessary, because people engaged in such criminal activity can be hostile and violent if discovered.

Chapter 6: Personal Protective Equipment (PPE)

PPE is worn to minimize exposure to hazards that cause workplace injuries and illnesses. These injuries and illnesses can be caused by contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards.

6.1 Assessing When PPE Is Needed

Hazards exist in every workplace so strategies to protect workers are essential. Priority should be given to engineering controls, work practices, and administrative controls before PPE.

When the hazard cannot be removed or adequately controlled, PPE can be used. PPE is considered the last level of protection when all other methods are not effective or feasible. A hazard is not "gone" when PPE is used, but the risk of injury may be reduced.

The first step in developing a PPE program is to assess worksite hazards, identify the risks, and select the appropriate PPE. This can be done using a JHA (see Chapter 2 of this handbook).

6.2 Developing a PPE Program

As mentioned in 6.1, the "hierarchy of controls" should be used to consider engineering controls, work practices, and administrative controls first; PPE is the last line of defense. When PPE is used, the work site must develop a program, with active participation from managers, supervisors, CDSOs, safety committee members (SCMs), and employees.

The OIC should publicize management's commitment to the PPE program, such as in the organization's policies or standard operating procedures. The OIC should also appoint a program coordinator and reevaluate (or audit) the program at least annually.

A generically-written PPE program template is available on IA SafetyNet (Written Program Template - 04 Personal Protective Equipment Safety Program.docx (sharepoint.com)). When

using the template, the work site should consider the following sections to address specific PPE uses, needs, and instructions for the workplace.

A. Hazard Identification and Risk Assessment.

The first step to identifying PPE needs is to assess job hazards. The work site will:

- Review work practices, job procedures, equipment, and worksite layout.
- Use JHA techniques (Chapter 2) to integrate accepted safety and health principles and practice into specific operations.

B. PPE Selection.

Once hazards are identified where PPE is needed, the work site will:

- Choose PPE to match the hazard.
- Get advice from RSMs, SPMs, CDSOs, SCMs, and affected workers on proper selection.
- Consider the physical comfort of PPE, such as having the worker perform the task positions and movements while wearing the PPE as a "practice run".
- Evaluate cost considerations of PPE usage.
- Ensure PPE meets standard, policy, and directive requirements.

C. Fitting and Wearing.

In addition to meeting standards and addressing hazards, PPE must fit the worker. The work site will:

- Ensure PPE fits the individual employee whenever possible.
- Observe or survey users to make sure the PPE is worn and worn properly.

D. Maintenance and Inspection.

PPE must be kept in good, working condition. The work site will:

- Make sure employees inspect PPE before and after each use.
- Employees should be able to care for their PPE.
- Employees should clean all PPE after use.

- Damaged or broken PPE should be repaired or replaced.
- PPE should be stored in clean, dry air free from exposure to sunlight or contaminants.

E. Education and Training.

Employees must be trained on proper PPE use. The work site will:

- Verify all managers, supervisors, and employees have PPE training.
- Training should include the following:
  - Why PPE is necessary and what its limitations are.
  - The proper care, maintenance, useful life, and disposal of the PPE.
  - How to fit, wear, and maintain PPE.
- Before performing work requiring PPE, employees should be able to demonstrate they understand the training and can effectively use the PPE.
- Re-training will be needed when changes to the workplace necessitate different equipment or when changes to the type or design of the PPE are made.
- Re-training will also be needed when an employee shows a lack of understanding or skill to use the PPE properly.

F. Documentation.

Record-keeping is required and critical to validating program efficacy. The supervisor must document the training of each of their employees required to wear or use PPE by preparing a certification that contains the following:

- The name of each employee trained.
- The date of training.
- The subject of the training.

G. Auditing the Program.

The work site will review the program at least annually and when there are changes to tasks and/or operations. Critical areas should be reviewed more frequently or whenever there is an incident involving PPE.

6.3 Signage

Signs must be posted to warn employees and other personnel when PPE is required. Examples of the signs follow; this or similar language may be used:

- “Hearing Protection Required”
- “Safety Glasses Required”
- “Danger – Eye/Face Hazard area – Do Not Enter Without Protective Equipment”
- “Danger – Hard Hat Required Area.”

6.4 Types of PPE and Their Use

PPE is designed to protect workers from serious injuries or illnesses resulting from contact with uncontrolled hazards in their workplace. Hard hats, goggles, face shields, steel-toed shoes, respirators, aprons, gloves, and full-body suits are all forms of PPE. The following sections describe eye and face, hearing, respiratory, gloves and hand, foot, and head protection, and protective clothing.

A. Eye and Face Protection.

IA site managers, school principals, and facility supervisors must ensure their employees wear eye and face protection appropriate for the work they are performing. They also need to ensure eye and face protections properly fit or can be adjusted to provide the necessary coverage.

The eye protection selected for specific work situations depends upon the nature and extent of the hazard, exposure, other protective equipment used, and personal vision needs.

Sources of potential eye or face injuries at IA sites include the following:

- Dust, dirt, metal, or wood chips entering the eye from activities like chipping, grinding, sawing, hammering, power tools, or strong winds.
- Chemical splashes from corrosive substances, hot liquids, solvents, or other hazardous solutions.
- Objects swinging into the eye or face, such as tree limbs, chains, tools, or ropes.
- Radiant energy from welding or harmful rays from lasers.

When selecting the most suitable eye and face protection, the PPE should do the following:

- Protect against specific workplace hazards.
- Fit properly and be reasonably comfortable.
- Provide unrestricted vision and movement.
- Be durable and cleanable.

- Not interfering with any other required PPE being used.

The IA site manager, school principal, or facility supervisor may choose to provide one pair of protective eyewear for each position rather than individual eyewear for each employee. If this is done, then they must make sure employees disinfect shared protective eyewear after each use. These are some of the various types of everyday and special-purpose protective eye and face wear:

- **Safety glasses.** These protective eyeglasses have safety frames made from metal or plastic and impact-resistant lenses. They protect from flying particles, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

- **Goggles.** These are tight-fitting eye protection that completely cover the eyes, eye sockets, and the area around the eyes. They protect from impact, dust, and splashes; some will fit over corrective lenses.

- **Face shields.** These transparent sheets of plastic extend from the eyebrows to below the chin and across the employee's entire face. Some are polarized for glare protection. Face shields protect against nuisance dust and potential splashes or sprays of hazardous liquids, but do not provide adequate protection against impact hazards. A face shield should be used in combination with goggles or safety glasses to safeguard against impact and dust or splash hazards.

In addition to the general eye and face protection above, some operations or conditions have specific eye and face protection needs. The following are a few specific requirements:

1) Welding Operations

The intense light from welding operations can cause serious and sometimes permanent eye damage if employees do not wear proper eye protection. The intensity of light or radiant energy produced by welding, cutting, or brazing operations varies according to several factors, including the task producing the light, the electrode size, and the arc current.

Welding helmets protect eyes from burns caused by infrared or intense radiant light; they also protect both the eyes and face from flying sparks, metal splatter, and slag chips caused by welding, brazing, soldering, and cutting operations. The filtering lenses in welding helmets come in different degrees of darkness or shades and are numbered appropriately. OSHA requires the filtered lenses to have a shade number appropriate to the hazards of the work being performed to protect against harmful light radiation.

2) Laser Operations

Laser light radiation can be extremely dangerous to the unprotected eye, and direct or reflected beams can cause permanent eye damage. Laser retinal burns can be painless,

so it is essential all personnel in or around laser operations wear appropriate eye protection.

Laser safety goggles or glasses are specifically created to protect against intense concentrations of light produced by lasers. Laser safety goggles or glasses should provide protection for the specific wavelength of the laser used and must be of sufficient optical density for the energy involved. Safety goggles or glasses intended for use with laser beams must be labeled with the laser wavelengths for which they are intended to be used, the optical density of those wavelengths, and the visible light transmission.

3) Prescription Eyewear

Prescription glasses do not provide adequate protection against most occupational eye and face hazards, so managers and supervisors must make sure that employees with corrective lenses either wear prescription safety glasses or have non-prescription safety glasses that fit over their prescription glasses.

Where contact lenses are permitted, they must be worn with PPE appropriate for the hazard or exposure (e.g., respiratory protection, welding helmets). Safety non-prescription glasses should be available to all contact lens wearers.

B. Respiratory Protection.

When IA employees must work in oxygen-deficient environments or anywhere harmful concentrations of dust, smoke, mists, fumes, gases, vapors, sprays, or biological contaminants such as hantavirus are present, they need respirators. These hazardous environments may lead to lung irritation, lung impairment, cancer, other conditions or diseases, or worse. Like other forms of PPE, the first step in determining respiratory protection needs is to assess the hazards. Hazard assessment may require occupational exposure monitoring; for more details, see 25 IAM 3-H: Volume 2 - Occupational Health Handbook.

Whenever the decision is made to provide respiratory protection to employees, then the site, school, or facility must designate a program administrator and have a written Respiratory Protection Program (RPP). The RPP must cover the following topics:

- Respirator selection procedures
- Medical evaluations to determine if a worker is physically able to use a respirator
- Fit testing
- Maintenance and care: inspection, cleaning, and storage
- Breathing air quality and use
- Training
- Voluntary Use

These elements are discussed in more detail below:

1) Respirator Selection

There are several types of respirators that may be used in the workplace. Selecting the correct type is key to providing the right protection workers from the specific hazards present in their work duties. The following are primary respirator types used in the workplace:

- **Filtering Facepiece Respirators.** An N95 respirator is a common example of a filtering facepiece respirator. The N95 designation describes the type of filter material and the protective properties. The first part of the filter's classification uses the letters N, R, or P to indicate the filter's ability to function when exposed to oils:

  "N" means not resistant to oil

  "R" means somewhat resistant to oil

  "P" means strongly resistant to oil, or oil-proof

  The second part of the classification—the number—refers to the filter's ability to remove particles. Filters that remove at least 95% of the particles are given a 95 rating. Those that filter out at least 99% receive a 99 rating, and those that filter out at least 99.97%—essentially 100%—receive a 100 rating. For example, P100 is the most protective filtering facepiece respirator for dusts and aerosols that may have oils.

- **Air-Purifying Respirator (APR).** An APR removes contaminates from the air by passing ambient air through an air-purifying element in a filter, cartridge, or canister. These are tight fitting half-facepiece rubber or silicone respirators with replaceable filters or cartridges or canisters (for gases and vapors). They can be cleaned, decontaminated, and reused.

  There is also a full-facepiece version with better sealing characteristics that provides a higher level of protection than a half-facepiece respirator. It covers the user's eyes and face, so it can also be used to protect against liquid splashes and irritating vapors.

- **Powered Air-Purifying Respirator.** A powered air-purifying respirator is an APR that uses a blower to force the ambient air through air-purifying elements to the facemask.

- **Supplied-Air Respirator.** A supplied-air respirator is an atmosphere-supplying respirator that is sometimes called an airline respirator. They supply clean breathing air to either a hood or a facepiece through a long hose from a clean source of air such as a cylinder or compressor.

- **Self-Contained Breathing Apparatus.** A self-contained breathing apparatus (SCBA) is a type of atmosphere-supplying respirator. SCBAs have a tight-fitting,

elastomeric facepiece that covers the user's face. The air is supplied from a cylinder of compressed breathing air carried by the wearer. These respirators are truly self-contained and provide the highest level of respiratory protection. SCBAs must be inspected at least monthly. Inspections should include checking regulators and warning devices and ensuring that air and oxygen cylinders are fully charged.

Note: In situations where the environment may be immediately dangerous to life or health (IDLH), supervisors must ensure the employees entering are using supplied air respirators or SCBAs, and that one or more employees are located outside the dangerous environment ready to provide an emergency response if needed. These employees must maintain visual or voice communication with workers in the IDLH atmosphere.

2) Medical Evaluation for Respirator Wearer

Respirators can make breathing more difficult and not everyone can wear one. OSHA requires everyone who uses a respirator to be medically evaluated to ensure they can use it. The only exception is the voluntary use of a filtering facepiece (dust mask/disposable paper type dust respirator). Some conditions that could prevent someone from using a respirator include heart conditions, lung disease, and psychological conditions like claustrophobia.

Medical evaluation must be performed by a physician or other licensed health care professional. The medical evaluation should use the OSHA Respirator Medical Evaluation Questionnaire: https://www.osha.gov/sites/default/files/publications/OSHA3790.pdf. The medical evaluation determines the following:

- Whether an employee is medically able to wear the respirator.
- If the employee has any medical limitations for using the respirator.
- The need for follow-up medical evaluations.
- A statement that the employee is medically able to use a respirator on the job.

3) Fit Testing

A respirator cannot provide protection if it does not fit. The respirator must fit the individual's face properly otherwise contaminated air can leak into the facepiece.

The quality of the seal between the respirator facepiece and the individual's face is determined using a "fit test." The quality of the seal is tested using one of two types of fit tests:

- **Qualitative fit testing** uses the employees' sense of taste or smell to detect leakage into the respirator facepiece. Qualitative fit testing is normally used for filtering facepiece and half-mask respirators (those that just cover the mouth and nose).

- **Quantitative fit testing** uses a machine to measure the actual amount of leakage into the facepiece and does not rely upon the individual's sense of taste or smell. Quantitative fit testing can be used for any type of tight-fitting respirator but must be used for full-face respirators.

Fit testing must be repeated at least every 12 months to make sure that the respirator still fits. In addition to a yearly fit test, respirator wearers should verify the seal on a negative pressure respirator every time it is used with the following two brief checks:

- **A positive pressure user seal check** where the user places hands over the exhalation valve and exhales. A slight bulge of positive pressure should build up in the respirator facepiece, without evidence of outward air leakage at the seal.

- **A negative pressure user seal check** where the user places hands over the inhalation filters and inhales. A slight collapse of negative pressure should build up in the respirator facepiece, without evidence of inward air leakage through the seal.

4) Maintenance and Care

It is important to inspect all respirators for damage before and after each use. This includes the rubber or plastic parts that can deteriorate or lose pliability. The facepiece, headband, valves, connecting tube, fittings, cartridges, canisters, or filters all must be in good condition. Supervisors should also ensure respirators are maintained in a sanitary condition and stored to prevent deterioration. For example, respirators should not be stored in a paint locker or dusty environment where they will be exposed to contaminants.

5) Breathing Air Quality and Use

Breathable air or oxygen used in any supplied air respirator must be pure and must meet the requirements for medical or breathable oxygen. Breathing air must meet the requirement for OSHA-defined Grade D breathing air. Air compressor systems supplying breathing air must be tested for air purity every six months.

Compressors used for supplying air must have the necessary safety devices and alarms (e.g., carbon monoxide alarm) to prevent contaminated air from entering. Compressors must be equipped with in-line, air-purifying sorbent pads and filters to ensure breathing air quality. Air-line couplings must be incompatible with outlets for other gas systems to prevent accidental interchange of air-line respirator hoses with non-breathable gas hoses.

6) Respirator Training

Training for supervisors and employees is essential for correct respirator use, and should include the following:

- Why respirators are necessary.

- Nature of the respiratory hazard and consequences of not fitting, using, and maintaining the respirator properly.
- Reason(s) for selecting a particular type of respirator.
- Capabilities and limitations of the selected respirator.
- How to inspect, put on and remove, and check respirator seals.
- Respirator maintenance and storage requirements.
- How to use the respirator effectively in emergency situations, including when the respirator malfunctions.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of the respirator.

7) Voluntary Use

In workplaces with no hazardous exposures mandating respirators, but where employees voluntarily use filtering facepiece respirators, a written program is still necessary to prevent potential issues associated with voluntary respirator use. Supervisors must inform employees who are voluntarily using respirators to review the basic information in Appendix D of OSHA's Respiratory Protection Standard.

C. Gloves and Hand Protection.

Within IA sites and school facilities operations there are many potential hazards to employees' hands and arms. No one glove or covering can provide protection for every situation, so it is important to assess the risks for each task and select the PPE that provides specialized protection. Many types of gloves protect against a wide variety of hazards. Employees should only use gloves specifically designed for the hazards and tasks found in their workplace because gloves designed for one function may not protect against a different function even though they may appear be similar.

The following factor examples may influence protective glove selection:

- Chemical handling
- Potential for cuts to the hand or arm
- Handling coarse or abrasive material
- Vibration
- Grip requirements (dry, wet, oily)
- Thermal protection

Gloves, made from a wide variety of materials and designed for many types of workplace hazards, include the following:

- **Cotton and fabric gloves.** Keep hands clean and protect against abrasions but may not be strong enough to handle work with rough or sharp materials.

- **Coated fabric gloves.** Provide moderate protection against some chemicals. They can be used in laboratory work provided they are tough enough to protect against the specific chemical being handled.

- **Rubber, plastic, or synthetic gloves.** Can be used when cleaning or working with oils, solvents, and other chemicals.

- **Insulating rubber gloves.** Will provide protection while working on live electrical circuits.

- **Leather gloves.** Used when there is a risk of cuts and abrasions and for welding operations because the leather resists sparks and moderate heat.

- **Aluminized gloves.** Provide reflective and insulating protection and are recommended for welding, furnace, and foundry work.

- **Kevlar gloves.** Provide a wide variety of industrial applications because they are cut- and abrasion-resistant and provide protection against both heat and cold.

- **Chemical/liquid-resistant gloves.** Come in several types to protect against specific chemicals:
  - **Butyl rubber gloves—**nitric acid, sulfuric acid, hydrochloric acid, and peroxide.
  - **Neoprene gloves—**hydraulic fluids, gasoline, alcohols, and organic acids.
  - **Nitrile rubber gloves—**chlorinated solvents.

- **Natural latex/rubber gloves.** Natural latex gloves are chemical resistant and comfortable to wear, which makes them a popular, general-purpose glove. They also resist abrasions caused by grinding and polishing, and protect employees' hands from acids, alkalis, salts, and ketones. Latex gloves have caused allergic reactions in some individuals and may not be appropriate for everyone.

Gloves should be inspected before each use to ensure they are not torn, punctured, or could be ineffective. A visual inspection should detect cuts or tears but a more thorough inspection by filling the gloves with water and tightly rolling the cuff toward the fingers will help reveal any pinhole leaks. Gloves that are discolored or stiff may also indicate excessive use or degradation from environmental or chemical exposure.

D. Foot and Electrical Protection.

IA site managers, school principals, and facility supervisors must ensure employees who risk foot and leg injuries are provided and use PPE.

Employees should have protective clothing and footwear in situations where injuries to the leg or foot are possible from falling or rolling objects; crushing, cutting, or penetrating materials; or where a worker's feet are exposed to electrical hazards.

Employees whose work involves exposure to heat, hot substances, corrosive, or poisonous materials must have protective gear to cover their exposed body parts, including their legs and feet.

Where IA, BIA, or BIE employees use chain saws, they should have cut resistant leg protection (e.g., chaps) and footwear.

If employees are working around live electrical equipment, their PPE should include non-conductive footwear. Non-conductive safety shoes will prevent the wearer's feet from completing an electrical circuit to the ground. These shoes are rated to protect against open circuits of up to 600 volts in dry conditions.

The insulating protection of non-conductive safety shoes may be compromised if the shoes become wet, the soles are worn through, metal particles become embedded in the sole or heel, or workers are in contact with conductive, grounded items.

On the other hand, static electricity may make using conductive footwear necessary. Static electricity can be an issue around sensitive electronic equipment, grain operations, blasting operations, and locations that may have flammable or explosive vapors present such as fueling vehicles and aircraft.

Examples of PPE for feet and legs include the following:

- **Pants, chaps, or leggings** protect the lower leg from heat hazards, welding sparks, cuts, and abrasion.

- **Metatarsal guards** protect the instep area from impact and compression. These guards may be strapped to the outside of the shoes.

- **Toe guards** fit over the toes of regular shoes to protect the toes from impact and compression hazards.

- **Combination foot and shin guards** protect the lower legs and feet and may be used in combination with toe guards when greater protection is needed.

- **Safety shoes** have a safety toe and may have puncture-resistant soles. Some shoes may also be constructed with insulated soles that protect the feet against hot work surfaces common in roofing, paving, and hot metal working.

F. Head Protection.

Protecting employees from head injuries should be a key element of any site, school, or facility safety program. Wearing a hard hat, safety helmet, or bump cap is one of the easiest ways to protect an employee's head from injury.

There are many types of hard hats, safety helmets, and bump caps available. IA site managers, school principals, and facility supervisors need to ensure that the protective head gear they provide is used by employees to protect themselves against potential workplace hazards.

The ANSI standard separates protective head gear into the following types:

- **Hard hats,** referred to as a Type I helmet by ANSI, provide protection for the top of the head only and are the type most typically provided. They have a hard outer shell and a shock absorbing suspension system. Hard hats can protect employees from impact and penetration hazards as well as from electrical shock and burn hazards.

- **Safety helmets,** referred to as a Type II helmet by ANSI, are more protective and protects against impacts to the top of the head and blows to the side of the head. This type of helmet is frequently used by workers in hazardous situations, by workers who climb, and by rescue workers. These helmets frequently include chin straps to prevent them from falling off. These helmets are more expensive than the Type I helmets and not as frequently provided.

- **Bump caps** protect workers from minor impacts. They are not a substitute for a hard hat; however, they can be worn when hard hats are not required but employees want protection from head bumps. Bump caps are not ANSI-approved or recognized by OSHA as occupational safety head protection.

ANSI separates helmets into the following classes:

- **Class G (formerly Class A)** provides impact and penetration protection and limited electrical protection (up to 2,200 volts). These are commonly used when overhead hazards are present with potential contact for low-voltage electrical wires (present in most office and residential buildings).

- **Class E (formerly Class B)** provides the highest level of protection against electrical hazards, with high voltage shock and burn protection up to 20,000 volts. These helmets also provide impact and penetration protection from falling objects.

- **Class C** provides lightweight comfort and impact protection but offers no protection from electrical hazards.

It is essential to check the type of hard hat employees are using to ensure the equipment provides appropriate protection. Each hat should bear a label inside the shell listing the manufacturer, the ANSI designation, and the class of the hat.

Protective headgear must fit the wearer appropriately. Most protective headgear comes in a variety of sizes with adjustable headbands to ensure a proper fit. A proper fit should allow sufficient clearance between the shell and the suspension system for ventilation and distribution of an impact. The hat should not bind, slip, fall off, or irritate the skin.

Some protective headgear accommodates accessories to help employees deal with changing environmental conditions, such as slots for earmuffs, safety glasses, face shields, and mounted lights. Optional brims may provide additional protection from the sun, and some hats have channels that guide rainwater away from the face. If they are used by employees, headgear accessories must not compromise the safety elements of the helmet.

Hard hats have a life span of three to five years from the date of manufacture. Mine Safety Appliances, 3M, and JSP hard hats all have a 5-year life span; most other manufacturers only have a 3-year life span. The date of manufacture is molded inside the helmet, usually on the underside of the brim.

Paints, paint thinners, and some cleaning agents can weaken the shells of hard hats and may eliminate electrical resistance. Also, protective headgear should not be stored in direct sunlight, such as on the rear window shelf of a car because sunlight and extreme heat can damage them.

A daily inspection of the hard hat shell, suspension system, and other accessories for issues that might compromise the protective value of the hat is essential. If any of the following defects are found during inspections, the hard hat should be removed from service and replaced:

- Holes, cracks, tears, or other damage.
- Perforations or deformity of the brim or shell.
- Loss of surface gloss, including chalking and flaking, which indicates exposure to heat, chemicals, or ultraviolet light and other radiation.

G. Protective Clothing.

Protective clothing, such as suits, aprons, coveralls, coats, and pants, should be available to employees when they could be exposed to body hazards. While there are no specific OSHA standards for body protection, 29 CFR 1910.132 states that protective clothing should be used when appropriate.

Conditions typically discovered during worksite assessments that require protective clothing include:

- Exposure to sharp knives or power cutting tools (e.g., chainsaw)
- Potential impacts from tools, machinery, and materials
- Contact with intense heat (e.g., steam, sparks, molten metal)
- Contact with pesticides and other hazardous chemicals

- Contact with infectious materials, including blood and body fluids
- Contact with rough or abrasive surfaces
- Using off road equipment such as all-terrain vehicles, utility terrain vehicles, and off-highway vehicles

A worksite hazard assessment may indicate the need for clothing to protect against hazardous conditions. If so, the PPE clothing selected must protect against the identified hazard.

Once provided, IA managers and supervisors must ensure their employees wear PPE for the parts of their body exposed to possible injury. The PPE must fit each worker properly, function well for the purpose for which it is intended and be carefully inspected before each use. Examples of body protection include laboratory coats, coveralls, vests, jackets, aprons, and full-body hazardous material suits.

Many different materials are available for protective clothing, such as:

- **Paper-like fiber** used for disposable suits provide protection against dust and splashes.
- **Duck** is a tightly woven cotton fabric that protects against cuts and bruises when handling heavy, sharp, or rough materials. Cotton or duck fabrics can also be treated for flame resistance.
- **Rubber, rubberized fabrics, neoprene, and plastics** protect against bloodborne, chemical, and physical hazards.
- **Leather** is often used to protect against abrasion, impact, dry heat, and flames.
- **Treated wool or cotton** adapts well to changing temperatures, is comfortable, fire-resistant, and protects against dust, abrasions, and rough or irritating surfaces.
- **Flame-retardant and heatresistant** synthetic fabrics protect against flames and dry heat.
- **Tyvek or Nomex suits** provide minimal protection for chemical hazards, flame, and heat protection.

Chapter 7: Material Handling and Storage

This chapter provides information and guidance to IA managers, supervisors, and employees on how to safely handle and store materials and equipment.

7.1 Manual Material Handling (MMH) Procedures

MMH involves lifting objects that may be light, awkward, heavy, large, or small. Employees frequently lift things without injury because they know what they can and cannot handle. Even so, safe lifting should be a part of every site, school, or facility safety program.

Normally, an employee can lift and carry a maximum of 50 pounds using proper lifting and carrying techniques. Workplace factors may reduce this recommended weight limit (RWL) and should be considered before attempting heavy lifts. Examples of factors that may limit a lift include:

- Physical size of an object
- Slippery container surface or poor grip ability
- Sharp edges
- Slippery floors or obstacles on the floor
- Stairways or ramps
- Distance and route of travel

An individual's "safe" MMH capability is defined as their capability to manually lift, carry, push, or pull an object alone. An employee's safe MMH capability will be at or below the RWL.

In some cases, a trained and physically conditioned employee may exceed the MMH capability limit, which should only be allowed after a complete hazard review of the task has determined an acceptable risk for minimizing injury.

A. Preparing for MMH.

Where MMH will be a necessary function of the task, the BIA RSM, BIE SPM, site manager, school principal, facility supervisor, or CDSO should thoroughly evaluate the activities to determine ergonomic solutions that will reduce or eliminate conditions that could cause or contribute to MMH injuries. Management should work in collaboration with workers to ensure solutions are acceptable and practical.

Before handling any object of significant size or weight, an employee must evaluate it to determine whether they can handle it safely. If there is any doubt about whether the employee can safely move the object alone, then either a mechanical device or extra help should be used. Before any manual lift, employees should warm up their back, leg muscles, and joints using a combination of stretching and flexing.

The safest transport route should be determined before beginning the activity. Workers should check the area around the object and the route over which it will be transported for slip, trip, and fall hazards, and remove hazards before moving the object.

Additionally, workers should identify safe grasping or handling points on the object; using containers with handles whenever possible provides better control and reduced muscle fatigue. Workers should also inspect the object for grasping or handling hazards (e.g., slivers, sharp edges, grease, or water), and remove hazards before the object is moved.

The distance to be traveled and the length of grip time for handling the object should be considered. If the travel distance is greater than 10 feet at maximum RWL, the employee should consider using an alternative method rather than manually carrying the object.

B. Lifting and Lowering Guidelines.

The recommended technique for manual lifting or lowering by one person using two hands involves the following maneuvers:

1) Make a trial lift to be sure the load can be handled safely.

2) Get a firm footing. Keep feet apart for a stable base with one foot slightly in front of the other.

3) Assume a crouching position close to the object.

4) Bend legs at the knees. Do not bend at the waist.

5) The employee should have a firm, two-handed grip on the object before lifting or lowering.
   - Do not change grips on an object while carrying or holding an object. Rest the object on a secure surface before changing grip.

6) Keep the back as straight as possible without arching. Leg and arm muscles should do the work.

7) Lift by straightening the legs. Lift or lower the load slowly and in a straight line, avoiding sudden movements.

8) Keep the load close to the body. Generally, the closer the load is to the body, the less force it exerts on the back.

9) Keep back straight, head and shoulders up, and stomach muscles tight.

10) Avoid twisting. Shift feet to turn body.

11) To shift the load to shoulder height or higher, rest object on a level surface, shift hands, and boost. Never lift objects above your head.

12) Allow for the fatiguing effects of stairs and ramps.
   - Avoid carrying objects on stairs, particularly where the line of sight may be obstructed, or the object can interfere with leg movement. All travel on stairs requires holding the handrail, so only carry objects that can be safely handled with one hand.

13) Avoid bruising or crushing hands and arms in narrow passageways.

14) Avoid manually carrying objects so large they will obstruct visibility.

15) Lower the object in the same manner in which it was raised and keep fingers clear when placing the object.

The recommended technique for manual lifting and lowering ***by two or more people*** involves the following maneuvers:

- Select people of similar size and strength.
- Two-person lifts should be planned and coordinated before performing the lift.
- Lift the object in unison.
- Carry long objects such as ladders, pipes, and lumber on the shoulders on the same side and walk in step.
- Handle packed articles in boxes by grasping them at opposite top and bottom corners. Grasp stacked material by opposite corners.
- Upending full drums is a two-person job. When rolling a drum, push hands on the center of the barrel. Snub drums with safety ropes or other tackle on inclines or skids.
- Provide help for handling odd-shaped objects if combination of irregularities and weight makes them too hazardous for one person.

C. Pushing and Pulling Guidelines.

Beyond lifting, MMH also involves transporting objects by pushing or pulling. Workers should:

- Check the condition of the floor, ground, or other surface before pushing or pulling an object across it.
- Be aware of the "break out" force of the object—this is the force at which a push or pull overcomes the frictional force between the surface and object. Adjust posture to avoid losing balance when this point is reached.
- Get assistance when moving or guiding a large load.
- Where possible, always push rather than pull a load.
- Never load a cart or load-carrying device that obstructs path of travel visibility.
- When pushing or pulling an object on an inclined surface, be certain that the load and direction of travel can be controlled before proceeding; get help if you need it.
- Never leave carts or loads in an area that will cause a hazard to other workers.

- Make sure carts or transport devices are secured in position before leaving them unattended.

7.2 Lifting Equipment – Hand Tools

The worksite should have a wide range of hand tools, hooks, crowbars, cribbing, rollers, blocks and tackle, sling, jacks, chain hoists, hand trucks, and dollies to safely handle objects, materials, and equipment. All hand tools and equipment should be inspected frequently to ensure they are safe to use.

Toolboxes used to carry loose tools in vehicles should be bolted down. Materials should be securely fastened so they do not fall out of the vehicle or shift and strike occupants in case of a vehicle accident.

7.3 Storage Design in the Workplace

Heavy or bulky materials should be stored at heights between the knee and shoulder to avoid stretching or bending, and step stools should be used to access objects above shoulder height.

Additionally, items should be arranged or packed to be lifted to avoid the shifting of weight in the package. If a box has hand cutouts, do not load the box so full that the handles cannot be used for carrying the box.
Work areas should be laid out to avoid the need to lift, carry, push, or pull heavy or bulky materials for extended distances.

Workplaces should be designed and planned for the following:

- Avoid lifting from the floor.
- Never twist the torso while handling loads.
- Avoid asymmetrical or unbalanced one-handed lifts.
- Never lift loads with sudden movements.
- Never lift loads over obstacles.
- Never lift loads using extended forward or sideway reaches.
- Uncomfortable or static postures should not be necessary throughout the work cycle.
- Consider environmental factors (e.g., task lighting, dry work surfaces, heat, or cold stress).

7.4 Material Storage in the Workplace

The maximum safe loads for all floors in pounds per square foot should be posted. Similarly, the maximum safe load for all shelving used for storage must be posted.

Stack, rack, block, interlock, or otherwise secure all materials to be stored in tiers to prevent sliding, falling, or collapse.

Aisles, passageways, and other access should always be kept clear to provide free and safe movement of material handling equipment or employees. All permanent aisles should be clearly marked.

Loads should not be lifted or swung over employees' heads, and employees are not permitted to walk under a suspended load. Everyone should wear hard hats in areas where overhead loads or hazards exist.

Some materials have unique hazards, and specific considerations are provided in the following sections.

A. Cement and Lime Storage.

Employees who will be handling cement or lime should be warned about the possibility of chemical burns, and be required to wear goggles, gloves, and protective clothing while handling such items.

Bags of cement and lime stacked more than 10 bags high should have restraining walls of appropriate strength to prevent their collapsing and injuring someone. Lime must be stored in such a way as to prevent a premature slaking action that may cause a fire.

During un-stacking, the entire top of the stack should be kept nearly level to prevent spillage and employee exposure to the contents.

B. Bricks and Block Storage and Lumber Storage.

Brick stacks must not exceed seven feet and should be tapered back starting at four feet. Bricks should always be staked on planks, asphalt, or concrete and never on uneven or soft surfaces. Blocks should be stacked in tiers on solid, level surfaces and taper back over the six-foot level.

Lumber must not be stacked more than 16 feet high, and cross strips should be placed on stacks more than four feet high. Lumber should be stacked on level and solidly supported sills to be stable and self-supporting. All nails should be removed from lumber before stacking unless the lumber is to be hauled away without further handling.

C. Reinforcing and Structural Steel Storage and Foundation Bolt Storage.

Steel rods should be stored in separate stacks according to length and size, and structural steel should be carefully stacked to prevent the danger of pieces sliding off or the stack toppling over. "I" beams should never be stored with the webs vertical.

Flat and corrugated sheet metal should be stacked flat with spacing strips between the bundles and not more than four feet high.

Bolts should be stacked in separate stacks according to length and size.

D. Pipes, Poles, and other Cylindrical Material Storage.

Cylindrical materials should be stacked and blocked in such a way as to keep the material from spreading or toppling. Pipes should not be stacked higher than five feet unless racked. When removing pipe or other material larger than two inches in diameter from storage, employees should be instructed to approach the stack from the ends, not from the sides.

E. Sand, Gravel, and Crushed Stone Storage.

When storing bagged material and masonry products, cross-binding and step back methods should be used. When removing sand, gravel, and crushed stone from stockpiles, there should be no overhanging or vertical faces at any time.

Materials should not be stored by being dumped against walls or partitions to a height that will endanger the stability or exceed the resisting strength of the walls and partitions.

7.5 Storage Yards

Storage yards are common in IA workplaces where raw materials, equipment, parts, and other objects are too large or numerous to store in indoor cabinets/lockers. The following are general safe work practices in and around storage yards:

- Yards used for storing materials, vehicles, and equipment should be level and well-drained. Storage yards should also be fenced with an eight-foot high, vandal-proof fence.

- Roadways and walkways should be provided to safely move employees, vehicles, lifts, and cranes.

- Fire extinguishers (see also Chapter 25 of this handbook) should be provided and maintained by the work site.

- Five-to-eight-foot corridors should be constructed both inside and outside of the perimeter fence to facilitate fire control and keep out rodents and snakes.

- The storage yard should be kept free of vegetation, debris, and rubbish, as well as surplus materials and obsolete equipment.

- Cribbing should be used to prevent stored materials from directly contacting the ground. Dunnage should not be used because it may inhibit bottom ventilation.

- Tarpaulins should be used on the top of stored materials to protect them from weather and sun damage.

- Heavy pieces and palletized material should be arranged in a manner that will allow for mechanical handling.

- Round objects should be blocked or nested to prevent rolling. If drums and kegs are piled on end, planks should be used between layers.

- Reinforcing steel and small diameter pipe should be stored on racks.

- Loading docks and hand trucks should be used for moving heavy and bulky items.

- Flammable storage areas should have signs designating them as “No Smoking” areas.

- Liquid storage areas should be diked to protect the yard from contamination by spilled liquid materials.

7.6 Warehouse Storage

Materials should be stored in warehouses at safe distances from heating devices such as stoves, steam pipes, heating ducts, and radiators. General storage rules are as follows:

- Materials should be sorted according to their degree of hazard and stored in separate areas.

- Materials should not be stored near fire sprinklers.

- Do not load storage bins beyond safe capacity.

- Do not allow stored materials to exceed safe floor loads.
- Keep areas around warehouses and other buildings free of dry grass, vegetation, and debris.

- Take adequate fire prevention measures to prevent loss or damage of stored materials.

- Provide metal containers with tight fitting covers for disposing of waste packing materials and rubbish.

- Provide adequate lighting for storage and warehouse operations.

Additionally, on all floors and in aisleways, adequate space should be provided for handling heavy or bulky bounded, stacked, or racked materials.

Storage should be planned so that lifting and handling can occur safely, and items are prevented from toppling. Floors should be kept clean and in good repair also.

A. Compressed Gas Cylinder Storage.

Compressed gas cylinders can be hazardous due to the amount of pressure and weight the cylinders carry. Workers should:

- Store compressed gas cylinders in cool, dry, well-ventilated areas with the valves tightly closed and the protective caps in place.

- Store compressed gas cylinders upright and fasten securely.

- Sort and store compressed gas cylinders according to their compatibly (for example, oxygen and acetylene must be stored separately).

- Separate full and empty cylinders.

B. Corrosive and Toxic Liquid Storage.

Corrosive and toxic liquids should be stored in a cool, dry, well-ventilated, and isolated place. Additionally, corrosive and toxic liquids should be stored on concrete floors treated to reduce solubility.

C. Flammable Material Storage.

Flammable liquids, paints, and oils should be stored in approved containers equipped with tight-fitting closures and should be separated from other items.

Metal storage cabinets and safety containers for even small quantities of flammable liquids should be used and good ventilation provided. Smoking should be prohibited in areas in which flammable liquids are stored or handled, and appropriate signage placed in the area (i.e., "No Smoking" signs).

7.7 Training on MMH

Employees who may have MMH as part of their duties are required to receive training that includes the following topics. This training must be completed before an employee is assigned a task that involves MMH activities.

- Instructing employees in proper lifting techniques.

- Showing employees how to avoid unnecessary physical stress and strain during MMH operations.

- Teaching employees to comfortably handle materials without undue strain.

- Instructing employees on the proper use of equipment.

- Teaching employees to recognize potential hazards and how to prevent or correct them.

7.8 Retaining U.S. Department of Transportation (DOT) Markings, Placards, and Labels

Any IA personnel receiving containers of hazardous materials that are required to be marked, placarded, or labeled will retain those markings, placards, and labels on the package.

A. Chemical Label Information.

OSHA has updated the Hazard Communication Standard (HCS) labeling requirements for hazardous chemicals. Labels are required to have a signal word (such as “danger” or “warning”), hazard and precautionary statements, the product identifier, supplier identification, and pictograms.

The hazard pictograms on the label provide a visual warning of the chemical’s hazards.

Pictograms also include a symbol plus other graphic elements that convey specific information about the chemical hazards.

B. Shipping Container Labels.

Chemical manufacturers, importers, and distributors are required to have HCS-compliant labels on their products when they leave their facilities. These labels provide basic information for transportation or warehouse workers who may become exposed if there is a spill, release, or other emergency. IA managers and supervisors must maintain the labels on the chemical containers, including tanks, totes, and drums, while the containers are on IA site, school, or facility property.

C. Small Chemical Containers.

Small commercial chemical containers commonly found in the workplace must also be labeled. The labels should at least include the product identifier and general information concerning the hazards of the chemical with one exception—what OSHA terms “small quantities.” Small quantities of chemicals intended for immediate use may be carried in a container without a label if it does not leave the user’s possession, is used up by the end of the shift, or is properly disposed of by the end of the day.

Chapter 8: Machinery and Machine Guarding

Any moving machine parts can create hazards which require guarding to protect employees. Every IA, BIA, and BIE location with machines should have a process in place to ensure that machines and equipment have guarding systems to eliminate or control employee exposure to hazards. This chapter covers various types of machines and equipment that require guarding such as saws, large power tools, mechanical equipment, and conveyor systems.

8.1 Machine Guarding Procedures

The following sections describe the procedures required for guarding against injury or accidents from machinery.

A. General Guarding Requirements.

The point-of-operation where an employee is exposed to injury requires guarding. Guards must be constructed so that they prevent the operator from placing any part of their body in the "danger zone" during the operating cycle. General requirements for all machine and equipment guards include:

- **Prevent contact.** The safeguard must prevent an employee's hands, arms, or other body parts from contacting dangerous moving parts.

- **Be secure.** Safeguards should withstand normal use, remain firmly secured to the machine, and should not be easily removed or tampered with by employees.

- **Protect from falling objects.** The safeguards should ensure that nothing can fall into the moving parts of the machine.

- **Create no new hazards.** The safeguards used should not create additional hazards.

- **Create no interference.** The safeguards should not impede a worker from performing the job quickly and comfortably.

- **Allow safe routine maintenance.** The safeguards should allow for routine maintenance.

As with other workplace hazards, machine moving parts hazards should be controlled using the "hierarchy of controls". The three types of controls below are listed in order of effectiveness:

1) **Engineering Controls**

   Engineering controls protect employees by removing hazardous conditions or by placing a barrier between the worker and the hazard. They do not rely on the worker's behavior for their effectiveness and eliminate the hazardous exposure at the source. Engineering controls offer the best and most reliable means of safeguarding employees and should always be the first choice for eliminating machine hazards. Examples include:

   - Local exhaust ventilation to capture and remove airborne emissions.
   - Machine guards to shield the worker.

2) **Work Practices**

   Work practices control hazards by altering how work is done or by substituting a less hazardous material, machine, or process. Safe work practices that help prevent injuries associated with machinery include:

   - Avoid loose clothing or jewelry and tie up hair to prevent it from becoming entangled in moving parts.

   - Use push sticks for pushing material into the point-of-operation.

- Ensure the machine is unplugged, locked, or tagged out before removing guards for cleaning or maintenance.

- Signs and floor markings can remind workers which areas they are prohibited from entering.

3) Administrative Controls

Administrative controls are changes to routine that reduce the duration, frequency, and severity of an employee's exposure to hazardous machine operations. These include:

- **Training.** Workers should be trained to identify hazards, monitor hazard exposure, and understand safe procedures for working around the hazard.

- **Procedures.** Steps in a job process could be rearranged to keep the employee form being exposed to the hazard.

- **Maintenance.** Preventive maintenance will help keep everything running safely and address any equipment issues before they become a problem.

- **Housekeeping.** Keeping the worksite clean and clutter-free helps reduce the risk of injury and can minimize the severity of an accident.

B. Guard Types.

There are four types of guards covered in this section:

- Guards
- Safety devices
- Feeding and ejection methods
- Miscellaneous aids

1) Guards

Guards are barriers which prevent access to danger areas and include:

- **Fixed Guards.** Fixed guards are a permanent part of the machine. They are not dependent upon moving parts to perform their intended function. They may be constructed of sheet metal, screen, bars, plastic, or any other material that is substantial enough to withstand whatever impact it may receive and to endure prolonged use. This type of guard is preferable to other types because of its simplicity and permanence.

- **Interlocked Guard.** When this type of guard is opened or removed, a tripping mechanism and/or power automatically shuts off and the machine cannot run until the guard is back in place. An interlocked guard may be electrical, mechanical, hydraulic, pneumatic, or any combination of these.

- **Adjustable Guard.** Adjustable guards are useful because they accommodate various sizes of stock. They provide a barrier that may be adjusted to a variety of production operations. During production they may require frequent adjustment and could potentially be moved out of the way by the operator.

- **Self-Adjusting Guard.** As the operator moves the material into the danger area, the guard is pushed away, providing an opening which is only large enough to admit the material. After the material is removed, the guard returns to its original position. These guards may be constructed of plastic, metal, or other materials and offer varying degrees of protection.

- **Safeguarding by Location/Distance.** Safeguarding by location/distance means locating the dangerous moving parts of machinery where they do not present a hazard to the operator or to employees in the vicinity. This can be done by positioning the hazardous operations against a wall, within an enclosure, or high enough (seven feet or more) to be out of reach by any worker.

Machine manufacturers provide point-of-operation and power transmission guards as standard equipment. Point-of-operation guards safeguard the operator while allowing the work to continue with minimum disruption to the production process. Power transmission guards cover the moving parts that transmit power keeping employees from contacting them.

User-built guards are sometimes necessary. Often, with older machinery, they are the only practical guarding solution. They can be designed and built to fit unique situations; however, user-built guards have the disadvantage of sometimes being poorly designed and constructed.

2) Safety Devices

A safety device may perform one of several functions:

- Stop the machine if a hand or any part of the employee's body is inadvertently placed in the danger area.

- Restrain or withdraw the operator's hands from the danger area during operation.

- Require the operator to use both hands on the machine controls, thus keeping both hands and body out of danger.

- Provide a barrier which is synchronized with the operating cycle of the machine to prevent entry into the danger area during the hazardous part of the cycle.

Devices fall into five categories:

1. **Presence-Sensing.** Presence-sensing devices use light, radiofrequency, or electrical mechanical operation to interrupt the machine's operating cycle. If the light or radio field is broken, the machine stops. If a mechanical contact bar cannot descend, the machine is prevented from operating.

2. **Pullback.** Pullback devices have cables attached to the operator's hands, wrists, and/or arms. When the slide/ram is up between cycles, the operator is allowed access to the point-of-operation. When the slide/ram begins to cycle by starting its descent, a mechanical linkage automatically pulls the operator's hands away from the point-of-operation.

3. **Restraint.** The restraint device uses cables or straps attached to the operator's hands at a fixed distance. The cables or straps are adjusted to let the operator's hands travel within a predetermined safe area. There is no extending or retracting action involved so hand-feeding tools are often necessary if the operation involves placing material into the danger area.

4. **Safety Trip Controls.** Safety trip controls provide a quick means for deactivating the machine in an emergency. They can be a pressure sensitive bar or safety tripwires activated by the operator in an emergency. Safety trip controls also include two-hand controls which require constant pressure by both the operator's hands to activate the machine.

5. **Gates.** A gate is a movable barrier that protects the operator. The gate must be closed before the machine cycle can be started.

3) Feeding and Ejection Methods

Feeding material into a machine and ejecting it out of the machine should not require the operator to be in the danger area. There are feeding and ejection methods that provide protections for the operator that include:

- **Automatic feed.** Automatic material feeds do not require any effort by the operator after the machine is set up and running, which reduces the operator's exposure during the work process.

- **Semiautomatic feed.** Semiautomatic feeding requires the operator to use a mechanism to place the piece being processed.

- **Automatic ejection.** Automatic ejection removes the completed part from the machine without operator assistance.

- **Semiautomatic ejection.** The completed pieces are ejected by mechanical means that is initiated by the operator.

4) Machinery Aids

Machinery Aids provide the operator with an extra margin of safety but do not give complete protection from machine hazards. Examples of machinery aids include:

- **Awareness Barrier.** An awareness barrier does not provide physical protection but reminds employees that they are approaching a danger area. A rope may be used as an awareness barrier to alert employees that they are approaching a hazardous area.

- **Protective Shields.** Protective shields do not give complete protection from machine hazards, but do provide some protection from flying particles, splashing cutting oils, or coolants.

- **Special Hand Tools.** Special hand tools may be used to place or remove material from the point-of-operation of a machine. Hand tools are not an alternative to machine safeguards; they are merely a supplement to the protection the guards provide.

C. Specific Equipment, Tool, and Machinery Guarding.

Guarding must be provided to protect machine operators from hazards such as pinch-points, point-of-operation, in-running nip points, rotating parts, flying chips, and sparks.

1) Woodworking Machinery

The requirements for woodworking machines in IA sites, schools, and facilities are as follows:

- Mechanical or electrical power controls that the operators can turn off without leaving their position at the point-of-operation must be provided for each machine.

- Woodworking machinery must have devices to prevent their automatic restarting after a power failure.

- Table saws must have a hood over the portion of the saw that is above the table. The hood must automatically adjust itself to the thickness of, and remain in contact with, the material being cut.

- Table saws used for ripping must have non-kickback fingers or dogs.

- All swing or cut-off saws must be provided with a hood that completely encloses the upper half of the saw.

- Limit stops must be provided to prevent swing or cut-off saws from extending beyond the front or back edges of the table.

- Inverted sawing or swing cut-off saws must have a hood that covers the part of the saw that protrudes above the top of the table, or the material being cut.

- The hood must completely enclose the upper portion of the blade and the end of the saw arbor.

- The sides of the lower exposed portion of the blade must be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock and will remain in contact with the stock being cut.

- All bandsaws and band resaws require safety devices.

- All portions of the saw blade must be enclosed or guarded, except for the working portion of the blade between the bottom of the guide rolls and the table.

- Guarding is required for the blades, chains, or other exposed hazardous parts on ripsaws, crosscut saws and circular saws, jointers, tenoning machines, shapers, planers, boring equipment, sanders, lathes, cutters, and similar machinery used in woodworking.

- Fixed machinery must be anchored and secured to prevent walking or movement during operation.

2) Specialized Machinery

i. Abrasive Wheel Requirements

An abrasive wheel is made up of individual particles that are bonded together to form a wheel. An improperly mounted or misused wheel can literally explode causing serious or fatal injury to the operator.

Immediately before mounting a new wheel:

- Inspect a wheel and sound it (ring test) by striking the wheel and listening for any abnormal sounds. This is done to ensure that the new wheel has not been damaged.

- Check the spindle speed of the machine to be certain that it does not exceed the maximum operating speed marked on the wheel.

- Make sure the manufacturer's instructions are followed to properly mount the wheel.

After mounting the wheel:

- Make sure the machine guards are in place.
- Adjust the tongue guard to less than 1/4-inch from the wheel.
- Adjust the work rest to less than 1/8-inch from the wheel.

When starting a wheel, stand to the side until the wheel is up to speed.

ii. Robotics

Robots perform work usually done by an employee. Replacing the operator with a robot removes the employee from the danger area. Robots are suitable for high hazard repetitive operations where high stress factors are present such as heat and noise; however, they can be a hazard themselves.

Robot-related incidents do not normally occur during operations, but rather during programming, maintenance, repair, testing, setup, or adjustment.

During these activities, the operator, programmer, or maintenance worker may be within the robot's working envelope where unintended movements could result in injury. Hazards include colliding with equipment, being crushed, or being trapped by equipment.

Robots must be guarded in the same way remotely controlled machines are guarded. This is usually done through the installation of perimeter guarding with interlocked gates.

D. Servicing and Maintenance.

Preventative maintenance is usually all that is needed to keep machines running smoothly. However, even with the best maintenance, things fail. When they fail, the hazards associated with their operation often create dangers during teardown for servicing and maintenance employees.

Employees who perform service or maintenance (including repair, lubrication, clearing jammed parts or materials, and tool changes) must be trained and knowledgeable about the equipment, the guards, and the hazards of the maintenance tasks.

Servicing and maintenance employees should be communicating with machine operators to learn about potential trouble spots before they become failures. Any machine with a condition that impairs its safe operation should be placed "out of service" until repairs are made.

Servicing and maintenance employees should be provided with appropriate protective equipment and tools (dogs, tongs, placement boards, etc.).

Whenever safeguards must be removed for machine servicing or maintenance, it is IA policy that the lockout procedures be followed (Chapter 17). It is also IA policy that the safeguards be replaced before the job is considered finished and the machine released from lockout.

E. Machine Ergonomics.

Machine ergonomics are significant for the safety of the operator. Poor ergonomic working conditions contribute to worker fatigue which, when working around machines doing repetitive tasks, contributes to injuries.

There may be opportunities to change the way work is being done and to ease the stress on the operator's body. This could include raising the operator's position to a comfortable height so that they are not reaching, reducing the need for repetitive bending or twisting, easing the force necessary to open a valve, and other things related to working on machinery.

Some of the operator's issues may also be solved by providing customizable work platforms, changing the tools that are being used (such as using a longer-handled tool) or changing the process altogether. In some instances, it could be a matter of training the operator to maintain correct body position or periodically changing the operator's task.

F. Written Procedures.

Written procedures should be developed by the site, school, or facility, and implemented for all machines, tools, and equipment that requires guarding. The procedures should include:

- Type of machine
- Type of guards
- Uses
- Reason for guards
- Inspection requirements
- Preventive maintenance requirements (including any lockout/tagout requirements for service or maintenance)
- Specific steps for maintenance and service
- Regularly serviced and maintained equipment will include the time intervals for services in the procedure

Non-routine tasks are tasks that are not normally performed at the worksite. Non-routine tasks should have specific written procedures in place before the activity takes place. The procedures should include:

- An evaluation of the anticipated hazards
- The use of machine guards
- Tools
- Protective equipment to reduce or eliminate any hazards that are anticipated

- Emergency shutdown procedures

G. Inspections.

Guards must be inspected regularly. It is recommended that inspections take place before each shift for equipment in constant use, and before each use for intermittently used equipment, to ensure guards are in good operating condition.

Each piece of machinery or equipment should be reviewed for guarding requirements when they are purchased, installed, or undergo significant changes to their structure or use. Documentation of equipment inspections and reviews should be maintained for the life of the equipment.

H. Operator Training.

Machine and equipment guarding systems may not be effective unless the employee knows why and how to use them. Operator training is important and should include instruction and coaching in the following:

- The hazards associated with individual machines
- How safeguards provide protection
- How to use the safeguards
- When can safeguards be removed, and by whom
- What to do if safeguards are damaged, missing, or unable to provide adequate protection

Training is necessary for new operators, when any new or altered safeguards are put in service, or when employees are assigned to a new machine or operation.

Chapter 9: Electrical Safety

This chapter provides information and guidance for IA managers and supervisors about processes to protect employees from electrical hazards that can cause burns, shocks, and electrocution. IA, BIA, and BIE sites, schools, and facilities should have an Electrical Safety Program in place to protect employees from electrical hazards.

Electricity has an understated capacity to cause injury. Therefore, safety-related work practices such as designing electrical systems, using electrical equipment and installations, and maintaining and repairing electrical systems are all important to keep employees safe and should be included in an Electrical Safety Program.

9.1 Electricity and OSHA Standards

Electricity is a serious workplace hazard, exposing employees to electric shock, electrocution, burns, fires, and explosions. This chapter describes the exposed or operating elements of an electrical installation such as lighting, equipment, motors, machines, appliances, switches, controls, and enclosures. Electrical equipment must be constructed and installed to minimize workplace electrical dangers.

OSHA uses three terms in their electrical standards: qualified employees, unqualified employees, and affected employees.

- **Qualified employees** are knowledgeable about constructing and operating equipment for electric power generation, transmission, and distribution involved in their job(s), along with the associated hazards.

- **Unqualified employees** are exposed to electrical hazards, even though they are not performing maintenance or repair on an electrical component.

- **Affected employees** work near electrical hazards without direct exposure.

9.2 Electricity Overview

Electricity flows more easily through some materials than others. Substances such as metals offer little resistance to the flow of electric current and are called "conductors." Glass, plastic, porcelain, clay, pottery, dry wood, and similar substances generally slow or stop the flow of electricity and are called "insulators."

Pure water is a poor conductor. But small amounts of impurities in water like salt, acid, solvents, or other materials can turn water into a conductor. Dry skin has a fairly high resistance to electric current; wet skin conducts electric current. This means that anyone working with electricity in a damp or wet environment needs to exercise extra caution to prevent electrical hazards.

Electrical shock can occur when an employee's body completes an electrical path with:

- Both wires of an electric circuit
- One wire of an energized circuit and the ground
- A metal part that accidentally becomes energized
- A "conductor" that is carrying a current

When a person receives a shock, electricity flows between parts of the body or through the body to a ground or the earth. An electric shock can result in anything from a slight tingling sensation to immediate cardiac arrest. The severity depends on several factors:

- The amount of current flowing through the body
- The current's path through the body
- The length of time the body remains in the circuit
- The current's frequency

9.3 Protecting Against Electrical Hazards

Most electrical accidents result from one of the following factors:

- Unsafe equipment or installation
- Unsafe environment
- Unsafe work practices

Accidents can be prevented using insulation, guarding, grounding, electrical protective devices, and safe work practices.

Insulators help stop or reduce the flow of electrical current. To work properly, the insulating material must be suitable for the voltage and environmental conditions such as temperature, moisture, lubricants, fuels, corrosive fumes, or other substances that could cause the insulation to fail.

Before connecting electrical equipment to a power source, the insulation should be checked for possible defects. Insulation covering flexible cords such as extension cords is particularly vulnerable to damage.

A. Guarding.

Guarding involves locating or enclosing electric equipment to make sure employees do not accidentally encounter live electrical parts. Effective guarding requires equipment with exposed parts operating at 50 volts or more to be placed where it is accessible only to authorized, qualified people.

Conspicuous signs should be posted at the entrances to electrical rooms and similarly guarded locations to alert people to the electrical hazard and to forbid entry to unauthorized people. Signs may contain the words “Danger,” “Warning,” “Caution,” or “Danger/High Voltage/Keep Out.”

B. Grounding.

Grounding prevents voltage buildup that could cause an electrical accident by creating a low-resistance path that connects to the earth. Grounding reduces the risk of electrical shock. A service or system ground protects machines, tools, and insulation against damage.

An equipment ground helps protect the equipment operator. It furnishes a second path for the current to pass through from the tool or machine to the ground. This additional ground safeguards the operator if a malfunction causes the tool’s metal frame to become energized. The resulting flow of current may activate the circuit protection devices.

Electrical tools and machines should have a grounding conductor that is a low-resistance wire that directs current directly to the ground. Cord and plug equipment with a three-prong plug is a common example of equipment incorporating this ground conductor.

C. Circuit Protection.

Circuit protection devices automatically limit or stop the flow of current in the event of a ground fault, overload, or short circuit in the wiring system. Examples of these devices are:

- fuses
- circuit breakers
- ground fault circuit interrupters (GFCI), and
- arc-fault circuit interrupters

Fuses and circuit breakers open or break the circuit automatically when too much current flows through them.
GFCIs are used in wet locations, construction sites, and other high-risk areas. These devices interrupt the flow of electricity within as little as 1/40 of a second to prevent electrocution. GFCIs compare the amount of current going into electric equipment with the amount of current returning from it along the circuit conductors. If the difference exceeds five milliamperes, the device automatically shuts off the electric power.

Arc-fault circuit interrupters protect from the effects of arc-faults by recognizing characteristics unique to arcing and de-energizes the circuit when an arc-fault is detected.

9.4 Safety-Related Work Practices

Safety-related work practices help prevent shock and injury to employees from either direct or indirect electrical contact with equipment or circuits that are or may be energized.

Safety-related work practices must be implemented as part of the Electrical Safety Program at IA, BIA, and BIE sites, schools, and facilities for qualified, unqualified, and affected employees working on or near energized parts, materials, equipment, or sources. This includes premises wiring, wiring from a connection to a supply, other types of wiring, and installing fiber optic cable in the same conduit or raceway with electrical wiring.

Only qualified employees may work on exposed energized electrical systems or conductors. Unqualified employees assisting with the work must be directly supervised by a qualified employee.

Test equipment must be designed and rated for the level of energy that will be tested and may only be used by a qualified employee. The qualified employee should visually inspect the test equipment before each use, and if defects or damage are found, it must be removed from service until repaired or replaced.

Only qualified employees should be using test equipment to verify that the circuit elements and equipment parts are de-energized. Testing should also determine if an energized condition exists because of inadvertently induced voltage or unrelated voltage back-feed though a circuit that has been de-energized and is presumed to be safe.

OSHA also requires that employees working near exposed energized conductors or circuit parts use insulated tools or handling equipment if they might make accidental contact with the conductors or other live parts. Work practices are designed to prevent shock and other injuries from either direct or indirect contact with live electrical parts and energy.

Live parts (>50 volts) must be de-energized before employees work on them, unless it can be shown that de-energizing the system creates new hazards, or where de-energizing is not possible due to design or operational limitations. If the system cannot be de-energized, then additional protective measures must be used to protect employees.

Locking out and tagging must be used to protect employees when live parts or equipment are de-energized. Lockout must occur in accordance with the written procedure for de-energizing the equipment or process (see Chapter 17 of this handbook).

When equipment or processes cannot be de-energized, only qualified employees can work on or near the equipment. Employees working on these systems must be familiar with the types and level of hazards presented, the protective equipment necessary, and the specific procedures and processes used to work on that energized equipment.

Proper illumination allows employees to work safely. Never blindly reach into a part, panel, equipment, or circuitry system.

Where flammable or ignitable vapors, gases, or dusts are present, electrical equipment capable of igniting these materials may not be used. And portable ladders must be non-conductive if used near energized materials.

A. De-Energizing Electrical Equipment.

Polices for de-energizing electrical equipment should include locking out and tagging it before testing, repairs, or maintenance begins.

Power and lighting circuits must have the switches, breakers, or disconnects to open those circuits when live energy is present. After de-energizing, these circuits may not be manually re-energized until it has been determined that it can be done safely.

Insulted tools and equipment are required when contact with live energy is possible. If the insulating capability of tools and equipment could be damaged during use, the insulating material must be protected. Fuse-removal tools must be rated for the circuit voltage.

Protective shields are required to prevent contact with live parts or energized materials. Unqualified employees performing service or repair of de-energized equipment must be protected from live electrical hazards in the vicinity.

Warning and alerting devices, such as signs, tag symbols, barricades, or attendants should be used to protect employees from contact with electrical hazards. Barricades and signs must be

used when access to a work area must be restricted. Where such barricades do not provide sufficient protection, attendants should be posted.

B. Accidental Equipment Start-Up.

Proper lockout/tagout procedures (see Chapter 17) protect employees from the dangers of the accidental or unexpected start-up of electrical equipment. These procedures ensure that electrical equipment is de-energized before it is repaired or inspected and protects against electrocution or shock.

The first step before beginning any inspection or repair job is to turn the current off at the switch box and padlock the switch in the OFF position; this also applies to so-called low-voltage circuits. Securely tagging the switch or controls of the machine or equipment being locked out of service clarifies to everyone in the area which equipment or circuits are being inspected or repaired.

C. Overhead Power Lines.

Overhead power lines should be de-energized whenever possible if there is a possibility of contact by employees working in the vicinity or their tools or equipment. Before working under or near overhead power lines, employees must maintain a safe distance from the lines. For very high-voltage lines, ground any equipment such as cranes that can become energized. When working around overhead power lines, the following guidance must be followed:

- Assume all overhead wires are energized at lethal voltages.
- Never assume a wire is safe to touch even if it is down or appears to be insulated.
- Never touch a fallen overhead power line. Call the electric utility company to report fallen electrical lines.
- Stay at least 10 feet away from overhead wires during cleanup and other activities. If working at heights or handling long objects, survey the area for the presence of overhead wires *before* starting work.
- If an overhead wire falls across a vehicle while it is being driven, the operator should stay inside the vehicle and continue to drive away from the line. If the engine stalls, the operator should not leave the vehicle. People should be warned not to touch the vehicle or the wire. Someone in the vicinity should be asked to call the local electric utility company and emergency services.

Other protective measures like guarding or insulating the lines help prevent accidental contact.

If unqualified or affected employees are working underneath or near energized power lines, they must be located far enough away from the lines that any tool or equipment they are using cannot

contact the line. At a minimum, the distances must be 10 feet for 50 kilovolts (kV) or less, and an additional four inches for every additional 10 kV of power above 50 kV.

When mechanical equipment is operated near overhead lines, employees standing on the ground should avoid contact with the equipment unless it is located outside the danger zone. When factoring the safe standoff distance, be sure to consider the equipment's maximum reach.

Qualified employees may not approach or work with un-insulated conductive objects any closer to overhead lines than the distances shown in the Voltage Range/Minimum Distance summary below. If the employees are within the approach distances, they must still be insulated by protective equipment or materials.

All equipment capable of being elevated must maintain a clearance of at least 10 feet from overhead lines. Vehicles moving with their structures lowered to their lowest level may reduce the clearance to four feet (plus four inches for every additional 10 kV more than 50 kV). If insulated barriers are used, they must protect the equipment from the voltage that may be encountered. Aerial lifts used by qualified employees for work on overhead lines may have clearances reduced to the distances shown in the Voltage Range/Minimum Distance summary below.

Employees on the ground may not have contact with such equipment or any of its attachments unless they are insulated, or the approach distances of the equipment are limited to those outlined in the Voltage Range/Minimum Distance summary below.

Voltage Range	**Minimum Distance**
300 volts (v) and less	Contact should be avoided
300 – 750 v	1 foot
750 - 2k v	1 foot 6 inches
2 kV – 15 kV	2 feet
15 kV – 37 kV	3 feet
37 kV – 87.5 kV	3 feet 6 inches
87.5 kV – 121 kV	4 feet
121 kV – 140 kV	4 feet 6 inches

Where equipment could contact the energized lines, and is intentionally grounded, employees may not stand at or within five feet of the grounding location. The grounding location should also be barricaded.

Any conductive material handled around overhead power lines must not contact energized wires or materials. Procedures and work practices may need to be implemented when long-dimensional objects are used or handled around power lines.

Tree trimming around overhead power lines will need to be done by line-clearance tree trimmers. These workers have received specialized training so they can work within 10 feet of energized power lines and equipment.

D. PPE.

Employees must be provided and use PPE appropriate for the electrical hazards that may be encountered. The PPE should be identified through the risk assessment/JHA process for the jobs they perform.

PPE must be maintained in a safe and reliable condition, and it must be inspected or tested periodically. If the insulating capability of protective equipment could be damaged during use, the insulating material must be protected (e.g., outer leather gloves over insulated inner gloves). PPE can include the following to help reduce the risk of electrical accidents:

- Rubber insulating gloves
- Hoods
- Sleeves
- Matting
- Blankets
- Non-conductive protective helmet

In situations where arc flash or electrical explosion is a possibility, eye and face protection, as well as fire retardant clothing, is required.

E. Tools.

Appropriate and properly maintained tools help protect workers against electrical hazards; well-maintained tools prevent them from deteriorating and becoming dangerous. The employee should check each tool before using it; if there is a defect, immediately remove the tool from service and tag it so no one will use it until it has been repaired or replaced.

When using a tool to handle energized conductors, the employee should also check to make sure it is designed and constructed to withstand the voltages and stresses to which it has been exposed.

9.5 Electrical Program Training

This section describes the training requirements for employees involved in the site, school, or facility electrical program. A risk analyses/JHA should be performed before beginning any task so the exposures to IA, BIA, and BIE employees can be determined.

The assessment should determine the level of exposure, requirements of the task, and the corresponding risk to employees from any exposed energized parts or equipment. This

information should be used to review the training needs and to help supervisors ensure that employees have the training they need to do the assigned tasks.

Employees also need training based on their regular duty assignments when these assignments have them working in the vicinity of energized equipment. Employees should be provided with PPE for these assignments and have training in their care and use. Employees should also be trained to use any instrumentation they may need to perform their work tasks.

Qualified employees will have appropriate licenses or documented training. Employees exposed to 50 volts or more to ground (and their first-line supervisors) require additional training that is commensurate with the risk encountered.

A. Safety Procedures.

All employees should be thoroughly familiar with the safety procedures for their jobs. When employees are working on or around electrical equipment, they should have training and coaching that teaches them to safely perform the following tasks. Good judgment and common sense are integral to preventing electrical accidents; specifically:

- De-energize the equipment before inspection or repair.
- Use lockout and tagging procedures to ensure that the equipment remains de-energized.
- Use insulating protective equipment.
- Maintain a safe distance from energized parts.
- Allow only qualified employees to repair electrical cords or equipment.

B. Qualified and Other Employee Training.

Training for qualified employees must be classroom or on-the-job, and the degree of training must be commensurate with the risk to the employee. Qualified employees should have training and be knowledgeable in the following:

- The construction of electric power generation, transmission, and distribution equipment construction.
- Operation of electric power generation, transmission, and distribution equipment.
- Maintenance of electric power generation, transmission, and distribution equipment.
- Repair of the electric power generation, transmission, and distribution equipment.
- Hazards associated with electric power generation, transmission, and distribution equipment.
- The electrical safety standards that apply to the work.

- Safety-related work practices required for the respective job or task.

Training unqualified and affected employees ensures they can recognize potentially dangerous electrical hazards. It also ensures that they understand how hazardous energy sources can impact their work area. The following training helps unqualified employees understand the electrical risks of their job:

- Electrical hazards in the workplace
- Procedures to follow to protect themselves when they work around electricity
- Tasks can only be performed by qualified workers (e.g., maintenance and repairs)
- How to report electrical problems
- What to do in the event of an emergency involving electricity

All unqualified employees should know the following electrical safety basics:

- How to inspect electrical tools and equipment before use to make sure insulation and wiring are in good condition.
- If a piece of electrical equipment shocks, smokes, smells, or sparks, turn it off, tag it out, and report it to the supervisor.
- Check plugs to make sure they have a good, tight connection.
- Outdoors or in wet areas use only cords that are approved for use under these conditions and plug into a GFCI.
- Do not touch anything electrical with wet hands or while standing in a wet area.
- Do not contact anything electrical with anything metal.
- Use only insulated, non-conductive tools around power sources.
- In areas with flammable liquids, vapors, or combustible dust, use only electrical cords and equipment identified as safe for that use.
- Make sure equipment does not spark or get hot enough to ignite flammable or combustible materials in the area.
- Do not overload outlets, circuits, or motors.
- Do not let grease, dust, or dirt build up on electrical equipment.
- Keep electrical equipment well-lubricated to prevent overheating.

- Do not reach blindly into a space that may contain energized parts.
- Use extension cords only if necessary and when rated for the job.
- Do not fasten electrical cords with staples, nails, or anything that could damage the insulation.

9.6 Electrical Safety Program

While not required, it is highly encouraged that every site, school, or facility where employees work on or around electrical hazards have an Electrical Safety Program. Every good safety and health program provides measures to control electrical hazards; however, the Electrical Safety Program goes beyond that. The responsibility for this program should be delegated to someone with complete knowledge of electricity, electrical work practices, and the appropriate OSHA standards for installation and performance.

The Electrical Safety Program establishes safe work practices at the site, school, or facility that reduces the risk of employee exposure to the electrical hazards. The program describes requirements for training, pre-job planning, and authorization for performing work on exposed, energized equipment. A suggested training outline for an Energy Safety Program is as follows:

- Introduction
- Identifying Electrical Hazards
- Minimizing Electrical Hazards
- Safe Work Practices
- Working on/near Energized Electrical Equipment
- Working on De-energized Electrical Equipment
- Flexible Cords and Portable Equipment
- Temporary Wiring
- Working Space Around Electrical Equipment
- Access to Workspaces
- Training Requirements for Employees Involved in the Electrical Program

Each of these areas is covered in more detail in the sections below.

A. Introduction.

The Introduction provides an overview of the Electrical Safety Program in the workplace and the policies and procedures employees are to follow. Written electrical policies or procedures are established to ensure that electrical products, wiring, and devices are designed, installed,

maintained, and used safely. Safe work practices and procedures are written and followed for regularly conducted tasks related to electrical exposures.

B. Identifying Electrical Hazards.

Through the site, school, or facility inspection and risk assessment process, the worksite should be assessed for electrical hazards. Identifying electrical hazards will help lower the risks to employees who work in the vicinity. Some of the more common electrical hazards include the following:

- **Overhead power lines.** Material and equipment used in the vicinity of overhead power lines could connect and cause major burns and possible electrocution to employees in the vicinity.

- **Damaged tools or equipment.** Tools and equipment should be checked for damage before and after each use. Damaged electrical tools could risk burns or electrocution.

- **Exposed electrical parts.** Exposed electrical parts could be worn or frayed cords or wires, missing knockouts on "J" boxes, panel fronts missing off breaker boxes, or light bulbs missing from their bases.

- **Inadequate wiring.** Installing wiring that is not large enough to carry the current required can lead to overheating and electrical fires.

- **Overloaded circuits.** Circuits are designed to carry a maximum load. Exceeding that load by adding appliances, lighting, or other equipment causes overheating and the risk of fire.

- **Improper grounding.** Improper grounding allows stray voltage to build up in a device and create a shock hazard. Lack of a quality equipment ground due to missing ground pins in plugs is a common OSHA violation.

- **Damaged insulation.** Damaged insulation can expose live electrical parts that can cause shock, burns, electrocution, and start fires.

- **Wet conditions.** Water increases the risk of electrocution, especially if the insulation on the device is compromised in any way.

C. Minimizing Electrical Hazards.

Identify abatement strategies for the hazards identified in the inspection process. The following are some of the abatement strategies for the more common electrical hazards. Employees should know their limits and apply the best electrical safety practices to help reduce the risk of electrical shock and fire.

- **Overhead power lines.** Material and equipment should be kept at least 10 feet from overhead power lines, and warning signs and safety barriers should be installed to help remind employees of the hazard.

- **Damaged tools or equipment.** If damage is discovered in the inspection process, the tool or piece of equipment should be removed from service and repaired or replaced.

- **Exposed electrical parts.** To prevent employee contact, the exposed parts need to be covered, repaired, or replaced.

- **Inadequate wiring.** Wiring that is not adequate for the circuit load should be replaced with new wiring that is the correct size.

- **Overloaded circuits.** Circuits with too many devices should have some of the devices removed and additional circuits added to supply their power needs.

- **Improper grounding.** Proper grounding can eliminate the stray voltage and reduce the risk of shock, burns, and electrocution.

- **Damaged insulation.** Whenever damaged insulation is encountered it should be immediately repaired or the equipment taken out of service. Electrical tape should not be used to make a temporary repair so the device can remain in service.

- **Wet conditions.** Electrical equipment should only be operated in wet conditions when it is designed for wet operation, or the operator has the necessary training and PPE to do the job.

9.7 Safe Work Practices

Each person is expected to work within the limits of their expertise and training and follow established practices, which are developed according to the hazards and tasks performed. Some examples follow:

- **DO NOT** leave exposed electrical hazards unattended.
- Replace covers or protect energized components from inadvertent contact.
- Use proper insulation, PPE, and tools for the level of exposure.

Non-routine tasks or emergency work should only be done under the direction of qualified employees after a thorough hazard and risk analysis, such as a JHA (Chapter 2), has been conducted.

A. Working on/near Energized Electrical Equipment.

Polices and safety-related work practices for employees who must work on or near energized electrical equipment should be implemented as part of the Electrical Safety Program. These practices help prevent shock and injury to employees from either direct or indirect electrical contact with equipment or circuits that are or may be energized.

B. Working on De-Energized Electrical Equipment.

Polices for de-energizing electrical equipment should include locking it out and tagging it. After de-energizing, the maintenance, repair, or testing can begin. After the work is complete, the equipment/circuits may be re-energized once it has been determined that it can be done safely.

9.8 Flexible Cords and Portable Equipment

Policies should be developed for working with cord and plug energized equipment including how it must be handled to avoid damage. Specifically:

- Flexible cords may not be used to raise, lower, pull, move, or hang equipment where the insulating jacket could be damaged. Visually inspect cords before using, which includes looking for loose parts, deformed pins, and damage to the jacket or insulation.
- Damaged equipment must be repaired or replaced before being used. Repairs may require testing to assure electrical continuity and safety.

- Plugs must be the appropriate type for the receptacle. Devices to circumvent this are prohibited (e.g., a three-prong adapter that allows the equipment to be plugged into a two-prong receptacle).

- Flexible cords for equipment requiring grounding must contain a grounding connector. The plugs may not be altered or changed to allow insertion into a non-grounded receptacle.

- Highly conductive environments (i.e., wet or damp locations or hazardous atmospheres) must use only equipment approved for that environment.

- Employees must not plug equipment into receptacles in such locations if their hands are wet and equipment is energized.

- Insulating materials may be required when electrical energy can be conducted through the hands or fingers.

- Locking connectors must be secured after connection.

9.9 Temporary Wiring

Temporary wiring includes using extension cords, temporary branch circuits, and electrical boxes in unintended ways. Temporary wiring may only be used in certain specific situations. Examples include: construction or remodeling; maintenance and repair; decorative purposes during holidays or other events, but for no more than 90 days; experimental or development work; and during emergency situations.

Temporary wiring must be removed immediately after completing the project or purpose for which the wiring was installed.

9.10 Working Space Around Electrical Equipment

This section describes the requirements for maintaining the workspaces with electrical equipment likely to require access for examination, adjustment, servicing, or maintenance while energized, and keeping those areas clear.

Access to electrical equipment must be kept clear for employees who inspect, operate, and maintain the electrical equipment. Sufficient access and working space must be provided and maintained around all electrical equipment to permit the safe operation and maintenance of the equipment.

The National Electrical Code requires that rooms or other areas where electrical panels are located have at least one entrance that is large enough to give access and provide adequate working space around the electrical equipment inside. If the electrical panels are rated at 1,200 amps or higher, the entrance to the space must be at least 24 inches wide and 6½ feet tall. The access to any electrical panel/equipment location should be continuous and unobstructed.

Electrical panels or equipment that depend on the natural air circulation for cooling should be installed so that airflow is not obstructed by walls or other installed equipment. Electrical equipment that has ventilating openings should be installed so that walls or other obstructions do not prevent the free circulation of air through the equipment.

Illumination must be provided for all working spaces with electrical equipment, switchboards, panelboards, and motor control centers. In electrical equipment rooms, the illumination may not be automatic—it must permit manual operation.

Chapter 10: Safety and Health for Visitors

This chapter provides information for effectively managing the safety and health of visitors to IA, BIA, and BIE sites, schools, facilities, and outdoor recreation areas. It includes sections on the safety and health of visitors with disabilities and special needs and outlines the expected response should an injury occur.

The term “visitor” includes anyone who comes onto an IA site, school, facility, or recreation area from a repair person to family members; other federal, state, or Tribal agency employees; and members of the public. Visitors should be made aware of OSH procedures for the areas they are visiting, including those who are attending tours of IA sites and facilities.

IA managers and supervisors will review the facilities and programs to ensure that the visiting public is safe and that there are minimal risks for injury, illness, and/or property damage while they are visiting IA, BIA, and BIE sites, schools, facilities, and recreation areas or in the proximity of IA operations. IA managers and supervisors will also enforce applicable safety requirements, including those directed at the public, which include codes, regulations, polices, and recognized national consensus standards, and will ensure safety procedures and guidelines are communicated to affected visitors.

IA DSRM staff, BIA RSMs, the BIE SPM, CDSOs, and SCMs will participate in and support agencies and organizations whose purpose relates to the safety of the visiting public, such as the

National Safety Council, the National Association of State Boating Law Administrators, and the National Water Safety Congress.

Additionally, IA managers and supervisors will coordinate their visitor safety programs with the appropriate Regional Safety Program and with applicable law enforcement, volunteer, recreation, engineering, and hazardous materials programs. IA and BIA law enforcement will coordinate with federal, state, and local law enforcement agencies, search and rescue, and emergency medical service providers as well.

IA and BIA law enforcement will ensure compliance with visitor use and conduct regulations, including the requirement for seat belt use by drivers and all occupants of motor vehicles equipped with safety belts.
Recreation, volunteer, and engineering programs are responsible for managing and maintaining established IA visitor sites and facilities. The environmental/hazardous materials program will identify and eliminate hazardous waste sites on public lands that may pose safety or health dangers to the visiting public.

10.1 Visitor Risks

Employees are trained on their workplace hazards and know what precautions to take; visitors receive no such training. Visitors may only be in an IA workplace for a short time and are generally unaware of the OSH program policies and procedures.

Protecting visitors who have access to IA workplaces without having the knowledge and appreciation of the hazards requires additional oversight to ensure they are not involved in an incident during their stay.

Visitors can place the health and safety of employees at risk. They may interfere with machines or safety systems, light up cigarettes around combustible fumes, distract workers performing vital functions, or expose themselves to dangers of which they are unaware.

Visitors should be informed of the site, school, or facility's safety expectations and emergency action requirements before they are allowed to move freely throughout any IA location.

IA, BIA, and BIE sites, schools, and facilities are intended to be accessible for visitors with disabilities and special needs and maintained to minimize the risk of injury or illness to all visitors. Visitor policies should be in place that help maintain safety, protect employees, and protect IA, BIA, and BIE operations.

10.2 Site Control

Procedures should be in place to manage visitors from their arrival at a location to their departure. These may include the following:

- Visitors should enter the site in a controlled fashion through designated entry points.

- The OIC of the site should know the number of visitors on the site at any given time so an accurate head count is possible if there is an emergency.

- The OIC should know where visitors are so they can be quickly moved to safety in an emergency.

- The OIC should establish measures to keep visitors from wandering into dangerous or restricted areas by mistake. And methods should be in place to inform visitors about workplace hazards and of required safe work practices.

- If visitors might cause a hazard, managers need methods in place to identify those hazards and take mitigation measures.

- Inform visitors when PPE is required and have the equipment readily available for their use.

- Employees should know how to identify unauthorized visitors and what to do if they encounter such visitors.

- The OIC should know when all visitors have left the site.

10.3 Emergency Planning

Part of successfully preparing for visitors and ensuring their safety while in IA establishments is preparing to manage visitors as part of the emergency management program. This preparation includes the following:

- Ensure the site's emergency action plan addresses visitor safety.

- Inform visitors when they arrive on-site about the emergency notifications and procedures that might apply to them.

- Train employees to help ensure visitor safety and assist with visitor evacuations in the event of an emergency.

Visitors to IA, BIA, and BIE sites, schools, facilities, and recreation areas should be quickly briefed on safety by a flyer, handout, or signage provided for their review. Flyers and handouts should not be more than one page and should include at least the following information:

- Procedures for checking in and checking out
- What to do if there is an emergency
- Hazardous areas requiring a visitor escort
- PPE requirements
- If chemical hazards exist in the workplace, information about the hazard communication program

- Natural hazards such as poisonous plants or dangerous wildlife in the area
- What to do if a visitor has an accident or an incident
- Facility or grounds map with parking areas, emergency shelter, and evacuation areas marked

Never rely on a visitor's common sense to keep them safe; every worksite should have its own unique set of visitor rules. Communicating the rules is essential to maintaining a safe work environment for everyone.

10.4 Inspections

All IA, BIA, and BIE-developed recreation areas, campgrounds, and facilities should be inspected at least annually for compliance with policies, standards, and codes to ensure the safety and health of the visiting public. These inspections must include safety related to access by visitors with disabilities and special needs. Qualified inspectors should conduct these safety and health inspections.

10.5 Accessibility to Outdoor Recreation

IA policies require facilities and services to be safely accessible to visitors with disabilities and special needs in conformance with applicable regulations and standards. IA, BIA, and BIE outdoor recreation facilities should accordingly be made as safe and accessible as possible. It is IA's goal to provide the highest level of visitor accessibility that is reasonable and not simply provide the minimum level that is required by law. Every site is unique, however, and IA managers need to do the following:

- Assess the level of accessibility of various recreational sites.
- Identify the barriers to accessibility.
- Conduct a risk analysis of the various recreation locations and identify hazards to visitors with disabilities and special needs.
- Ensure that all locations are safely accessible.
- Develop policies and guidelines regarding appropriate methods and techniques for improving safe access.
- Provide technical assistance and in-service training on effective approaches and program implementation to managers, supervisors, and employees.

In conforming to the appropriate standards, the level of safe accessibility will be largely determined by the nature of the area, the program, and the ability to preserve the quality of the recreational experience.

In some locations natural features may dictate that visitors will need assistance to access certain undeveloped areas without becoming a hazard to themselves and others. Other locations that have more rugged natural elements, such as steep or rocky trails, may be too difficult for visitors with disabilities and special needs to use. These areas should be signed so visitors do not attempt access and inadvertently place themselves in a hazardous situation.

Managers and supervisors are encouraged to promote visitor accessibility by doing the following:

- Provide the highest level of accessibility that is reasonable for people of all abilities in all facilities, programs, and services.
- Implement this goal within the daily operations of their recreation areas.
- Incorporate access for visitors with disabilities and special needs into recreational area policies and operational procedures.
- Establish a framework for implementing the actions necessary to achieve the highest level of accessibility that is reasonable.
- Ensure the implementation of "universal accessibility" principles into all changes, modifications, and new construction.

Additionally, the following access features should also be considered:

- Reserved parking spaces
- Wheelchair ramps
- Hardened surfaces on trails and walkways
- Accessible restrooms
- Easy-to-reach campsites
- Facilities for service animals that accompany visitors with disabilities and special needs

IA recommends recreation managers and supervisors take questions on accessibility from the public and provide the information they may need to make their visit successful.

10.6 Building Accessibility

Title III of the Americans with Disabilities Act (ADA) requires government buildings be accessible to people with disabilities and special needs on an equal basis with the rest of the public. The following is an overview of the accessibility requirements.

People with disabilities should be able to arrive at the site, approach the building, and enter safely.

1) Entrance

If there are stairs at the main entrance, there must be a ramp, lift, or alternative accessible entrance. The entrance door must have at least 32 inches of clear opening. There must be at least 18 inches of clear wall space on the pull side of the door, next to the handle. A person using a wheelchair or crutches needs this space to get close enough to open the door. The door handle can be no higher than 48 inches and capable of being opened with a closed fist.

2) Parking and Drop-Off Areas

Accessible parking spaces must be available and have a certain number of accessible spaces based on the total spaces available. Specifically:

- One space in a parking lot of up to 25 spaces.
- Two spaces in a parking lot of up to 50 spaces.
- Three spaces in a parking lot of up to 75 spaces.
- Four spaces in a lot of up to 100 spaces.

Accessible parking spaces should be eight feet wide for a car and five feet wide for an access aisle. For a lift-equipped van, the spaces and access aisles should each be eight feet wide. At least one of every eight accessible spaces provided must be van-accessible (with a minimum of one van-accessible space in all cases).

10.7 Access to Materials and Services

People with disabilities should be able to obtain materials or services without assistance.

A. Route of Travel.

There should be a route of travel that does not require the use of steps or stairs. The route of travel should be stable, firm, and slip resistant. Route of travel has the following requirements:

- 36 inches wide and any objects protruding into the route should be detectable by a visually impaired person using a cane.
- An object must be within 27 inches of the ground to be detected by a visually impaired person using a cane.
- Objects hanging or mounted overhead must be higher than 80 inches to provide clear headroom.
- Objects may not protrude more than four inches from the wall.

Ramps should be non-slip and have slopes that are no greater than 1:12. Handrails should be provided on both sides of the ramp and must be continuous within the full length of the ramp run. The top of gripping surfaces of handrails should be 34 inches minimum and 38 inches maximum.

B. Interior Comfort.

All controls that are available for use by the public (including electrical, mechanical, cabinet, game, and self-service controls) must be located at an accessible height. Specifically:

- The maximum height for a side reach is 54 inches.
- The maximum height for a forward reach is 48 inches.
- The minimum reachable height is 15 inches for a front approach.
- The minimum reachable height is nine inches for a side approach.

Controls must be operable with a closed fist.

C. Seats, Tables, and Counters.

Aisles between fixed seating must be at least 36 inches wide with spaces for wheelchair seating distributed throughout. The tops of tables or counters should be between 28 inches and 34 inches high. Knee spaces at accessible tables should be at least 27 inches high, 30 inches wide, and 19 inches deep.

At each type of cashier counter, there must be a portion of the main counter that is no more than 36 inches high. There must be a portion of food-ordering counters that are no more than 36 inches high, or there must be a space at the side for passing items to customers who have difficulty reaching over a high counter.

D. Restrooms.

When restrooms are open to the public, they should be safely accessible to people with disabilities. At least one restroom (either one for each gender, or unisex) must be fully accessible.

Restroom doorways and passages must have tactile signage on the latch side of the door identifying the accessible restrooms. The restroom doorway must be at least 32 inches clear. Restroom doors should be equipped with accessible handles (operable with a closed fist) and be no more than 48 inches high.

The entry configuration should provide adequate maneuvering space for a person using a wheelchair. A person in a wheelchair needs 36 inches of clear width for forward movement, and a five-foot diameter or T-shaped clear space to make turns.

A minimum distance of 48 inches clear of the door swing is needed between the two doors of an entry vestibule. There should be a 36-inch-wide path to all fixtures.

Restroom stall doors should be operable with a closed fist, inside and out. At least one wheelchair-accessible stall that has an area of at least five feet by five feet, clear of the door swing, must be available. In the accessible stall, there should be grab bars behind and on the side wall nearest to the toilet. The toilet seat should be 17 to 19 inches high.

At least one lavatory (or sink area) should have a 30-inch-wide by 48-inch-deep clear space in front. A maximum of 19 inches of the required depth may be under the lavatory. The lavatory rim can be no higher than 34 inches. There should be at least 29 inches from the floor to the bottom of the lavatory apron. The faucet should be capable of being operated with one closed fist.

E. Drinking Fountains.

At least one drinking fountain should have a clear floor space of at least 30 inches by 48 inches in front, and at least one drinking fountain should have its spout no higher than 36 inches from the ground.

F. Telephones.

If pay or public use phones are provided, there must be clear floor space of at least 30 inches by 48 inches in front of at least one. The highest operable part of the phone can be no higher than 48 inches. The phone can protrude no more than four inches into the circulation space. The phone should be hearing-aid compatible and have a volume control.

If there are four or more public phones in the building, at least one of the phones must be equipped with a text telephone or telecommunications device for the deaf.

10.8 Horizontal Circulation

The accessible entrance should directly access the main floor, lobby, or elevator. The accessible routes of travel within the building should be at least 36 inches wide. Accessible routes should include five-foot diameter circles or T-shaped spaces for a person using a wheelchair to reverse direction.

A. Doors.

Doors into public spaces should have at least a 32-inch clear opening. On the pull side of doors, next to the handle, there should be at least 18 inches of clear wall space. Interior door handles should be 48 inches high or less and be operable with a closed fist.

B. Rooms and Spaces.

All aisles and pathways should be 36 inches wide. There should be a five-foot diameter circle or T-shaped space within rooms for turning a wheelchair completely. Carpeting should be low-pile,

tightly woven, and securely attached along edges. All obstacles should be cane-detectable (located within 27 inches of the floor) and protruding less than four inches from the wall.

10.9 Accessible Route

There must be ramps, lifts, or elevators to all public levels. Stair treads must have a non-slip surface and have continuous rails on both sides, with extensions beyond the top and bottom stairs.

There must be both visible and audible door opening/closing indicators for elevators. The call buttons can be no higher than 42 inches, and the controls inside the cab must have both raised and Braille lettering.

There must be signs on both door jambs at every floor identifying the floor in raised and Braille letters, and the emergency intercom in the elevator must be identified by Braille and raised letters and usable without voice communication.

10.10 Emergency Exit and Signage

Emergency systems—if provided—must have both flashing lights and audible signals.

The following are requirements for signs and room numbers:

- Mounted approximately 60 inches from floor
- Mounted on the wall adjacent to the latch side of door, or as close as possible
- Have raised characters, sized between 5/8 and two inches high
- Have Braille text
- If a pictogram is used, it must be accompanied by raised characters and braille

Directional and informational signage should be mounted above 80 inches and have letters at least three inches high, with high contrast and non-glare finish.

10.11 Visitor Incidents and Injuries

When a visitor is injured, care should be provided, a report should be taken, and an accident investigation initiated.

If IA, BIA, and BIE-staffed facilities have designated first-aid providers, they could provide first-aid treatment. They should also activate the nearest emergency medical system (911), and initiate transportation, if necessary, to medical assistance.

IA, BIA, and BIE employees responsible for the safety and health of the public will have special training, such as hazard recognition, first aid, and cardiopulmonary resuscitation.

A. Report Requirements.

Reports should be taken on all visitor injuries and incidents. The reports should have all the information relevant to the incident and include the following:

- Date, time, and location of the incident.
- Names, addresses, and telephone numbers of everyone involved in the incident. If an IA, BIA, or BIE employee or volunteer is involved, then their job title and name of immediate supervisor should also be included.
- Names of injured people, the extent of their injuries, what care was provided on-site, and if they were transported to a hospital (if so, then also include which hospital and who provided the transport).
- Extent of the damage to property, equipment, or materials, and owner information if any of the damage is to property not owned by IA, BIA, or BIE.
- Names, addresses, and telephone numbers for witnesses.
- Written statements from witnesses with their signatures and dates.
- Written narrative on the events leading up to the incident.
- Written narrative detailing what happened at the moment of the incident, including environmental conditions such as slippery floors or inadequate lighting.
- The narratives should include everyone's position (location) when the incident occurred.
- Written narrative on the actions taken immediately after the incident occurred.
- Include information on any IA, BIA, or BIE property, equipment, or materials that may have contributed to the incident.

The accident report should be provided to the site manager, school principal, or facility supervisor, and to the BIA RSM, BIE SPM, IA DSRM, law enforcement, and the tort claims manager.

B. Visitor Accident Investigation.

IA, BIA, or BIE personnel will initiate and/or cooperate in the investigation of public-related accidents that occur on their facilities or land. Known accidents/incidents involving visitors will be subject to the same reporting and investigation requirements as those involving IA employees and volunteers (see also 25 IAM 3-H, Volume 2, Section 4.2, Accident Reporting in SMIS).

For all incidents involving visitors, a prompt accident investigation is necessary. Accidents are investigated to prevent another future incident—not to lay blame or find who is at fault. This

encourages individuals to report all incidents, and it also encourages witnesses to tell investigators everything they know.

The investigation should identify the causes of the incident so that controls can be put in place to prevent the same incident from happening again. The findings from the investigation should be recorded and kept on file. The incident investigation should include the following:

- Incident investigation preparations
- Visit the incident scene
- Secure any property that may have contributed to the accident
- Take measurements and photographs
- Gather other information such as weather reports and emergency responder reports
- Interview witnesses
- Analyze the evidence
- Write the report

For an accident investigation to be effective, management must have a plan in place for implementing any corrective actions and making system improvements. Management must also periodically evaluate the quality of the investigative process to make sure that it is still an effective tool.

All known visitor accidents/incidents that could reasonably result in tort claim action must be reported in the Department's Safety Management Information System (SMIS): https://www.smis.doi.net.

Chapter 11: Contractor Safety and Health

Contractors on IA, BIA, and BIE projects are responsible for ensuring that work performed meets applicable safety and health requirements. IA, BIA, and BIE should coordinate with contractors and other temporary workers to ensure they are not exposed to hazards while on-site or create hazards for IA employees.

The IA Contracting Officer (CO) or the Contracting Officer's Representative (COR) are responsible for including OSH program requirements in all Requests for Quotations and incorporating applicable requirements into the contracts themselves.

The CO should advise contractors of all potential unsafe or unhealthful working conditions determined to exist or have the potential to occur on their job sites. The CO should also provide information regarding potential hazards, including hazardous substances, to contractors as required by OSHA Standards 29 CFR 1910.1200, Hazard Communication.

If hazardous substances either exist on-site or are being provided by the government, then the CO should provide Safety Data Sheets (SDS) or the equivalent to the contractor. If the contractor

is to acquire, control, and use hazardous materials, the contractor is required to acquire SDSs for the hazardous products used and provide copies to IA.

The CO should advise contractors of the requirement for reporting accidents that occur on the job and to assist in their investigation.

CORs and Project Managers ensure identified controls are implemented and maintained, and job site work environments are safe. Contractors and/or subcontractors will comply with applicable statutory safety and health laws, regulations, policies, and rules. Contractors are responsible for providing a safe environment for their employees and for other people at the project site who may be exposed to their work.

11.1 Employer Categories

These guidelines apply to all contracted employees working at IA, BIA, and BIE facilities or sites. Contract employees can be temporary workers contracted through a third party such as a Tribal agency, or they may be contracted to provide specific services such as computer support, inspections, construction, facilities maintenance, equipment repair, or bus driving. In any situation, it is important for IA to communicate and coordinate with the contractor to provide a safe environment for everyone.

A "multi-employer" worksite category is a workplace where employees that report to different employers work together. When it comes to managing risk and identifying and abating hazards, OSHA breaks the employer's responsibility down into the following four categories:

- The **creating** employer causes a hazardous condition.
- The **exposing** employer exposes employees to a hazard.
- The **controlling** employer has the authority to correct the hazardous conditions or to require others to correct the hazards.
- The **correcting** employer corrects an on-site hazard.

If a hazardous condition exists at an IA, BIA, or BIE worksite, OSHA will consider issuing citations to any or all of the above categories. In these circumstances, it is important that IA managers, supervisors, and/or CORs communicate with the contractor about how each will conduct their work in the vicinity of the other without creating an unsafe situation for either party.

11.2 Establishing Effective Communication and Coordination

Effective communication and coordination means that before coming on-site, contractors should be aware of the following:

- The types of hazards that may be present.

- The procedures or measures they need to use to avoid or control their exposure to these hazards.

- Whom to contact at IA to report an injury, illness, incident, or if they have a safety concern.

It also means that IA employees should be aware of the following:

- The types of hazards that may arise from the work being done on-site by temporary workers and workers employed by contractors.

- The procedures or measures needed to avoid or control exposure to these hazards.

- How to contact the contractors if they have a safety concern.

- What to do in case of an emergency.

Each IA site, school, or facility needs to establish and implement a procedure to ensure the exchange of information about hazards and the hazard-control measures. This exchange of information will benefit all the workers on the site, regardless of their employer.

11.3 How to Accomplish Effective Communication

Before work begins, IA managers, supervisors, and CORs should communicate with contractors to determine which among them will implement and maintain the various parts of the OSH program to ensure protection of all on-site workers. These determinations can be included in contract documents that define the relationships between the parties.

IA needs to provide information to contractors and temporary workers about hazards already present in the workplace and the measures that have been implemented to prevent or control them. IA should gather and distribute information that will help the contractor assess existing hazards and help them avoid creating new hazards that may affect other workers on-site.

Contractors should regularly inform the COR of injuries, illnesses, or concerns reported by their workers and the results of any tracking or trends they do. Contractors need to know how to tell the COR about work hazards and how to control them. The COR should tell contractors about non-routine and emergency hazards and emergency procedures.

Contractor accidents must be reported to the COR. The COR reports accident or incident information into the Department's SMIS. The COR will investigate accidents or incidents to find the cause and identify corrections.

11.4 Establish and Accomplish Effective Coordination

Site managers and the COR need to work with contractors to plan and schedule the work to make sure there are no safety concerns before the work begins. IA location managers and the IA CO and COR need to do the following:

- Include in contracts and bid documents any specifics related to OSH and ensure contractors selected for the work meet requirements.

- Identify issues that may arise during on-site work and include procedures to resolve conflicts before work starts.

IA location managers, supervisors, and the COR need to work with contractors to do the following:

- Ensure the contractor's workers are correctly trained and equipped before coming to the worksite.

- Blend everyone's OSH policies and procedures to resolve important differences so all workers and employees at the site have the same protection and receive regular and reliable OSH information.

- Make sure managers with decision-making authority are available and prepared to deal with day-to-day coordination issues.

11.5 Safety and the Acquisition Process

Project safety begins with the acquisition process. This starts when IA, BIA, or BIE managers decide they need to purchase either goods or services. The type of purchase drives how safety is communicated to the contractor.

If the purchase is below the micro-purchase threshold, then OSH communications must be made directly with the contractor or their employees when they arrive on-site to begin the task. If the purchase is above the micro-purchase threshold, then the OSH requirements must be included in the contract documents.

All contracts must have OSH clauses requiring the contractor to comply with all applicable safety and health standards. The clauses should also advise the contractor that failure to comply with safety and health requirements will result in stopping work. All costs related to a stop work order for not complying with safety and health standards will be paid for by the contractor.

The CO or COR will review the contractor's safety record, safety procedures, and any important contractor exceptions before contract award. The CO or COR will also resolve any safety issues before contract award. If there are any differences in how they will perform the work, they will be documented.

11.6 Contract Management

Contract management helps to ensure the government gets what it pays for, and the government does what it agreed to do with the contractor. Different procurements have different ways of managing the contract. Typically, other than for small purchases, the contractor briefs IA's site managers and the project management team on project safety requirements and how the contracted work will comply with them.

The CO, COR, or Project Inspector must watch the contractor's safety performance and note where the contractor falls short. Job sites can be inspected at any time to make sure safety and health rules are followed. All safety and health deficiencies noted during inspections should be recorded and kept in the project contract files. Actions taken by the CO, COR, or Project Inspector to urge the contractor to follow safety rules will be recorded and may negatively affect future contract awards.

Chapter 12: Confined Spaces

Some sites, schools, and facilities may contain spaces that are "confined" because their configurations hinder the activities of employees who must work in them. Employees who work in confined spaces may face an increased risk of injury from hazards such as machinery, equipment, entrapment, engulfment, and hazardous surroundings.

The term "permit space" is used to describe a "permit-required confined space." Both refer to spaces with limited entry and exit, contain safety or health hazards, and are not safe for employees to be in them. For this reason, OSHA requires workers to have a permit to enter these spaces.

12.1 Definitions and Signage

A **confined space** is:

- large enough for an employee to fully enter and perform work;
- not designed for continuous occupancy; and
- has a limited or restricted means of entry or exit.

Confined spaces may include underground vaults, tanks, storage bins, pits and diked areas, silos, and cramped areas. Each site, school, or facility with confined spaces must maintain a detailed list of those locations.

All confined spaces will require a permit to enter until testing, or the pre-entry procedures show they do not need a permit.

A **permit-required confined space** or **permit space** is a confined space with one or more of these characteristics:

- Contains or has the potential to contain a hazardous atmosphere.

- Contains a material with the potential to swallow up someone who enters the space.

- Has an internal configuration that might cause an entrant to be trapped or suffocated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.

- Contains any other recognized serious safety or health hazards.

Management must post danger signs reading: "DANGER, PERMIT REQUIRED, CONFINED SPACE, DO NOT ENTER", or similar wording at the entrances to all permit spaces.

12.2 Written Confined Space Entry Programs

Any site, school, or facility that allows employees to enter permit spaces must have a written program for those spaces. The written program should include:

- Measures to prevent unauthorized entry.

- Procedures to identify and evaluate permit space hazards before allowing employee entry.

- Testing air conditions in the permit space before entry operations and monitoring the space during entry.

- Testing for the following hazards: oxygen, combustible gases or vapors, and toxic gases or vapors.

- The means, procedures, and practices to eliminate or control the hazards necessary for safe entry (e.g., ventilation, barriers, isolation, and acceptable entry conditions).

- Identifying the employees' job duties.

- Providing PPE and any other equipment necessary for safe entry and requiring employees to use it.

- Ensuring that at least one attendant is stationed outside the permit space as long as the employee is in the confined space.

- Coordinating entry operations when employees of more than one employer are working in the permit space.

- Implementing procedures for getting rescue and emergency services and making sure unauthorized/untrained employees do not attempt rescue.

- Establishing a system to prepare, issue, use, and cancel entry permits.

- Reviewing entry operations annually and revising the permit space entry program, as necessary.

- Implementing the procedures for any attendant monitoring multiple permit space entries to follow during an emergency in one or more of those spaces.

12.3 Controlling and Detecting Hazards

Atmospheric testing for confined space entry evaluates the hazards of the permit space and makes sure conditions are acceptable for entry.

The atmosphere of a permit space may be hazardous; testing should be conducted for the residues of all possible contaminants. Testing results should be recorded on the permit. This helps ensure procedures specific to the entry operation are in place before employees enter the space.

If hazardous conditions are discovered during entry, employees must immediately leave the space. IA must evaluate the space to determine the cause of the hazardous condition and modify the entry program, as necessary. When entry to permit spaces is prohibited, IA must make sure entry is prevented.

Non-permit confined spaces must be reevaluated whenever changes occur in their use or structure and must be reclassified as permit spaces if appropriate.

12.4 Contract Employees

IA must inform any contractors hired to enter permit spaces about the following:

- the permit spaces and permit space entry requirements;
- all known hazards;
- IA's experience with the space including knowledge of any hazardous conditions; and
- precautions or procedures to be followed when in or near permit spaces.

When employees of more than one contractor are conducting entry operations, all parties must be aware of the accepted entry procedures and must coordinate entry operations to ensure their employees are protected from permit space hazards.

At the conclusion of entry operations, IA should be briefed on the work done, hazards encountered, and overall entry operations.

12.5 Entry Permits

A permit, signed by the entry supervisor, must be posted at the entrance and provided to employees before they enter a permit space. Entry permits must include the following:

- Name of permit space to be entered, authorized entrant(s), eligible attendants, and individuals authorized to be entry supervisors.
- Test results with the tester's initials or signature.
- Name and signature of the supervisor who authorizes entry.
- Purpose of entry and known space hazards.
- Measures to be taken to isolate permit spaces and to eliminate or control hazards.
- Name and telephone numbers of rescue and emergency services.
- Date and authorized duration of entry.
- Acceptable entry conditions.
- Communication procedures during entry.
- Additional permits, such as for hot work, that have been issued.
- Special equipment and procedures, including PPE and alarm systems.
- Any other information needed to ensure employee safety.

12.6 Cancelled Entry Permits

The entry supervisor must cancel entry permits when an assignment is completed or when new or changed conditions exist. These conditions must be noted on the canceled permit and used to revise the permit space program. All canceled entry permits must be kept on file for at least one year.

Canceled permits should be reviewed to ensure the program's accuracy. The program should be revised if any issues are noted so that employees who perform entry operations are protected from permit space hazards. Single annual reviews covering all entries performed during a 12-month period should be completed. If no entry is performed during a 12-month period, no review is necessary.

12.7 Confined Space Entry Training

The site, school, or facility should have standardized training for all employees involved in confined space entry to occur under the following conditions:

- Before the employee is first assigned duties that require a confined space entry.
- When there is a change in assigned duties.
- Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained.
- Whenever IA management or its employees have reason to believe that there are differences in the permit space entry procedures.

- Whenever there are inadequacies in the employee's knowledge or use of the procedures.

- Rescue team members also require training in CPR and first aid.

Management must document that the training has been accomplished and contains the following information:

- Employee's name
- The signatures or initials of the trainers
- The dates of training

12.8 Assigned Duties

Authorized entrants are the employees who will enter the permit space and are required to do the following:

- Know space hazards, including information on the means of exposure such as inhalation or dermal absorption, signs of symptoms, and consequences of the exposure.

- Properly use the correct PPE.

- Maintain communication with attendants so they can monitor the entrant's status and alert the entrant to evacuate when necessary.

- Exit from the permit space as soon as possible when alerted to evacuate.

- Recognize the warning signs or symptoms of exposure.

- Know when a prohibited condition exists.

- Know when an automatic alarm is activated.

- Alert the attendant when a prohibited condition exists or when warning signs or symptoms of exposure occur.

The attendant is required to do the following:

- Remain outside the permit space during entry operations unless relieved by another authorized attendant.

- Perform non-entry rescues when required by the establishment's rescue procedure.

- Know existing and potential hazards, including the mode of exposure, signs or symptoms, consequences, and physical effects.

- Maintain communication with, and keep an accurate account of, those workers working in the permit space.

- Order evacuation of the permit space when:
  - a prohibited condition exists;
  - a worker shows signs of physiological effects of hazard exposure;
  - an emergency outside the confined space exists; or
  - the attendant cannot effectively and safely perform required duties.
- Request rescue and other services during an emergency.

- Ensure that unauthorized people stay away from permit spaces or exit immediately if they have entered the permit space.

- Inform authorized entrants and the entry supervisor if any unauthorized person enters the permit space.

- Perform no other duties that interfere with the attendant's primary duties.

Entry supervisors are required to do the following:

- Know space hazards including information on the mode of exposure, signs or symptoms, and consequences.

- Verify emergency plans and specified entry conditions such as permits, tests, procedures, and equipment before allowing entry.

- Terminate entry and cancel permits when entry operations are completed or if a new condition exists.

- Verify that rescue services are available and that there is a way to call them to the location.

- Take appropriate measures to remove unauthorized entrants.

- Ensure that entry operations remain consistent with the entry permit and that acceptable entry conditions are maintained.

12.9 Acceptable Entry Conditions

The internal atmosphere should be tested and continuously monitored for the following conditions:

- Flammable gases and vapors should not exceed 10% of their lower flammable limit (LFL).

- Oxygen content should be maintained between 19.5% and 23.5%.
    - Warning: a small difference in oxygen may represent a significant increase in toxic gas or toxic vapor, even if it is still within the acceptable range for oxygen. A change in oxygen concentration should prompt the supervisor to investigate what contaminants may be present.

- Potential toxic air contaminants should not exceed their respective occupational exposure limit(s).

- Airborne combustible dust should not exceed their LFL.
    - Note: This concentration may be approximated as a condition in which the dust obscures vision at five feet (1.52 meters) or less.

12.10 Controlled Space Operations

In confined spaces where the atmosphere and safety conditions can be controlled, the space may be entered without the need for a written permit or attendant under the following conditions:

- The space is not a permit space.

- The space is a permit space that can be made safe for entry by mechanical ventilation alone, as verified by monitoring and inspection data.

Controlling the hazards in a permit space to eliminate the need for a permit can be accomplished by doing the following:

- Eliminate conditions that make the space unsafe before the entrance cover is removed.

- Guard the space with a railing, temporary cover, or other temporary barriers to prevent falls and protect employees working below from falling objects.

- Test the internal atmosphere and continuously monitor the permit space for the conditions referenced above in Section 11.9 Acceptable Entry Conditions.

- Use continuous forced air ventilation to:
    - test the space to confirm that the forced air ventilation has eliminated any hazardous atmospheres before employees enter;
    - ensure that forced air ventilation has ventilated the areas where employees will be working and continues to do so until they have left the space;
    - ensure the forced air ventilation air supply is from a clean source; and
    - test the atmosphere within the space periodically to ensure no hazardous atmospheres have accumulated.

The entry team leader will verify that the space is safe for entry and that the measures required by the written permit are accomplished before anyone enters.

When there are changes in the use or design of a confined space that might increase the hazards to entrants, management will reevaluate that space and, if necessary, reclassify it as a permit space.

The equipment listed below is needed to conduct confined space operations. At a minimum, this equipment should be maintained for confined space operations.

- Multi-gas monitors
- Ventilation equipment
- Rescue tripod/davit arm and winch system
- Body harness
- Extraction cable and lanyards
- Air compressors (as required)
- Supplied air respirators (as required)
- Air purifying respirators (as required)
- Self-contained breathing apparatus equipment (as required)
- Emergency escape breathing apparatus (as required)
- Radio communication system (as required)
- Signage (as required)
- Lockout/tagout equipment (as required)
- Intrinsically safe lighting equipment
- PPE
- Hearing protection equipment
- Head protection equipment
- Eye protection equipment
- First-aid kits
- Timekeeping equipment
- Hand tools
- Escape ladders (for depths of four feet or shoulder height).

Authorized entrants who enter a permit space must wear a chest or full body harness with a retrieval line attached to the center of their backs near shoulder level or above their heads.

The other end of the retrieval line should be attached to a mechanical device or a fixed point outside the permit space. A mechanical device must be available to retrieve someone from vertical type permit spaces more than five feet deep.

12.11 Emergencies

Before entry into a permit space is conducted, the following procedures must be in place:

- Summoning rescue and emergency services
- Rescuing entrants from permit spaces
- Providing necessary emergency services for rescue
- Preventing unauthorized personnel from attempting a rescue

IA must ensure that responders can respond to an emergency in a timely manner and provide on-site rescue service personnel with PPE and rescue equipment— including respirators—and train personnel to use it.

Rescue service personnel also must receive the authorized entrants training and be trained to perform rescue duties. Rescuers should be trained in first aid and CPR.

Practice rescue exercises should be performed at least annually, and rescuers should be provided with access to permit spaces so they can practice rescue operations. Rescuers must also know about the hazards of all permit spaces. If using an outside fire department or rescue team, a written memorandum of agreement can help verify the outside team meets the requirements and can respond in a timely manner.

12.12 Using SDS

If an injured entrant is exposed to a substance for which an SDS or other similar written information is required to be kept at the worksite, that SDS or other written information must be made available to employees for review and the medical facility personnel treating the exposed entrant.

Chapter 13: Safety of Students, Staff, and the Visiting Public

IA, BIA, and BIE must ensure students have places to live, play, and study that are free from hazards that may cause injury or illness. Every site, school, and dormitory must establish a student safety program based on IA policies, national standards, and OSHA regulations that help students understand their personal safety responsibilities.

Student safety helps protect students and can be linked to academic performance. Students working and living in unsafe or risky environments are at risk for poor attendance and poor academic performance.

CDSOs and SCMs will help establish the student safety program and will help develop safety materials to be used in the overall effort to prevent injuries to employees, students, and visitors. The CDSO and SCMs will periodically inspect various buildings and activities and, at the request of the principal, participate in the school student safety program, provide safety films, training, literature, and posters.

The custodian, janitorial, and/or facilities management staff will operate all emergency facilities and systems such as gas or oil cut-offs, air distribution systems, standpipes, sprinklers, and fire extinguishers, as required. They will also help evacuate students and personnel in an emergency.

Administrative staff will contact emergency responders for assistance. And teachers and dormitory aides will supervise student evacuations and perform all tasks necessary to ensure students' safety on a daily basis as well as in an emergency.

Students are expected to comply with safety rules and regulations pertaining to their attendance at all IA schools and are encouraged to serve on committees having to do with making their schools a safe place to attend.

Older students should encourage the younger students to observe all safety rules in connection with each athletic event, playground activity, dormitory living, sanctioned outdoor activities, field trips, school, and dining hall activities.

13.1 Classroom and General School Safety

Practicing safety in the classroom helps prevent accidents and injuries to students and helps prevent damage to equipment and facilities. Teachers and school administrators must model safe behaviors and discuss safety procedures and regulations.

The following recommendations will help keep classrooms free of accidents and injuries:

- Establish safety procedures and make sure that students understand and observe them.
- Inform students about evacuation plans for classrooms and other school environments, and make it clear what to do in case of an emergency.
- Teachers should inspect materials, equipment, and classroom facilities regularly.
- Only supplies that can be used within a week should be stored in the classroom. Otherwise, supplies should be stored in an area protected by a fire or smoke detection system.
- Unsafe or defective equipment should be tagged for repair or be replaced.
- Teachers should use posters and bulletin boards to highlight potential hazards and safety procedures.
- Students should be supervised when using equipment that may be hazardous.

- Emergency numbers and procedures should be posted in the classroom.

A. Physical Education.

Participation in physical education activities, both during class and as a recreational activity, creates a risk for injury. Both classroom and recreational activity accidents can be reduced by supervising participants and properly maintaining the equipment and facilities. The following recommendations help keep physical education activities free of accidents and injuries:

- Students should not be permitted to do more than they are physically capable of doing without harming themselves.

- Students should wear the appropriate clothing for the activity.

- When playing outdoors, staff should monitor the environment for excessive heat or cold, and for inclement weather that could pose a risk to students.

- Have a fully stocked first-aid kit on hand during activities.

- Staff should know how to recognize the signs of a concussion, such as dizziness and headaches.

- Ensure that all students follow safe practices while engaged in physical education activities.

- All physical education equipment must be installed correctly.

- All physical education equipment must be maintained in a safe condition. Broken or unsafe equipment should be taken out of service until it is repaired or replaced.

- Physical education equipment and facilities must be inspected periodically, and work orders submitted to correct any unsafe conditions.

- All students should be given safety instructions before beginning any activity.

- All students using the gymnasium for games and other activities must wear proper footwear. Students should not be allowed to participate without shoes.

B. Dining Hall and Kitchen.

Students working in kitchens and dining halls must know the safety rules and procedures. Students, especially young students, need to know which appliances and utensils are safe for them to handle and which are not and need to know hazards in the workplace, especially the hazards they cannot see such as bacteria and viruses.

The following recommendations will help students working in kitchens and dining halls avoid accidents and injuries:

- Cracked or chipped glasses should be discarded.

- Students should not handle raw food (such as chicken) without knowing the hazards.

- Students should be taught to keep kitchen surfaces clean and to wash their hands.

- Only high school and post-secondary school students should operate machinery, such as ovens, mixers, etc.
- Heavy food containers should be opened and the contents stored as a single item rather than in bulk.

- All cleaning powders, liquids, and detergents should be kept in a locked container away from the food-storage area, not accessible to students.

- Under no circumstances will the students be asked to use detergents and other chemicals without proper instruction, rubber gloves, and eye protection.

- Students will wash the dining room floors a section at a time. Warning signs will be posted with "Warning - Wet Floor - Very Slippery, Stay Off."

C. Industrial and Shop Classes.

All equipment used in industrial art classes must at least meet OSHA requirements. Teachers will be familiar with the care, operation, and safety features of all equipment being used for instructional purposes. The following recommendations will help keep students in industrial arts shop programs free of accidents and injuries:

- All projects must be approved by the shop teacher.

- Students should never work alone. At least two people must be present when power tools are used.

- Horseplay is not allowed.

- Using personal electronic equipment including ear buds or headphones should not be allowed while students are working in a shop.

- Students should never use tools or machinery without first receiving training.

- Never remove machine guards.

- PPE will be provided for students engaged in activities where personal injury is possible. This equipment will include goggles, face shields, welding helmets, gloves, aprons, respirators, and foot shields.

- Everyone in the shop should always wear closed-toe shoes.

- Everyone in the shop should always wear hearing protection when working with or around power tools or other machinery that are likely to exceed 85 decibels sound levels.

- Long, loose hair should be restrained and securely tied back to prevent machine and tool entanglement.

- Secure or remove loose clothing that can potentially get caught in power tools or other shop appliances.

- Food and beverages should only be allowed in designated areas.

- Good housekeeping should be maintained by regularly cleaning work areas. Floor areas must be kept free of debris and other hazards that may result in slips, trips, or falls.

- Always use the dust-collection system if available for power tools.

- Shop waste, sawdust shavings, and scrap wood should be properly disposed of at least daily and more often, if necessary, to prevent hazardous accumulations.

- Gasoline will not be used for cleaning purposes and will not be allowed inside school buildings.

- Operating heat-producing equipment such as welding, brazing, and soldering equipment, and heat-treating and metal-melting furnaces is restricted to secondary school students under proper supervision.

- Each shop will be equipped with fire extinguishing equipment.

- All manual and power-operated equipment will be located to allow a safe area of operation around each machine. Heavy equipment must be anchored to the floor or bench to prevent tipping over.

- Safety lines painted on floors will designate the area needed to safely operate each piece of equipment.

- All damaged tools and devices should be reported to the shop teacher immediately.

D. Power Tools.

The following recommendations will help keep students using power tools free of accidents and injuries:

- Students should not be allowed to use any power tool until they have been instructed in its proper use and only under strict supervision of the teacher.
- Students should always wear safety goggles or safety glasses with side shields when using power tools.
- Students should use a dust mask for dusty operations.
- Everyone using power tools should always wear hearing protection.
- Tired, sick, or distracted students should never use power tools.
- The area where students are working should have plenty of bright, shadow-free light.
- Before plugging in any power tool, make sure the power switch is off.
- Be sure all appropriate guards are in place and working.
- Safety signs and operational instructions will be posted near all power tools used in industrial arts shops.
- Students should turn off and unplug the tool before making any adjustments or changing accessories.
- Students should never use a tool that is damaged or malfunctioning in any way.
- Students should always unplug, clean, and store power tools in a safe, dry place when finished using them.

E. Hand Tools.

Hand tools are non-powered; teaching students to safely use them will help prevent injuries. Hand tools should be stored so that they are available to students only with the teacher's permission and under the teacher's supervision. Additionally:

- Tool handles should not be split and should be tightly fastened.
- To prevent slipping, the student's hands should be dry and not oily.
- Hand tools should be put back in their proper place when the task is complete, not left in the work area or sticking out from workbenches.

- Tools should be properly sized; for example, the proper size screwdriver should be used to fit the screw. Improperly sized screwdrivers slip and may cause injury.

- Use a tool only for what it is made. Wrenches are not for hammering, chisels are not for prying, screwdrivers are not for chiseling, files are not for hitting or prying, and so on.

- All hand tools must be maintained in good condition. Unsafe tools will not be used.

- All portable electric tools should be tested quarterly for electrical shorts and continuity of the equipment grounding conductor.

F. Arts and Crafts.

Pottery and glazing arts and crafts teachers must teach students to use all tools, materials, equipment, and supplies, and supervise their activities. Teachers must also take the following precautions to prevent injuries to students or visitors to the classrooms:

- Post signs near kilns during firing that read "KILN FIRING."

- Operate kilns according to manufacturer directions.

- Restrict kiln operations to the teacher in charge.

- Instruct students in dipping, brushing, and pouring glazes, and the need to wash hands after glazing.

- An approved respirator will be used by all students and teachers when using spray guns for glazing.

- All glazing activity will be done in a well-ventilated glazing booth.
    - Lead content glazes will not be used in the elementary grades without the approval of the school principal.
    - Only approved ceramic materials and supplies will be used.

G. Equipment Operation Test.

All students attending secondary or post-secondary schools that are enrolled in agriculture, art, homemaking, industrial arts, and vocational courses should be given equipment operation tests for the equipment on which they have been trained. Students will not be allowed to use power machines or equipment until they have satisfactorily passed an approved equipment operation test developed by the teacher.

A copy of each student's test should be kept and filed with the teacher's information. In case of a serious reportable accident, a copy of the student's test will be forwarded to the RSM, SPM, and accident investigation team.

13.2 Dormitory Safety

Dormitory employees must be familiar with the school safety program and know what their responsibilities are to keep the students' living quarters free from hazards, which may cause an accident to the student or the visiting public. Safety rules should be posted so that the students may refer to them. The following recommendations will keep dormitories free of accidents and injuries:

- Electrical outlets should not be overloaded.
- If extension cords are used, they should be Underwriters Laboratories (UL)-approved and not be under rugs or pinched by any object.
- Heating units should be kept clear.
- Hot plates, microwaves, and small ovens (anything with an open flame or exposed heating element) are not allowed in the rooms.
- Trash cans should be emptied daily.
- Floors should not be cluttered with clothing, trash, or other hazardous items.
- The bathrooms should be clean.
- Empty beverage and food containers should not be in the room.
- Smoke detectors should work.

13.3 Playground Safety

Students using play areas must be supervised. All playground equipment should be inspected frequently; unsafe equipment and facilities must be reported promptly. If serious hazards are identified, place a "DO NOT USE" tag on them. Copies of work order requests for playground equipment repair should be provided to the BIE SPM and to the school facilities and site operations CDSO.

The following recommendations will help keep playgrounds free of accidents and injuries:

- Surfaces around playground equipment should have engineered wood fiber or mats made of safety-tested rubber or rubber-like materials in accordance with the manufacturer's recommendations and requirements.

- Play structures more than 30 inches high should be spaced at least nine feet apart.

- Playground equipment should be inspected for dangerous hardware such as open "S" hooks or protruding bolt ends, and for sharp points or edges.

- Openings in guardrails or between ladder rungs should measure less than 3½ inches or more than nine inches.

- The playground should be checked periodically for tripping hazards such as exposed concrete footings, tree stumps, and rocks.

- Elevated surfaces (i.e., platforms and ramps) should have guardrails to prevent falls.

- Playground equipment and surfaces should be kept in good condition.

13.4 Water Safety

All water activities and instruction will be supervised by personnel having a valid Water Safety Instructor Card issued by the American Red Cross. One or more qualified lifeguards must be present for the entire time students are involved in activities related to water, specifically swimming sports and related events.

Fatigued, chilled, injured, or unruly swimmers should be ordered out of the water if their behavior, in the opinion of the person in charge, jeopardizes the safety of others.

All swimmers will follow these swimming pool rules and regulations:

- Swimming pools will have on hand first-aid and safety equipment necessary to ensure safe operations under both normal and emergency conditions.

- Rescue devices, such as ring buoys and shepherd hooks, will be prominently displayed in a convenient location in each pool area.

- Safety signs and pool markings will be posted in plain view.

- Emergency telephone numbers will be posted in plain view near the telephone. Emergency call procedures will be known by all pool employees and posted near the telephone.

- Emergency procedures will be known and rehearsed by personnel in charge.

- One or more qualified lifeguards will be on duty whenever a pool is open. A minimum of one lifeguard for every 50 swimmers, or fraction thereof, will be maintained. Additional personnel will be available when necessary to minimize drowning danger.

- Conversations between lifeguards and swimmers should be discouraged.

- The water in the pool or natural swimming area must be clear enough for the bottom of the deep area to be visible whenever swimmers are in the water. If the water is not clear, the pool or natural swimming area should be closed until the condition has been corrected.

- Chlorine and pH kits will be used by pool personnel acquainted with water-testing techniques.

- The pool lifeguards have authority to remove or exclude swimmers for:
  - disobeying pool regulations
  - eye, ear, skin, respiratory, or other diseases
  - appearing to be under the influence of alcohol

- Running and rough play are not permitted anywhere in the pool area.
- The lifeguard has the right to require swimming tests before allowing swimming in deep water. Swimmers will not be permitted to take non-swimmers or children into deep water.

- Diving is not permitted in water less than four feet deep.

- Water wings, buoys, tubes, or other enabling devices or eyeglass ware, such as sunglasses, water goggles, or diving masks are not allowed in the pool without the express authority of the person in charge.

- Baseballs, tennis balls, and related items are not allowed in the pool.

- All swimmers will be familiar with the pool rules.

13.5 School Activities

Principals, supervisors, and teachers must prepare for all on-campus, off-campus, and dormitory-connected school and student activities. Each trip off-campus may present hazards that must be considered, such as school bus operation, distance, and where the student and supervisor activities will be conducted. The following recommendations will help reduce accidents and injuries associated with activities:

- Choose suitable venues and providers.

- Cooperate and coordinate with third parties such as any special staff or event coordinator requirements.

- Arrange suitable travel to, from, or between locations and ensure that bus drivers are first aid trained and have a CDL.

- Arrange for suitable accommodation if the venue is off-campus and overnight.

- Have appropriate authorizations, risk assessments, and arrangements for activity participation involving staff and students.
- Have an emergency plan for activities away from the campus. The plan should include:
  - student names;
  - parent or guardian information;
  - location of nearest available hospital from any point on the trip;
  - emergency telephone numbers (including the principal's); and
  - any other pertinent information.
- Ensure the students have adequate chaperones.
- Ensure chaperones have first-aid training.
- Ensure adequate communications.
- Brief staff and students on the arrangements and codes of behavior.

13.6 Special Events

The principal of each IA-owned or IA-operated school is responsible for establishing safety requirements for special events and for ensuring a safe environment for students.

A. Fire Regulations for Special Events.

The school principal who is planning a special event will notify the BIE SPM at least 10 days before the event. Additionally, the event must comply with local fire department regulations, and the following fire-related requirements must be implemented:

- All electrical devices and equipment used on school property will be labeled UL-approved.
- All booths, stands, and platforms used for display or dispensing will be substantially constructed.
- Booths and stands will not obstruct any exit or passageway or block any door.
- Paper from paper drives will not be stored within 10 feet of buildings, in ways of egress, or on sidewalks or roads.
- Using propane or butane is prohibited except by vendors, workmen, and artisans.
- No person will inflate any toy balloon or other similar rubber toy device with any poisonous, explosive, or flammable gas.

- No bonfires or other open fires will be permitted on IA-owned or IA-operated school or adjacent property, except for functions approved and having standby protection from the local fire department.

- At any special event, portable braziers and barbecues using solid fuel (charcoal briquettes) may be used outside school buildings. Braziers and barbecues may not be used inside buildings.

- Using firearms or any type of fireworks involving flammable or explosive liquids or powders is prohibited, except for firearms in which blanks are used by authorized personnel for athletic events and practice sessions or Reserve Officers' Training Corps (ROTC) firing range activities.

B. Parade Floats.

All float decorations will be either treated with flame-retardant chemicals or made of non-combustible materials. This applies to all material ⅛-inch thick or less.

Smoking or using open flame gas lamps, flares, fuses, candles, or lighted matches is prohibited on floats. The BIE SPM or school CDSO will perform a final inspection of all floats and similar displays at least two days before use.

C. Food Preparation.

Food prepared for special events must conform to the health requirements and standards established by IA and the Indian Health Service (IHS).

D. Law Enforcement.

IA Law Enforcement Services and the Tribal or local police should be notified about all special events so they can make necessary arrangements for patrolling, traffic control, and related security.

13.7 HCS

The HCS covers using hazardous chemicals in schools and dormitories. Teachers and students need to know the identities and hazards of the chemicals to which they may be exposed. The HCS requires that management must follow these guidelines at schools or dormitories where chemicals are stored or used:

- Have a written Hazard Communication Program (HCP) that includes lists of hazardous chemicals present.
- Label all chemical containers.
- Maintain SDSs.
- Provide training on chemical hazards and protective measures.

A. Written Program.

The written program helps ensure that implementation is systematic; that all program elements are covered; and that potentially exposed employees, teachers, and students have the information they need to be protected. A typical school or dormitory written HCP contains an introduction, chemical inventory, and training and instruction.

The chemical inventory identifies and lists the hazardous chemicals in the workplace, provides information on container labeling, and notes the location of SDSs in the workplace and how they are accessed and updated.

The instruction and training section outlines the training requirements for teachers, students, and/or BIE employees using or exposed to hazardous chemicals.

B. Container Labeling.

IA managers and supervisors must maintain the labels on the chemical containers, including tanks, totes, and drums while the containers are on school or dormitory property. The labels must have the following information:

- Chemical identification
- Hazard information
- Pictograms that provide a visual warning of the chemical's hazards
- A signal word (such as "danger" or "warning")
- Hazard and precautionary statements
- The product identifier
- Supplier identification

Smaller commercial containers must also be labeled unless the contents of the container will be used up by the end of the work shift. Small quantities of chemicals intended for immediate use may be carried in a container without a label as long as it does not leave the user's possession, is used up by the end of the shift, or is properly disposed of by the end of the day.

C. SDSs

SDSs must be maintained at a central location for each hazardous chemical in the workplace. Teachers, employees, and students should have easy access to the SDSs. They may be kept in a binder at a central location (such as on a shelf in the workshop) or access can be electronic. In the event of an emergency, hard copy SDSs must be available to medical personnel so they know what first aid or medical treatment to provide.

The SDSs communicate information on the hazards of the chemical products present in the workplace. As of June 1, 2015, the HCS requires new SDSs to be in the following standard 16-section format:

Section 1, Identification. Includes product identifier, manufacturer or distributor name, address, phone number, emergency phone number.

Section 2, Hazard identification. Includes all the chemical's hazards.

Section 3, Composition/information on ingredients. Includes information on the chemical's ingredients and on trade secret claims.

Section 4, First-aid measures. Includes important symptoms/effects of the chemical and required treatment.
Section 5, Fire-fighting measures. Lists suitable extinguishing techniques and equipment.

Section 6, Accidental release measures. Lists emergency procedures, protective equipment, and proper methods of containment and cleanup.

Section 7, Handling and storage. Lists techniques for safe handling and storage.

Section 8, Exposure controls/personal protection. Lists OSHA's permissible exposure limits, American Conference of Governmental Industrial Hygienists threshold limit values, other exposure limits, and appropriate engineering controls, work practices, administrative controls, and PPE.

Section 9, Physical and chemical properties. Lists the chemical's characteristics.

Section 10, Stability and reactivity. Lists chemical stability and reactions if exposed to other chemicals or the environment.

Section 11, Toxicological information. Includes exposure routes, symptoms, acute and chronic effects of exposure, and toxicity.

Section 12, Ecological information. Provides information on the environmental impact of the chemical(s) if released into the environment.

Section 13, Disposal considerations. Provides disposal, recycling, or reclamation information for the chemical or its container.

Section 14, Transport information. Includes information for transporting the hazardous chemical.

Section 15, Regulatory information. Identifies the safety, health, and environmental regulations specific to the product not covered anywhere else on the SDS.

Section 16, Other information. Includes the date of preparation.

D. Training on the Chemical Hazards and Protective Measures.

Training teachers, workers, and students is essential to ensure they understand the information on hazards, where to get more information, and how to protect themselves. Training should be provided before the individual is first assigned to work in an area where chemicals are present, and when new hazards are introduced. Supervisors and teachers must give the following information to their employees and students on the chemicals present:

- HCS requirements
- Chemical hazards to which employees or students may be exposed
- Reading and understanding chemical label information
- Operations where hazardous chemicals are present
- Signs and symptoms of an exposure
- Protective measures such as specific procedures, work practices, or PPE
- How to recognize the presence or release of a hazardous chemical
- What to do in case of an exposure or if a spill or release occurs

Employees and students working with or around chemicals should receive instruction on the protective measures in place; some examples of those measures are as follows:

- Local exhaust ventilation
- Keeping containers closed
- Storing flammables in safety cans or flammable storage cabinets
- Storing incompatible chemicals separately
- Blanking, purging, and lockout/tagout
- Not eating, drinking, or smoking near chemicals
- Washing after handling chemicals
- Wearing appropriate PPE (e.g., gloves and goggles)

If chemicals present in the workplace are inadvertently released into the environment, employees, teachers, and students should be able to detect their presence in the following ways:

- Smell or odor
- Changes in chemical color
- Changes in the chemical's thickness or stickiness
- Detectors and alarm systems

- Reaction to other chemicals in the vicinity

If chemicals are inadvertently released into the environment, everyone should know whom to notify and what emergency steps to take.

13.8 Safety Councils

Schools and dormitories should have safety councils whose purpose is to bring employees, teachers, and school/dormitory administrators together to discuss issues and help the school or dormitory reduce the risk of injury or illness and comply with IA policies, federal regulations, and local requirements.

These are the primary goals of safety councils:

- Interact and provide information to the BIE Associate Deputy Directors (ADDs), SPM, CDSOs, and the school administrator by presenting clear discussions of issues, objectives, and concerns.

- Familiarize teachers, employees, and students with safety.

- Present various viewpoints for discussion.

- Promote interest and cooperation in accident prevention among teachers, employees, and students.

A. Organization and Meetings.

Each principal should organize a safety council in their school. The council should be chaired by the principal or their designee. Council members should include representatives from all the work units within the organization. One or more students should also be selected to serve on the council.

Safety council meetings should be held monthly, but frequency may vary depending on the size of the organization. Meetings should be held often enough to maintain interest in the council, but not so often that they must hunt for items to add to or make up the agenda. An agenda must be published in advance to allow members sufficient time to prepare for the meeting and will typically include the following:

- Review and follow-up action on items carried over from the previous meeting
- Major discrepancies and unresolved items from safety inspections
- Accident trends identified by safety inspections
- Determination of courses of action required to resolve problem areas
- Discussion and disposition of reported hazards
- Introduction of new accident prevention policies and directives

- Talks by selected guest speakers
- Preview of pertinent safety training
- Discussion and attendance of various safety-oriented training courses (e.g., volunteer fire fighters' school)
- Additional agenda items requested by employees and students

The Chairman of the safety council controls the meeting and does not allow it to become a grievance session. Each meeting should fall into one of four categories:

1) **Opinions requested.** Purpose is to get an expression of opinion. This can include people from outside the council membership.

2) **Informational.** Purpose is to develop ideas and ensure the council will pursue realistic goals.

3) **Development.** Purpose is for the group to develop a procedure to follow (e.g., planning a seasonal type of safety program).

4) **Reconciliation.** Purpose is to reconcile conflicting interests. The Chairman must ensure the discussion is kept impersonal and conducted in a business-like manner. Decisions made by a majority vote should get the support of the entire group. The Chairman should point out the advantages of the solution to the dissenters and point out that compromise is frequently necessary. The discussion should be reviewed and clarified to ensure that all members are aware of the conclusions. Written reports of all meetings are required.

B. Minutes.

Although records of activities should be maintained and actions that are taken recorded in writing, the paperwork should be kept to a minimum.

A copy of the minutes should be sent to each council member because these minutes reflect the items discussed and will serve as a reminder to those members who have received assignments requiring action.

A complete file of the minutes should be kept in the CDSO files for reference and to keep a record of unfinished items. Minutes of safety council meetings should be provided to the BIE SPM as a courtesy.

C. Student Safety Councils.

To ensure students have a voice in the OSH program, the school or dormitory should organize a student safety committee or student safety council. The committee or council should have a teacher advisor and plan student safety and well-being topics for the meeting agenda. The committee or council should also have a member representing the students on the school's safety council.

13.9 Fire Prevention

Having a Fire Prevention Plan (FPP) may help prevent fires from occurring in the school or dormitory. The Plan describes the fuel sources (hazardous or other materials) on-site that could initiate or contribute both to the spread of a fire, as well as the building systems, such as fixed fire extinguishing systems and alarm systems, in place to control the start or spread of a fire. The FPP must be an integral part of the school and dormitory safety program plan.

The FPP must be in writing and available to teachers, employees, and students for review. However, at sites with 10 or fewer employees, the plan may be communicated orally to employees. At a minimum, the fire prevention plan must include the following:

- A list of all major fire hazards, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard.

- Procedures to control accumulating flammable and combustible waste materials.

- Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials.

- The name or job title of employees responsible for maintaining equipment to prevent or control ignition sources or fires.

- The name or job title of employees responsible for controlling fuel source hazards.

Teachers and employees must be informed upon initial assignment to a job of the fire hazards to which they are exposed. The supervisor or manager must review with everyone those parts of the FPP necessary for their self-protection.

A. Protection.

Each school that does not have the protection of a regular city or county fire department will have an active volunteer fire brigade composed of members of the faculty, facilities management, and other school-based organizations.

During the annual safety inspection, and more frequent informal in-house inspections, particular attention should be paid to the condition of all fire exit doors, lights, fire extinguishers, and fire hoses. Under no circumstances will a fire exit be blocked, locked, or chained so the door is inoperable while the building is occupied.

All fire brigade members should have yearly training and every other year attend a volunteer firefighter’s school. The fire brigade members should train teachers, employees, and older students to properly use fire extinguishers and conduct in-house fire inspections to identify and eliminate all potential fire hazards.

Fire brigade members must respond to all fire alarms. If it is a false alarm, they should follow the same procedures as for an actual fire. All students should be removed from the building and brigade members should go through the building to make certain there is no fire, or anyone left in the building.

Firefighting equipment, such as fire extinguishers, should not be covered or concealed from view. School and dormitory staff should be on the alert for unauthorized use of fire extinguishers by students.

B. Fire Drills and Evacuation for Primary and Secondary Schools.

Fire drills will be held at least four times during each school term in all schools, including all the various buildings (e.g., dormitories, schools, dining room, and gymnasium).

The fire alarm system in each school will be tested at least monthly. A different alarm box will be used for each test to ensure that all boxes are working. Principals should number the alarm boxes in the various buildings and report the tests by number. A report of these tests should be included in the principal's monthly report to the school Superintendent's office.

A record will be kept in the principal's office including the date and hour of each drill and evacuation times for staff, teachers, and students. In each classroom, instructional cards should be posted that describe the procedures and exit routes for fires and fire drills. Methods should also be in place to ensure that all students and personnel are accounted for.

After a fire alarm sounds, people should do the following:

- All students, school personnel, and visitors will leave the building immediately.
- Speed should be secondary to control and order. There will be no talking, running, pushing, or taking stair steps two at a time.
- The first person to reach any exit door will open it.
- Students will not stop to take books, coats, or other personal belongings with them.
- The teacher will pick up the class attendance record and proceed with the group.
- The teacher or other adult supervisor will be the last one to leave the room and will check to be sure that everyone is out, turn off the lights, and close the door.
- Students will proceed to their assigned areas, away from the buildings.
- Students in lavatories, or otherwise away from their assigned rooms, will join the nearest line going toward the exit and proceed to a prearranged location, report to the teacher in charge, receive permission to join their own class, report to their own teacher, and take their proper place.

- All groups will assemble at least 100 feet from the building.

- Students will stay clear of any driveway or entrances that may be used by the fire department.

- Egress from rooms on the upper floors will be distributed so that each stairway accommodates a balanced number of exiting people.

C. Variations in Fire Drills.

The method of sounding the alarm for a fire drill should alternate between the automatic and emergency system. Fire drills should be conducted at different hours of the day or evening without advance notice. Variations in the drill such as the following should be considered:

- Blocked exit drills should be conducted where a customary exit or means of egress is unavailable. The usual procedure is that the administrator or custodian places a sign reading "Exit Blocked" at the head of the stairs or in front of an exit, which indicates to the students the non-availability of that exit or stairway.

- Gymnasium and auditorium drills will be held according to a pre-arranged plan.

D. Administrator's Duties.

The administrator supervises the fire drill and ensures that all rooms, auditoriums, and lavatories are evacuated. The administrator or designated assistant will take whatever steps are possible to protect the school's vital records. In case of a fire alarm, other than planned drills, the administrator or designated assistant will contact the local fire department or other designated emergency responders.

E. Custodian Duties.

The custodial or janitorial staff's primary duty should be to report to pre-arranged stations where they can operate all emergency facilities and systems such as gas or oil cut-offs, air distribution systems, standpipes, sprinklers, and extinguishers, as may be required. Secondary duties will include helping to evacuate students and personnel.

F. Administrative Staff Duties.

Administrative staff should be instructed to telephone emergency responders and the local fire department for help and do the following:

- Know the location of alarm boxes and the telephone numbers of the emergency responders and fire departments in the area.

- Know the location of other telephones or communications in the event that service to the school is interrupted.

- Know to active the fire alarm pull station that automatically connects to emergency services.

G. Teachers and Dormitory Aide Duties.

Teachers and dormitory aids should be instructed in the following:

- All teachers and dormitory staff should know the location of the fire alarm pull stations for the building to which they are assigned.
- The teacher or dormitory staff should supervise the group exit and make sure it is performed in an orderly manner. Additional duties include checking rooms and lavatories to make sure they have been evacuated.

- In "blocked exit" drills, the teacher will know the alternate route and guide or instruct the class about what course to take; maximum control will be maintained.

- The teacher or dormitory staff will gather the attendance records or register and leave with the class.

- Those in charge will make sure the class goes to its assigned position on the grounds after which the roll will be taken to make sure that all students are present. The teacher or dormitory personnel will remain with those for whom they are responsible.

13.10 Fire Drills and Evacuation for Post-Secondary Schools

Fire drills will be conducted twice during the first month of the school year to refresh the memories of the returning students and to instruct new students in the proper and safe ways to evacuate dormitories and school buildings.

A record will be kept indicating the evacuation procedure training and the dates completed. Consideration will be given to the type of building in which students are housed and the maturity of the students occupying the building.

Upon enrollment at the school, all new students will be thoroughly oriented about the fire exits of each building in which they are housed. Fire evacuation routes will be posted in all dormitories, and new students will be familiar with these routes. A report describing these drills must be submitted to the school CDSO.

It will be the responsibility of the staff member in charge of each dormitory to see that evacuation routes are posted in the dormitories and that all students are thoroughly familiar with the evacuation routes. It will be the responsibility of the staff member in charge of each classroom building, gym, and dining facility to see that evacuation routes are posted where needed and all students are familiar with fire exits in the buildings.

It will also be the responsibility of the dormitory staff member in charge to see that all telephone numbers needed in case of fire are posted in conspicuous places throughout the dormitories.

All staff members and students will know the procedures to notify the fire department and evacuate the building involved in case of fire.

13.11 Inspections and Evaluations

To identify, remove, and/or eliminate hazard-producing situations within the schools or dormitories, teachers and staff will do the following:

- Tour their area of responsibility daily to detect safety deficiencies.
- Inspect the immediate area, hallways, classrooms, closets, stairways, dormitories, gymnasium, and other areas on campus where students gather.
- Act, if possible, to remove the hazard, guard the hazard, or protect the students.
- Report unsafe conditions to their supervisor if immediate correction cannot be made.
- Contact facilities management if the condition is serious and complete a work order request so that necessary measures to eliminate the hazard can be taken.
- Provide a copy of the work order request to the CDSO and the safety committee.
- Make certain that all equipment meets the OSHA standard requirements.
- Pay particular attention to good housekeeping practices.

A. Frequency of Inspections.

Safety inspections should be an ongoing, integral part of each supervisor's daily responsibilities. These informal inspections are the supervisor's opportunity to look for unsafe acts by their employees, teachers, and students, and conditions that could result in accidents to students, staff, and the visiting public.

Deficiencies observed by the supervisor should be recorded and work requests submitted to facilities management identifying the hazard, location, and other required information needed for planning purposes. A follow-up system to ensure actions have been taken should be developed.

B. Spot Inspections.

Spot inspections should be conducted by the site CDSO and SCM. The objective of these inspections is to uncover hazards, determine causes, and recommend corrective actions. These unplanned visits will uncover temporary hazards and those not seen during scheduled inspections because of efforts made to temporarily eliminate them when inspections are announced. A suitable checklist prepared and used as an inspection guide will prove invaluable.

C. Inspection Report.

Each spot inspection of an activity should be recorded, and copies forwarded to the principal, dormitory manager, and BIE SPM. Work orders based on spot inspection findings should be submitted to facilities management. Copies of these findings should also be filed in the principal's office.

D. Self-Evaluations.

The annual safety evaluation is a self-evaluation. The principal or dormitory manager will select someone to lead the self-evaluation activity. The self-evaluation is an application that can be downloaded to a smart device. The application asks 32 questions that are answered online. The answers to the questions generate the annual evaluation report and provides a corrective action plan for the principal or dormitory manager.

13.12 Student Transportation

Vehicles used to transport students to and from school, and to and from school-sponsored activities will meet the DOT's Federal Motor Vehicle Safety Standards for school buses.

A. School Bus Operation.

All vehicles with a rated seating capacity of 11 or more occupants (including the driver) used on school-related events will meet federal standards for school buses.

Vehicles other than school buses can transport students on school-related events provided they meet the following criteria:

- Designed with a rated seating capacity of 10 occupants or less including the driver.
- All occupants must have seat belts and wear them while the vehicle is in motion.
- The cargo in the vehicle must be secured so that it does not become a flying missile in a crash situation. A cargo net or other adequate securement tie-down will be carried.
- Acceptable passenger vehicles include compact, intermediate or full-size cars, sports utility vehicles, vans, mini-vans and pickup trucks.

B. School Bus Inspections.

School administrators will ensure school buses are inspected annually by the General Services Administration (GSA). The BIE SPM may also inspect school buses as part of the annual OSHA-mandated site inspection program.

C. Driver's Licensing Requirements.

All school bus drivers will have a CDL. In 1999, The U.S. Congress directed the Federal Motor Carrier Safety Administration to establish a special CDL endorsement for drivers of school buses, prescribing minimum standards for written and driving tests that include the following:

- A driving skills test in a school bus of the same vehicle group as the school buses the applicant will drive.

- A knowledge test covering at least the following three topics:
  - Loading and unloading children, including the safe operation of stop signals, external mirror systems, flashing lights and other warning devices, and passenger safety devices required for school buses by state or federal law or regulation.
  - Emergency exits and procedures for safely evacuating passengers in an emergency.
  - State and federal laws and regulations related to safely traversing highway rail grade crossings.

Bus drivers must also meet minimum medical requirements.

13.13 Accident Response and Hazard Reporting

Principals and dormitory managers will tell their staff about the procedures they must follow in the event of an injury to a student.

In cases of student accidents, the individual who was responsible for the student at the time of the injury will see that the student receives proper first-aid treatment. If the injury requires more than first aid, the student will be transported to the nearest hospital or outpatient clinic.

13.14 Reporting Unsafe or Unhealthful Living/School/Working Conditions

IA has established a formal process for teachers, employees, and students to report unsafe and unhealthful conditions and to request the condition(s) be inspected.

Teachers, employees, and students have a right, and are encouraged, to report unsafe and unhealthful conditions to their supervisor, manager, facilities, or site operations CDSO, SCM, SPM, or the IA DSRM. Anyone can also report unsafe and unhealthful conditions directly to OSHA.

Informally, teachers, employees, or students can go directly to their supervisors or other managers and make a verbal report of an unsafe or unhealthful condition. In the case of an informal oral notification, the official receiving the report will enter the information into the standardized internet form.

In the case of imminent danger situations, employees will make reports by the most expeditious means available.

Employees exposed to unsafe or unhealthful conditions can file a “Indian Affairs Employee Report of Unsafe or Unhealthful Working Condition” electronic form on the IA Safety Management System (aka IA Safety Connect) at https://doimspp.sharepoint.com/sites/bia-ems/iasafety

The process also lets employees remain anonymous and still be informed when their concern has been resolved.

13.15 First aid and Cardiopulmonary Resuscitation

Administrators are responsible for providing information about where first-aid training and cardiopulmonary resuscitation certification courses are taught. All employees are encouraged to complete at least an American Red Cross standard first-aid course. Optimally, schools should strive to ensure that at least one first-aid certified adult staff member is present in any building or event location when students are present.

All school and dormitory staff will be made aware of the location of first-aid supplies and equipment in case of injury or illness. Standard 24-unit first-aid kits are required on school buses, for teachers conducting field trips, and in driver training automobiles.

Chapter 14: Safety Committees

Safety committees are required at locations with 15 or more employees. Safety committees, once established, will help managers and supervisors prevent workplace injuries and illnesses, property damage, and near-miss accidents. Safety committees can also protect the safety of students and the visiting public.

14.1 Function of the Safety Committee

Safety committees are an important part of the site, school, or facility safety program, forming a communication link among employees, supervisors, and management. The Safety committee's advice to management includes developing, coordinating, and reviewing the following elements:

- Workplace self-inspections
- Accident investigations
- Hazard complaint investigations
- Safe work practices
- Written OSH programs
- Training
- Employee reports of unsafe or unhealthful working conditions
- Safety program inspections and evaluations

Safety committees continually appraise the organization's OSH efforts to CDSOs, managers, supervisors, and employees. They also do the following:

- Discuss safety policies and recommend their review or adoption by management.

- Discover unsafe conditions and practices and determine appropriate remedies.

- Work to obtain measurable program results by helping to implement the recommendations.

Committee meeting minutes, recommendations, and management's responses should be in writing and retained for at least two years.

14.2 Safety Committee Membership (SCM) and Training

SCM should represent a cross-section of the workforce. Members should be selected for their knowledge of the workplace and their interest in safety—both theirs and their fellow employees. Safety committee membership should be comprised of people enthusiastic about their safety and the safety of those who work around them. The committee structure should include managers, supervisors, and employees from all the work areas within the site, school, or facility. Committee size should not be so large that it becomes ineffective.

To be effective, SCMs must be trained for their roles and responsibilities on the committee. Training should be provided within the first six months of their appointment, and refresher training provided periodically after that. A well-trained safety committee is a valuable tool to promote safety within an organization. Safety committee training should include the following topics:

- The Occupational Safety and Health Act of 1970
- OSHA safety regulations
- DOI OSH program elements
- IA OSH program requirements
- Site safety program
- Recordkeeping requirements
- Hazard recognition and correction
- Job hazard analysis
- Safety program auditing
- OSH inspection techniques
- Hazard abatement
- Accident and incident investigation
- Conducting effective meetings
- Specific training on OSHA regulations includes the following:
    - PPE
    - Hazard communication
    - Bloodborne pathogens

- Lockout/tagout
- Ergonomics
- Emergency procedures
- Fire prevention
- Housekeeping

Training SCMs is an ongoing process, not a one-day activity. Training can be done through online training resources, in-class courses, or trainers attending committee meetings to deliver specific training.

Safety training given to employees may cover some of the technical training required for SCMs.

14.3 Safety Committee Mission

The mission of the safety committee is as follows:

- Provide opportunities for managers and supervisors to participate in the OSH program and keep them informed on safety matters.
- Maintain employee interest in the OSH program and help everyone understand that their continued cooperation is needed to prevent accidents.
- Make OSH activities an integral part of operating policies and procedures and a function of daily operations.
- Provide an opportunity to freely discuss hazards, near misses, accidents, property damage, and possible preventive measures.
- Allow workers an avenue to report unsafe conditions and to help managers and supervisors evaluate safety suggestions.

14.4 Safety Committee Development

The safety committee is advisory and should not become, in effect, a management body. For it to be successful, the safety committee will need manager and supervisor support, recognition and participation from employees, and its existence seen as a service to the organization. When the committee is formed, certain fundamentals should be followed:

- The SCM should include a representative from each work unit in the establishment.
- The committee should be as small as is consistent with the above requirement. A small committee will function more effectively than a large committee.
- Safety committees should have the full backing of management.

- Safety committees should provide good two-way communication between employees and management.
- The safety committee must have effective leadership if it is to be successful.
    - The CDSO should participate on the committee but should not serve as the committee chairman.
    - The individual chosen to chair the committee should be enthusiastic about the safety program and be able to draw out discussion rather than dominate it and be familiar with committee practice and procedures.

- Employees participating on the safety committee should be chosen by their managers for their knowledge of the workplace and interest in managing the risks.

14.5 Safety Committee Charter

The safety committee charter should address the committee's mission, authority, responsibilities, composition, meeting frequency, and minutes. Committee charters should begin with an overview of the committee's purpose, which includes a mission statement and objectives, and an overview of committee membership. Additionally, the charter should address:

- Safety committee member term limits
- Safety committee member appointment process
- How the committee chairperson is chosen
- Vice chair or co-chair appointments
- Safety committee size limitations and requirements
- Safety committee member voting privileges
- Minimum number of committee members required to be in attendance to constitute a quorum

The committee charter should also list the committee's roles and responsibilities, which may include the following:

- Scope of committee activity
- Extent of committee authority
- Meeting times and place
- Agendas and order of business
- Reporting procedures
- Requirements for taking attendance
- Meeting frequency
- How meeting minutes are recorded

- Safety committee access to inspection, abatement, complaint, or other information

14.6 Planning and Meeting

Good safety meetings require thorough planning and effort. Meeting notices, preferably accompanied by an agenda, should be sent to each committee member.

The frequency of meetings varies, depending upon the type of safety committee and the program. There should be sufficient items of business to meet at least once a month. When the interval between meetings is longer than one month the members tend to lose interest.

Where possible, the meeting place should be comfortable and cheerful. Each person attending the meeting should be provided with a seat and be able to see and hear the speakers. Meetings should be conducted according to the generally accepted rules of order. Formality should not be allowed to overwhelm the meeting and inhibit free and frank discussions. The following is a suggested order of business that may be adopted for safety committee meetings in general:

1) The meeting should be called to order promptly at the appointed time.

2) Names of members and others present should be recorded. Members who cannot attend should notify the secretary in advance and the reasons for absence should be noted in the minutes.

3) Introduce visitors.

4) Minutes of the previous meeting should be read, and corrections made (may be waived).

5) All unfinished business on which definite decisions have not been made should be brought up for reconsideration.

6) Review accidents, including cause and proposed preventive measures.

7) When it is desired and time permits, the chairman should request a member to present a safety education topic at the next meeting. The subject to be discussed should be recorded in the minutes; other programs may be scheduled.

8) Facilities and installations should be inspected at regular intervals, sometimes by a subcommittee. A record of the inspection time, territory covered, unsafe conditions found, and recommendations made should be included in the minutes. Definite action, not necessarily favorable, should be taken on the recommendations and reported to the committee.

9) The chairman should question members about the condition of bulletin boards and posters under committee authority. Posters may provide good ideas for future meetings.

10) New business might include the chairman appointing subcommittees to arrange for the following:

   a. Competition between branches or installations.
   b. Special no accident weeks or months.
   c. Safety rally programs.
   d. Speakers from outside the installation.
   e. Accident statistics.
   f. Revising safety rules and shop practices.

Minutes should be taken, prepared, and circulated by the secretary, after approval by the chairman. The minutes are important because they are often sent to others besides committee members, especially top management. The minutes must accurately record all decisions made and actions taken because they keep management informed of the group's work and to help ensure follow-up.

14.7 Maintaining Interest

There are many ways to maintain interest among SCMs. Maintaining interest requires effort on the part of the chairman, the CDSO, and site management. Each SCM should have a committee work assignment to involve them in the success of the committee and overall installation safety. Additionally, supplying informative material, such as data from outside sources, accident frequency, and comparing data with other months of the year, other years, and other organizations helps maintain interest and purpose among SCMs.

Safety newsletters provide important safety information and may help promote the program. Monthly newsletters could consist of contributions from members of safety committees and others. The newsletter could include accident information, causes and methods of abating them, along with interesting articles from magazines and IA publications. The value of educating employees in accident prevention lies in helping them watch out for risky situations where employees can be injured and realizing that the risky behavior can be just as serious as the mechanical hazards.

Other ways of maintaining interest among committee members are well-prepared safety bulletins, toolbox safety meetings, prompt handling of committee member suggestions by chairmen, rotating members, and awards for special accomplishments related to the safety program.

14.8 Management Support

It is important that management show appreciation for the service provided by the safety committee and the work they do. Showing appreciation need not involve undue expense or difficulty, but some ideas to consider are as follows:

- A letter of appreciation signed by the BIA or BIE Director, BIA Regional Director, BIE ADD, site manager, school principal, site supervisor, or an agency superintendent.

- Expression of appreciation at a general employee group meeting.

- Special lunch for SCMs.

These suggestions are one way to encourage SCMs. Other methods could be used to highlight how important the safety program is, and that it is a top management priority. Employees need to know that leadership, managers, and supervisors are engaged, and that worker cooperation is essential for success.

14.9 Special Committees

Special committees or council subgroups are sometimes created to investigate specialty situations, advise the council on special topics, or conduct inspections. Examples of special committee activities are as follows:

- Review and recommend ongoing programs of the site, school, or facility.
- Develop and recommend proposals for new programs, initiatives, and action plans.
- Consider and develop plans and objectives for workplace operations.
- Develop and operate an organizational safety awards program.
- Review accident/incident/near miss information and reporting.
- Conduct workplace inspections.

An inspection committee is an effective way to engage all employees in the safety program. If the organization forms an inspection committee, the following should be considered:

- Depending upon the installation size, the inspection committee may have from one to five members, with three being optimum. There may be an inspection committee for the whole site or one for each workplace (if they are sufficiently large); a committee formed for a special purpose may make general or special inspections.

- The main contribution of the inspection committee is catching details overlooked by supervisors and employees too close to the job.

- Committee membership should rotate at intervals long enough so that each member gains personal experience and yet short enough so that the opportunity to serve can be passed around. One year of service is usually the minimum for inspection committee members.

- The supervisor is encouraged to accompany the committee on its inspection.

- The committee should also observe unsafe practices during the inspection. When found, they should be reported to the supervisor for resolution.

- Those making inspections should wear the required PPE in the areas they enter. If the inspecting team members do not have and cannot get the necessary PPE, they should stay out of the area until this equipment is provided.

- Observations, findings, and recommendations should be approved by the Safety Committee before the inspection report is issued.

14.10 Suggestion System

One of the many ways to encourage interest for safety among employees is a suggestion system. Employees operating equipment, machines, and doing field work are sometimes better able to suggest practical improvements than are inspectors, committee members, and others.

Employees working in shops and other areas around the site are likely to provide valuable suggestions, the adoption of which could prevent accidents, injuries, and property loss.

Suggestions are valuable for preventing accidents and improving conditions and methods, improving health, and increasing the well-being of employees. Employees should be encouraged to make suggestions that will do the following:

- Decrease the risk of accidents to themselves and their fellow workers and reduce the potential for damage to equipment and materials.

- Eliminate fire hazards and increase the effectiveness of fire extinguishing methods and equipment.

- Improve the sanitary and health conditions in the work area.

- Create more efficient operations.

- Provide better housekeeping, less clutter, and safer operations.

Chapter 15: Compressed Gas and Air

This chapter describes procedures for compressed air receivers and other equipment used to provide and use compressed air for performing operations such as cleaning, drilling, hoisting, and chipping. The hazards related to using compressed air must be evaluated, safety procedures implemented, and proper hazard information communicated to all affected employees.

This chapter also includes information about compressed gas cylinders. Depending on the compressed gas in a cylinder, content-release incidents could create environments hazardous to employee health. Cylinder rupture could also be fatal to employees working nearby. Cylinders containing medical gases or gases that are intended for human consumption must be handled by employees with specific training.

15.1 General Safety Requirements for Compressed Air

Supervisors must ensure employees are trained and qualified to operate each type of machine that uses compressed air before allowing the equipment to be operated unsupervised. Employees should also be familiar with the operator's manual and perform a pre-operational check of all air hoses, couplings, and connections to ensure there is no damage or leakage before beginning operations.

Air compressors should be positioned at the safest location in the work area. Using wheel chocks will ensure the compressor does not roll. The drive assembly on a belt driven compressor must be protected to prevent employee contact.

Unsafe equipment or damaged equipment should be tagged "Do Not Use" or equivalent and rendered inoperative by disconnecting it from its power source.

Machine and equipment operators must wear PPE appropriate to machine hazards. PPE requirements can be determined using the JHA process (see Chapter 2). Hearing and eye protection will be worn whenever employees are operating an air compressor.

Air pressure must be released from a compressor before removing any caps or air equipment attachments such as jackhammers and drills. Oils and flammable materials should be kept clear of air fittings and joints. A high temperature and/or carbon monoxide alarm must be installed on oil-lubricated compressors.

Hose connections should be secured to prevent hoses from coming loose during use. Hose ends must be secured to prevent whipping in case an accidental cut or break occurs. High-pressure air is dangerous and can cause severe injury.

Compressed air used for cleaning floors, equipment, and bench areas will be regulated to 30 pounds per square inch (psi), and only with effective chip guarding, diffuser nozzles, and PPE. The compressor pressure-relief valve will be checked, and the pressure relieved, before transporting a compressor unit. Compressed air must not be used under any circumstances to clean dirt and dust from clothing or a person's skin.

At the end of each shift, the compressor should be shut down, the air receiver condensate drain valve opened, and the system allowed to equalize or relieve pressure. The valve should remain open until the system is restarted and air begins to dissipate from the system.

15.2 Safety Valves

Safety valves must be installed and maintained in accordance with the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. No valve of any type should be installed between the air receiver and its safety valve or valves. Safety devices such as safety valves, pressure gauges, and pressure control devices should be installed where they cannot be made inoperative by any means, including corrosion.

Safety valves should be sized to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10%. All safety valves must be tested frequently to ensure they are in good operating condition.

15.3 Installation

Air receivers must be installed so that all drains, hand holes, and manholes are easily accessible.

Air supply hoses should not be placed across floors or aisles where they are liable to cause employees to trip and fall. When possible, air supply hoses will be suspended overhead, or located in areas where they are protected against damage. Operators will be aware of employees and others on foot in work zones.

15.4 Drains and Traps

The lowest point of every air receiver should have drainpipes and drain valves to remove accumulated oil and water. Automatic traps may be installed in addition to drain valves. The drain valve on the air receiver should be opened regularly and the air receiver completely drained to prevent accumulating excessive liquid.

15.5 Gauges

Every air receiver should be equipped with an indicating pressure gage (located to be readily visible) and with one or more spring-loaded safety valves.

15.6 Compressed Air in Machine Shops

Using compressed air in machine shops is subject to the following precautions:

- All compressed air pipelines, pipes, hoses, and fittings must have their maximum working psi identified.
- Air supply shutoff valves will be located (as near as possible) at the point-of-operation.
- Pneumatic impact tools, such as riveting guns, should never be pointed at another person.
- Before a pneumatic tool is disconnected (unless it has quick-disconnect plugs), the air supply must be turned off at the control valve and the tool pressure relieved.
- Goggles, face shields, or other eye protection must be worn by employees using compressed air for cleaning equipment.
- Static electricity can be generated by pneumatic tools. This type of equipment must be grounded or bonded if it is used where fuel, flammable vapors, or explosive atmospheres are present.

15.7 Compressed Gas Cylinders

Hazards associated with compressed gases include oxygen displacement, fires, explosions, and toxic gas exposures, as well as the physical hazards associated with high pressure cylinders. In the event of a leak, inert gases can quickly displace air creating an oxygen-deficient atmosphere, flammable gases can result in fire and exploding cylinders, and toxic gases can poison atmospheres. Special storage, use, and handling precautions are necessary to control these hazards.

15.8 General Cylinder Safety

Compressed gas cylinders create hazards in the workplace because of the pressure of the gas and the physical weight of the cylinder. A falling gas cylinder can break containers, crush feet, and the cylinder itself can become a missile if the valve is broken off. Safe cylinder handling procedures include the following:

- Accept only properly identified cylinders from suppliers.
- Provide employees with PPE appropriate for the hazard potential of the gas.
- If there is corrosion on the cylinder or valve, contact the supplier for instructions.
- Leaking cylinders should be removed and isolated in a well-ventilated area. It may be necessary to call trained emergency response personnel and to remove leaking cylinders from the workplace.
- If there is a gas leak between the cylinder valve and cylinder, contact the supplier for instructions.

15.9 Cylinder Storage, Use, and Handling

Cylinders should be properly secured in a well-ventilated area away from heat, flames, and the sun. Additionally:

- Segregate cylinders by hazard classes while in storage.
- Consider a cylinder empty and discontinue using it when the pressure goes below 25 psi.
- Mark or tag empty cylinders “Empty.”
- All compressed gas cylinders must be clearly labeled with the identity of the contents.
- Compressed gas cylinders must be stored in an upright position and always supported, whether full or empty. Store the cylinders using these methods:
    - Wall-mounted or bench-mounted gas cylinder brackets.
    - Chains or belts anchored to walls or benches.
    - Free-standing dollies or carts designed for gas cylinders and equipped with safety chains or belts.
- Gas cylinders must always have the valve protection cap in place except when in use.

- Dollies or hand trucks should be used to move cylinders weighing more than 50 pounds.
- Pressure regulators and gauges must be compatible with the cylinder valves.
- Never purchase more or larger cylinders than necessary.
- Flammable gases should not be stored next to an exit or near oxygen cylinders.
- Copper fittings or tubing should never be used on acetylene tanks.
- Teflon tape should not be used on cylinder or tube fitting connections that have metal-to-metal face seals or gasket seals.
- Oil or grease should never be permitted to contact cylinders or their valves, especially cylinders containing oxidizing gases.

15.10 Disposal

Most compressed gas cylinders are returnable and should be returned to the suppliers even if they are not empty. Some compressed cylinders are non-returnable, and disposal can be difficult and expensive. Therefore, when possible, compressed gases should only be purchased in returnable cylinders.

Chapter 16: Hand and Portable Power Tools

IA requires hand and portable power tools to be purchased, maintained, and used only by qualified employees who understand the limitations and requirements to safely use these tools.

IA has the following various tool types based on the power source they use: electric; liquid fuel; hydraulic; pneumatic; and powder-actuated. Tools can cause a variety of hazards including cuts, lacerations, blindness from flying particles, and serious contusions if caught in rotating parts or nip points. Tools must be inspected and, when required, employees trained in their proper use, maintenance, and the maintenance of their guarding systems. PPE may be required, even if guarding systems are in place.

16.1 General Requirements

Hand and portable power tools are a common part of an IA employee's daily life and present in nearly every workplace. These tools help employees perform tasks that would otherwise be difficult or impossible. However, these simple tools can be hazardous and can potentially cause severe injuries when used or maintained improperly. Paying special attention to hand and portable power tool safety will reduce or eliminate these hazards. These are the basic rules of hand and portable power tool safety:

- Employees should not use an unsafe or defective tool. Tools that are damaged or defective should be removed from service.

- Hand and portable power tools that generate sparks or operate at high temperatures will not be used in areas that are hazardous because of the presence of flammable or combustible materials.

- The facility is responsible for supplying specialized tools for employee use.

- Only qualified and trained employees may operate powder-actuated tools. Powder-actuated tools, also called direct fasteners and explosive actuated fastening tools, use a small, controlled explosion to drive a nail, stud, or other specialized fastener into a solid base material such as steel, concrete, or masonry.

- Before a job starts, the supervisor should ensure that the employee is fully aware of the hazards associated with the tools to be used.

- Either GFCI protection or an assured equipment grounding program will be provided for all power tools using 120 volts or greater current.

- Adapters that interrupt the continuity of the equipment grounding conductor will not be used (e.g., 3-wire to 2-wire adapter).

- Double-insulated tools do not require an equipment grounding conductor (3rd wire) in the cord, but they do require GFCI protection.

- Modifications will not be made to any tool or related equipment. The manufacturer's instructions will be followed when repairs are necessary.

- Tools should never be carried by their cord or hose; the cord should not be yanked to disconnect. Cords and hoses should also be protected from heat, oil, and sharp edges.

- Cords and hoses should be routed in a way that does not create a tripping hazard.

Non-sparking hand power tools will be required in areas with flammable or combustible material hazards unless monitoring ensures that the tool can be used safely.

The tools employees use should be appropriate for the job they are doing. Supervisors need to ensure employees can recognize the hazards associated with their work and select the right tool for the task. The worksite should have procedures to remove a tool from service. Whenever a tool is excessively worn or broken, procedures must be in place for its removal.

When tools are used that could present a hazard to anyone other than the user, all exposed employees will be instructed in the hazards. Follow these safety steps before beginning a job:

- Ensure the tool selected is the correct tool for the job.

- Tools producing 100 decibels of noise should be labeled with a "Hearing Protection Required" sticker or tag.

- Adjusting keys and wrenches should be removed before the tool is connected to the power supply.

- Before each use, the operator should visually inspect portable electric tools and accessories for damages or defects, to ensure the following:
  - Ensure the tool is in good condition.
  - Check power cord for damage or deterioration.
  - Check extension cords and equipment for loose parts and damaged cords.
  - Test portable GFCIs per manufacturer's specifications.

- Before using the tool, the operator should check the workplace for nails, clutter, or similar hazards or imperfections that could place the operator in danger.

- Check the attachment plug, connector body, and cord for the following:
  - General condition
  - Cord grip tightness
  - Grounding prong integrity
  - Reverse wiring
  - Condition of outer cord jacket. Cord will not be spliced and must be replaced if outer jacket is damaged.
  - Boot and visible parts of body for damage, loose parts, or deterioration
  - Lamps should be a rough-service type and checked for lens, bulb, or power cord damage
  - Handle, guard, other visible parts of the tool for damage, loose parts, or deterioration

While using the tool, follow these guidelines:

- Employees using hand or portable power tools should have the appropriate PPE for the job, including:
  - Do not wear loose clothing or dangling jewelry.
  - Confine long hair in a hairnet, cap, or fasten securely to the back of the head.
  - Use care when operating tools while wearing gloves.
  - Safety glasses are the minimum PPE when using any tool; additional PPE requirements may be necessary depending on tool being used and job application.
  - Use hearing protection if required.

- Follow the manufacturer's instruction when using any tools.

- Keep cutting tools in good condition. Sharpen or replace when necessary.

- Never use fingers to pull or dislodge chips or turnings from tools or parts. Use pliers, rakes, or hooks.

- In some areas, compressed airlines have been installed for specific uses. Be sure that air-powered tools are hooked up only to lines supplied for the purpose.

- Do not set down or carry a portable power tool in any way so that the starting trigger or button can be accidentally struck.

- Precautions must be taken when tools are used in a wet location (e.g., electrically insulated gloves).

- Power tools will be stored in a dry location when not in use.

- Tools will not be carried by their cord or hose.

- Cords or hoses will not be yanked to disconnect it from the receptacle.

- Tools will be disconnected when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.

After using the tool, follow these guidelines:

- Disconnect tools from their power source when not in use.

- Never lubricate, clean, repair, or adjust a tool while it is connected to a power source.

- After a job is finished, clean all scrap and debris from the worktable and surrounding area. Use proper receptacles.

- Take care of all tools. Keep them sharp and clean. Follow manufacturer's instructions for lubricating, changing accessories, and inspection.

All electric tool repairs will be made by a factory authorized tool repair service or a designated portable power tool repair service. The only exception is cord plugs and connector bodies that may be replaced by a qualified person with an electrical background. After replacing the plug or body, test the ground integrity. Do not repair portable GFCIs.

16.2 Guarding Methods

One or more guarding methods should be provided to protect the operator and other employees in the area from hazards such as flying chips, sparks, and risks created by point-of-operation, in-running nip points, and rotating parts.

Examples of guarding methods are blade guards, barrier guards, and electronic safety devices. Guards should protect the operator from danger and not create additional risk themselves. Before operating tools with guards, employees will do the following:

- Inspect tools for signs of guard tampering or removal. If it is evident that a guard is missing, the tool should be tagged out of service and a replacement obtained.

- Inspect tools having guards for proper operation and maintenance before using.

- Operators should never remove a guard while the tool is in use.

Each facility should conduct a self-assessment to evaluate compliance with tool operation and guarding requirements and develop action plans to correct deficiencies.

16.3 Powder-Actuated Tool Training

Users of powder-actuated tools must be trained and certified. Training may be conducted as part of an apprenticeship program or in other recognized training forums. Employees who indicate they have had prior training will be required to demonstrate understanding, capabilities, and produce a certification before being assigned to work. Manufacturer's instructions will be retained for training and reference purposes. Employees using powder-actuated tools must have specific training in their operation. Additionally:

- OSHA requires that employees receive training and certification before they use any powder-actuated tool/system.

- Employees must pass a written exam before they will be certified.

- Some training programs include hands-on experience.

- Most powder-actuated tool distributors have certified instructors, and some manufacturers offer online training.

- A record of training will be kept in personnel training files or equivalent recordkeeping system.

16.4 Training and Re-Training

To prevent injuries, IA, BIA, and BIE must ensure all employees have training using all tools necessary to perform their jobs and are provided with the necessary PPE.

The hand and portable power tool safety topics should also be provided to employees during toolbox safety meetings and other informal times. Training can be conducted on an as-needed basis or when the following conditions are met:

- Re-training will be provided whenever there being a change in job assignments, a change in the type of tools used, or when a known hazard is added to the work environment.

- Additional re-training will be conducted whenever a periodic inspection or observation by the supervisor indicates gaps in the employee's knowledge or use of tools.

- The re-training will reestablish employee proficiency and introduce new or revised methods and procedures, as necessary.

Supervisors will verify that employee training has been accomplished and is being kept current. Supervisors will also retain training documentation that includes at a minimum, each employee's name, training title, and training dates.

Chapter 17: Lockout/Tagout

This chapter assists in complying with OSHA requirements for controlling hazardous energy in 29 CFR 1910.147. It also describes working on or around equipment where employees may be exposed to unexpected energization, motion, or start-up and includes servicing or maintaining machines and equipment at all locations.

This chapter does not apply to cord- and plug-connected electrical equipment where the plug is under the direct control of the servicing mechanic.

17.1 The Lockout/Tagout Program

The lockout/tagout (LOTO) Program establishes the minimum requirements for isolating energy whenever maintenance or servicing is done on machines or equipment. It ensures the machine or equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before employees perform any servicing or maintenance where the unexpected energizing or start-up of the machine or equipment or release of stored energy could cause injury.

All employees are required to comply with the restrictions and limitations imposed on them and the equipment during lockout. No one will attempt to start, energize, or use a machine or piece of equipment that is locked out to perform servicing or maintenance.

17.2 Written Procedures

Written procedures should be in place and up to date for isolating energy sources (locking, blocking, and tagging). The procedures should include both routine and non-routine service and maintenance work, as well as set-up, cleaning, and un-jamming.

These procedures must have sufficient detail for employees to control all the hazardous energy they may be exposed to (such as electrical, mechanical, gravitational, hydraulic, pneumatic, chemical, thermal, or other hazards). Procedures must also be in place to maintain the integrity and continuity of the LOTO requirements during shift changes or personnel changes.

The written procedures should detail how contractors will be informed of the establishment's LOTO Program, procedures, and devices. They should also detail how IA employees will be informed about the contractor's program.

17.3 Applying Locks and Tags or Other Energy Control Devices

LOTO consists of the following six steps:

1) **Prepare for shutdown.** The authorized employee must have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled and the methods and means to control the energy. This knowledge should include a review of the written procedure.

2) **Shutdown machine or equipment shutdown.** Shutdown machine or equipment using the established written procedures (normal operating procedures) after notifying affected employees of the shutdown.

3) **Isolate machine or equipment.** Locate and isolate all energy sources.

4) **Apply hazardous energy control device.** Attach lock and tag (or other device) so that equipment is held in a "safe" or "off" position.

5) **Power down energy sources.** Relieve, disconnect, or restrain all energy sources so that they are made safe.

6) **Verify isolation.** The authorized employee will verify isolating and de-energizing the machine or equipment by trying to activate the machine.

17.4 Tags without Locks

Tags will always accompany LOTO specific locks, with these exceptions:

- If locks cannot be used, tags must be supplemented by other means to ensure an equivalent level of safety to that of a lock application.

- Locks are not used, and the supplemental means must be reviewed with each authorized and affected employee.

- When equipment is being taken out of service (i.e., abandoned in place or no longer used), non-LOTO locks and tags can be used. The tag will contain the words "Out of Service" and an appropriate description.

17.5 Other Energy Control Devices

Other energy control devices include the following:

- Blocks, chains, wedges, adapter pins, or self-locking fasteners may be used to block machines or equipment from unexpected energization.

- Automotive repair personnel should consult with the vehicle servicing guidelines to determine if removing the ignition key is sufficient to ensure energy hazards are controlled, or if batteries must be disconnected during diagnostic or repair activities.

- Generators and similar stand-alone equipment must have the energy sources controlled by disconnecting the spark plug or locking out the engine controls.

The responsible authorized employee should compete the following steps when releasing from LOTO or restoring equipment to service:

- Check the work area to ensure tools and other non-essential items have been removed and the machine or equipment components are intact.

- Check the area to ensure employees have been safely moved away from the work area.

- Verify that the machine controls are in neutral or off.

- Remove the LOTO device(s).

- Reenergize the machine or equipment.

- Notify area employees the servicing or maintenance work is completed, and the machine is ready for use.

17.6 Lock Removal for Absentee Employee

Each LOTO device will be removed from the energy-isolating device by the authorized employee who applied the device. When the authorized employee who applied the LOTO device is not available to remove it, the device may be removed under the direction of a single designated person at the facility provided this designated person follows these specific procedures:

1) Verify the authorized employee who applied the device is not at the facility.

2) Make every effort to contact the authorized employee to inform them their LOTO device has been removed.

3) Ensure the authorized employee knows their device was removed BEFORE they resume work.

The establishment manager will designate a primary authorized employee who could be the CDSO or another individual to serve in this capacity. The primary authorized employee will ensure consistent application of the absentee lock removal process.

17.7 Tag Application

Use only approved LOTO locks, tags, blocks, and other devices. Additionally:

- Tags should be attached with nylon cable ties or an equivalent strength material.
- Tags should be attached to the locks.
- Tags must contain the following information:
  - Name of equipment being secured
  - Name of person securing
  - Date of application (securing)
  - How to contact person securing
  - Reason for being secured (e.g., taken out of service, repair)
  - A statement prohibiting removal or tampering with the lock or tag
  - A statement such as “Do Not Start,” “Do Not Open,” “Do Not Close,” “Do Not Energize,” or “Do Not Operate”.

17.8 New Equipment Design or Major Modifications to Existing Equipment

Machinery must be able to be locked out or made lockable when they are:

- replaced or undergo major repairs,
- renovated or modified, or
- purchased and installed.

New equipment installations must be capable of being locked out as an integral part of the machine (i.e., without the use of chains or other barriers).

17.9 Group Lockouts

Whenever servicing or maintenance is performed by a group of employees, the IA site, school, or facility must have an energy control procedure that provides authorized employees with the same level of protection as a personal lockout or tagout device.

Servicing and maintenance operations performed by a group of employees are often more complex than servicing or maintenance performed by an individual. As a result, group lockout or tagout operations typically require more coordination and communication than personal lockout or tagout operations.

Under the OSHA standard group LOTO requirements, the primary authorized employee must assume the overall responsibility for controlling hazardous energy for all members of the group while the servicing or maintenance work is in progress.

Group lockout devices may include a lockable container (like a strong-box) to hold the process lock keys and tagout records for large jobs and long-duration work, or a multiple lock adapter (that will not release until all locks have been removed) for single machines that require more than one lock.

A master locking device provides protection from the main energy source and is the sole responsibility of the primary authorized employee.

Each authorized employee involved in the group lockout must affix a personal lockout or tagout device to the machine, equipment, or into a group lockbox or onto the device when their work begins and remove it when their work is completed.

17.10 Shift/Personnel Change Procedures

Specific procedures to account for shift or personnel changes must ensure the continuity of LOTO protection and must include a provision for the transfer of devices between off-going and on-coming employees. This will minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment or the release of stored energy.

17.11 Required Periodic Inspections

The work site should appoint a LOTO program manager; this is often the CDSO. The program manager/CDSO must inspect LOTO procedures and actual lockouts to ensure they meet regulatory requirements. The inspection should be led by an authorized employee who has been trained in that procedure. This person must be someone other than the one performing the lockout. The inspections requirements include the following:

- Check training records to verify people have been trained to the level necessary.
- Ensure the procedure document was reviewed within the last calendar year. Reviews must ensure the procedures are up-to-date, adequate, understandable, and being followed.
- Verify that all employees authorized to use that procedure participate in the review (group meeting reviews are acceptable).
- Inspect actual locks/tags used in the workplace to verify the equipment is being locked out properly. The inspector and the person locking the equipment are required to participate, at a minimum.
- Ask operators how they would lock/tag equipment and verify by demonstration.
- Note and correct any deficiencies.
- Document the assessment using the inspection certificate form provided with the program, or an equivalent record. Both the inspector and the person performing the LOTO must sign the assessment certificate.

If the procedure is found lacking or deficient, it must be revised and all employees who would use that procedure must be re-trained on the new procedure before servicing or maintaining that equipment.

Each procedure that is used for "normal" or "routine" lockouts must be reviewed at least once per year. "Non-routine" lockouts must have a procedure reviewed before the procedure is used if it has not been used in the last calendar year.

17.12 Safety Information

Specific requirements for electrical LOTO with more than 50 volts to ground are as follows:

- Only an electrical qualified person can operate the equipment or otherwise verify the equipment cannot be restarted.
- Only an electrical qualified person can use test equipment to test the circuit elements and electrical parts of the equipment, including exposure to back-feed or inadvertently induced voltage.
- Only an electrical qualified person can conduct tests and inspections to verify the equipment can be safely re-energized.
- Locks must be accompanied by tags describing the work being done.
- Safe de-energizing and re-energizing procedures must be determined before service or maintenance is performed and approved in writing by an electrical qualified person before the actual LOTO is performed.

17.13 Training and Re-Training

General LOTO training includes the following:

- Training will be provided to authorized, affected, and other employees, based on their exposure to LOTO and Hazardous Energy Control procedures.
- Training is required:
  - upon initial assignment,
  - when changes in job responsibilities occur,
  - when new equipment is brought into an area,
  - when new processes that present new hazards are introduced,
  - when there are changes in the hazardous energy control procedures,
  - when deficiencies or deviations from established procedures are noted, and
  - when an inspection or review reveals deficiencies.

Three specific levels of training are required. These are as follows:

1) **Authorized employees** will receive formal LOTO training. The training should also be supplemented by localized application, procedure, or equipment-specific instruction, which includes written procedures and hands-on instructions in LOTO application. The training should enable the recognition of hazardous energy sources, the type and magnitude of the energy source, and the methods and means necessary for energy isolation and control.

2) **Affected employees** will receive a mid-range level of training to inform them of the purpose of the program, and their limitations and responsibilities under the program.

3) **Other employees** can be trained verbally, or by another method, and will inform employees about the procedure and program, about the prohibition relating to attempts to start machines or equipment that are locked out or tagged out, and in recognizing LOTO devices and their purpose.

Re-training is required for both authorized and affected employees under the following circumstances:

- Employee lockouts are performed incorrectly, reviews reveal deficiencies, or when there is reason to believe there are inadequacies in the employee's knowledge of the energy control procedures.

- A change in job assignment.

- Modifications to equipment occur which affect the LOTO procedure or present a new hazard.

- A procedure has been changed since the last time the employee performed LOTO on that equipment or machinery.

All levels of training and re-training should include information on who serves as the primary authorized employee designated for the lock removal for an absent employee.

Training records must be maintained and include the following:

- The name of the employee trained
- The date of training
- As needed, information on the specific procedure to which the employee is trained (i.e., a non-routine task).
- Copies of training materials (i.e., the specific written procedure and signed inspection certificate) used for non-routine tasks must be maintained as well.

17.14 Tagout Only Systems

When tagout only systems are used, all employees will be trained on the following tag limitations:

- Tags are warning devices only and do not provide physical restraint.
- Tags may not be removed, except by the person who applied them.
- Tags must be legible and understandable by all employees.
- Tags must stand up to the conditions where they are applied (wet, cold, heat).
- Tags must be secure, so they do not inadvertently fall off or get removed.
- Tags may evoke a "false sense of security" and must not be used as a sole system when locks or other devices can be applied.

Chapter 18: Liquefied Petroleum Gas and Natural Gas

This chapter covers the general procedures to safely handle and store all liquefied petroleum (LP) gas and natural gas cylinders larger than one liter in size and provides recommended safe practices for transporting these cylinders.

All LP gas and natural gas cylinders or containers on IA sites, schools, facilities or used in the field, must bear the proper label for LP gas or natural gas.

18.1 Safe Handling Procedures for LP Gas/Natural Gas

Containers will not be filled except by the supplier of the cylinder/container or with the supplier's consent. When filling is authorized, it will be accomplished in accordance with DOT, OSHA, and Compressed Gas Association (CGA) requirements.

The supplier will inspect cylinders before they are filled and delivered to IA in accordance with CGA and National Fire Protection Association (NFPA) guidelines. After delivery, inspection requirements become the responsibility of IA. To obtain any of the CGA safety manuals, a current catalog is online here: www.cganet.com.18.12 Training on Usage of LP and Natural Gas.

Warning labels on LP gas and natural gas cylinders/containers must always be legible. All employees, whose work may be in an area where LP gas and natural gas cylinders are used will be instructed to recognize and understand warning labels. At a minimum, the following will be addressed:

- When a warning label is attached to an LP gas or natural gas cylinder/container, it should not be removed, bypassed, or ignored.

- To be effective, warning labels must be legible and understandable by all employees who work in the area. Non-legible or missing labels must be reported to the supervisor, CDSO, or SCM immediately.

- Labels and their means of attachment must be made of materials that will withstand the environmental conditions encountered in the workplace.

- Labels must be securely attached to cylinders/containers so that they cannot be inadvertently or accidentally detached during use.

- Ignition sources are not permitted in areas where LP gas and natural gas are stored or transferred. Liquefied natural gas must be stored and transferred under positive pressure to prevent the infiltration of air or other gases.

- Provisions must be made to protect LP gas and natural gas operations from exposure to adjoining buildings, equipment, property, and concentrations of people.

- Where storage areas are heated, the source must be by steam, hot water, or other indirect means. Heating by flame or fire is prohibited.

- Electrical equipment will conform to the provisions of the NFPA 70, National Electrical Code Article 501, for Class 1 Division 2 locations.

18.2 Maintenance of LP Gas and Natural Gas Cylinders

LP gas and natural gas cylinders and their accessories will be maintained only by the supplier or their authorized representative. Any employee who is not sure of the type of maintenance allowed on cylinders should contact their supervisor, CDSO, or SCM for further information. Additionally:

- The markings or symbols stamped into cylinders will not be removed or changed unless the cylinder supplier has consented to the change, and it is done in accordance with valid regulatory standards.

- No employee will deface or remove any markings, labels, decals, tags, or stencil marks applied by the cylinder supplier and used to identify content.

- No employee will change, modify, tamper with, obstruct, or repair pressure relief devices in cylinder valves or the cylinders themselves.

- Cylinders will not be painted. If a cylinder shows signs of corrosion, it will be removed from service and returned to the supplier.

- Suppliers paint their cylinders for recognition and segregation. If IA changes suppliers of LP gas or natural gas, the color codes could also change. This makes it important to always

double-check the cylinder, so it is appropriate for the intended use. Never rely solely on the cylinder color for identification.

- Any cylinder suspected to be contaminated or having suspect contents should be immediately removed from service and reported to the supervisor, CDSO, and the supplier.

18.3 Leaking or Defective Cylinders

Employees should be advised by their supervisor of what to do if they discover a leaking, defective, or corroded cylinder. Specifically, employees should be informed to take the following actions:

- Notify workers in the immediate area of the leak.

- Evacuate everyone in the immediate area to fresh air if the cylinder could contain hazardous material (preferably upwind or side wind relative to the source).

- Report the following as soon as possible to the supervisor, CDSO, or SCM:
  - Contents
  - Location
  - Number of employees in immediate area
  - Circumstances of the release
  - Condition of container
  - Other pertinent information as required

18.4 Cylinder Usage and Moving Requirements

Where IA employees are responsible for handling and connecting cylinders for use, the operation will not proceed unless the contents can be verified by legible markings and labels.

Additionally, where removable caps, outlet caps, or plugs are provided by the gas supplier for valve protection, IA employees will always keep the caps on the cylinders except when the cylinders are connected to dispensing equipment.

No cylinder will be used for anything other than its intended purpose. Cylinders will not be used as rollers, supports, or for any purpose other than to contain the content as received. When cylinders are not being used, the valves will always remain closed.

Cylinders will not be rolled, dragged, or slid. A suitable hand truck, fork truck, roll platform, or similar device will be used to move cylinders. Cylinders will not be dropped or permitted to strike violently against each other or other surfaces. Additionally, these lifting requirements should be followed:

- Cylinder caps will not be used for lifting except for the use of hand trucks that grip the cylinder cap for lifting onto the hand truck. In any case, the cylinder will not be lifted higher than six inches above the operating surface.

- Magnetic lifting devices are prohibited from use with LP gas and natural gas cylinders.

- Ropes, chains, or slings are prohibited from use with LP gas or natural gas cylinders unless lugs or lifting attachments are provided by the manufacturer.

- Where approved lifting attachments have been provided by the manufacturer, cradles or platforms are authorized for use.

18.5 Cylinders Storage Requirements

When storing LP gas and/or natural gas cylinders, specific requirements must be followed. Specifically:

- Post "No Smoking" signs in the storage area.

- Post signs indicating LP gas or natural gas are stored in the area.

- Where different types of gases are stored in the same general area the following apply:
  - Gases will be stored with like gases and segregated from dissimilar gases.
  - Full and empty cylinders will not be intermingled. Separate storage areas will be delineated for each.
  - Stock will be rotated so that the oldest material will be the first to be used. The storage layout will be such that old stock can be removed first with a minimum handling of other containers.
  - Storage rooms used by IA will be well-ventilated and dry. Room temperature will not exceed 125°F. Avoid storing in subsurface locations.
  - Cylinders will not be exposed to continuous dampness and should not be stored near salt or other corrosive chemicals or fumes. Corrosion may damage the cylinders and may cause the valve protection caps to stick.
  - All LP gas and natural gas cylinders in use will be restrained above the midpoint to prevent them from accidentally falling over. Gas cylinders with a water volume up to 305 cubic inches (5 liters) may be stored in a horizontal position.
  - Liquefied gas cylinders, except those designed for use in a horizontal position on tow motors, will be stored and used valve end up.
  - Cylinders may be stored in direct sunlight, except in localities where extreme temperatures prevail (above 125°F). If the cylinder supplier recommends storing in the shade for a particular gas, this recommendation must be observed.

- Cylinders stored inside will not be located near exits, stairways, or in areas normally used or intended for the safe exit of employees.
- LP gas and natural gas cylinders stored inside buildings with other occupancies will be kept at least 20 feet from combustibles or ignitions sources.
- LP gas and natural gas cylinders stored inside industrial buildings on IA property (except those in use or those attached for use) are limited to a total cylinder content water capacity of 735 pounds for LP gas.

18.6 Connecting Cylinders and Withdrawing Content

When connecting cylinders and withdrawing content, specific requirements must be followed:

- Trained employees will verify that a label exists and review the label before beginning operations with an LP gas and natural gas. Unmarked cylinders will not be used. Such cylinders will be reported to the supervisor, CDSO, or SCM.

- The cylinder color will never be relied on to identify cylinder contents.

- Caps will be retained and not removed until the cylinder is placed in service.

- A suitable pressure-regulating device will be used where gas is admitted to a system of lower pressure rating than the supply pressure.

- A suitable pressure relief device will be used to protect a system using LP gas and natural gas where the system has a pressure rating less than the LP gas and natural gas supply source and where, due to the gas capacity of the supply source, the system pressure rating may be exceeded.

- Connections that do not fit will not be forced. Threads on regulator connections or other auxiliary equipment will match those on container valve outlets.

- Where LP gas and natural gas cylinders are connected to a manifold, the manifold and its related equipment will be of proper design for the product(s) they are to contain at the appropriate temperatures, pressures, and flows.

- Regulators, gauges, hoses, and other appliances provided for use with a particular gas or group of gases will not be used on cylinders containing gases having different chemical properties unless information obtained from the supplier indicates that this can be done safely.

18.7 Container Valve Requirements

Cylinder valves will be opened slowly and pointed away from other employees and sources of ignition. For valves having no hand wheel, the wrench provided by or recommended by the supplier will be used. On valves containing a hand wheel, wrenches will not be used. Additionally:

- Valves will never be forced open or closed. If valves become frozen for whatever reason, the supplier will be contacted to provide instructions.

- LP gas and natural gas will not be used to dust off clothing or clean work areas of debris. This may cause serious injury to the eyes or body or create a fire hazard.

- LP gas and natural gas will not be used where the cylinder may be contaminated by the feedback of process materials unless protected by suitable traps or check valves.

- Connections to piping, regulators, and other appliances will be kept tight to prevent leakage. Where a hose is used, it must be kept in good condition.

- Before a regulator is removed from a cylinder, the cylinder valve will be closed and the regulator drained of gas pressure.

18.8 Fire Protection Requirements

Adequate portable fire extinguishers of carbon dioxide or dry chemical types will be made available for fire emergencies at IA storage locations.

“No Smoking” signs will be posted around the storage area of buildings or at the entrance to storage rooms. Additionally, a flammable gas leak detector, soapy water, or other suitable solution will be used to detect LP gas and natural gas leaks.

18.9 Training and Re-Training

Initial training will be provided before job assignment. Supervisors will provide training to ensure the knowledge and skills required for the safe application and usage of LP gas and natural gas are acquired by employees. The training will include the following:

- Employees who work with LP gas and natural gas cylinders will be trained to recognize the hazards associated with these materials, and the methods and means necessary for safe operation.
- Employees who work in the vicinity of LP gas and natural gas cylinders will be instructed in the purpose and use of LP gas and natural gas.

- All other employees whose work operations are or may be in an area where LP gas and natural gas may be used will be instructed about emergency procedures and prohibition(s) relating to LP gas and natural gas used in their work area.

- All employees, whose work operations are or may be in an area where LP gas and natural gas may be used, will be instructed to recognize and follow warning labels.

- Storing and handling requirements will be covered in accordance with this safety program.

- Connecting and disconnecting requirements will be covered in accordance with this safety program.

- Health hazard regarding liquefied petroleum gases will be covered in accordance with this safety program.

IA will verify employee training has been accomplished and is being kept up to date. Training documentation will contain each employee's name and dates of training. The LP gas and natural gas suppliers will be requested to provide training as needed or required for all LP gas and natural gas users and handlers.

Refresher training will be conducted on an as-needed basis. Re-training will be provided whenever there is a job assignment change, a change in the type of gas used, equipment or processes that present a new hazard, or when there is a change in operating procedures.

Additional re-training will be conducted whenever a periodic inspection reveals an issue, or whenever there is reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the compressed gas safety procedures.

The re-training will reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

Chapter 19: Powered Industrial Trucks (PIT)

PITs, commonly referred to as forklifts, lift trucks, powered pallet jacks, and other special use, materials-handling equipment are used in many IA sites, schools, and facilities to move materials. They can be used to move, raise, lower, or remove objects on pallets or in boxes, crates, or other containers.

This chapter describes employee training, certification, truck requirements, battery charging and changing, and general operation including loading and unloading, parking, and refueling PITs powered by either electric motors or internal combustion engines.

19.1 Facility Requirements

The hazards commonly associated with PITs vary depending on the vehicle type and the workplace where the truck is used. Each type of truck presents different operating hazards. Workplace conditions also present different hazards and PIT operators must constantly maintain pedestrian safety. Specific safety requirements for PITs include the following:

- PIT operations must be in accordance with the requirements and limits identified in the manufacturer owner's manual. Supervisors should also develop and document workplace specific rules and procedures, where required.

- Standard roadway driving rules apply (e.g., stay to the right, no passing at intersections, stop at corners and crosswalks, negotiate turns at a slower speed).

- Maintain appropriate aisle spacing; consider the width requirements of the equipment, aisle storage, and pedestrian aisle-width safety requirements.

- Fire aisles, access to stairways, and fire equipment will be kept clear.

- Facility lighting (2 lumens per square foot) must be available, or directional lighting must be provided on the vehicle.

- Where noxious gas can accumulate from the vehicle exhaust, additional ventilation may be required.

- Chocks must be used, and brakes must be applied to prevent movement during loading and unloading of any highway trucks, railcars, or similar vehicles.

19.2 Dock Boards and Bridge Plates

All dock boards and bridge plates must be strong enough to carry the load imposed. Additionally:

- Portable dock boards will be secured in position, either by being anchored or equipped with devices that will prevent slipping.

- Powered dock boards will be designed and constructed in accordance with U.S. Department of Commerce standards for commercial industrial lifts and hinged loading ramps.

- Handholds, or other effective means, will be provided on portable dock boards to permit safe handling.

- Positive protection will be provided to prevent trucks, trailers, railroad cars, and other vehicles from being moved while dock boards or bridge plates are in position.

- Dock boards and bridge plates that meet OSHA requirements must be provided, as needed.

- Dock boards and bridge plates must never exceed their rated capacity.

19.3 Requirements for PIT Battery Charging and Maintenance Areas

When a visual examination of the PIT battery indicates the electrolyte is low, acid should be added into water, not water into acid. Additionally:

- Perform battery maintenance in designated areas only.
- Provide ventilation in charging areas for battery off-gassing.
- Clean battery vent caps because they function to dissipate heat during charging.
- Park PIT and apply brake before charging.
- Smoking and other ignition sources are prohibited in the battery charging area.
- Keep metallic tools away from the tops of batteries.
- Eye washes are required in battery charging areas.
- Any means of quick drenching (e.g., a water hose or emergency shower) must also be available in the event of a splash to an employee's body.
- The following PPE is required for battery maintenance and charging:
    - safety glasses
    - neoprene gloves
    - apron
    - chemical face shield
    - steel-toed safety shoes
- Overhead cranes or hoisting equipment must be provided for changing batteries.

19.4 Electrolyte Handling and Addition

A carboy tilter or siphon system must be provided for handling electrolytes; open flames may not be used to view or check electrolyte levels. The following are required in the event of an electrolyte spill:

- Flushing and neutralizing equipment must be provided to assist the spill response and cleanup to flush any spilled electrolyte.

- If a spill occurs, the following PPE will be required for cleanup:
    - neoprene gloves
    - chemical face shield
    - neoprene apron
    - safety glasses with side shields

- All spills must be reported to the supervisor, the CDSO, or a SCM, who will decide whether to call emergency responders to clean up the spill, or have employees with the skills, equipment, and training respond.

19.5 PIT Vehicle Requirements

The operator should ensure that all equipment is inspected at the beginning of each operator's shift. Any deficiencies discovered during the inspection and other items that would impact the safe use and operation of the truck should be documented.

Defective equipment should immediately be removed from service (including all electric, mechanical, and hydraulic components) until repairs are made. All trucks must be labeled, and this label maintained in a legible and readable condition. Additionally, the label must indicate the truck was approved by a recognized testing laboratory (such as UL, Factory Mutual Insurance, or other agency) and meets ANSI requirements for PITs.

Attachments supplied by the manufacturer must be labeled with the truck weight and maximum elevation allowed. Platforms attached to the forks of a PIT for elevating personnel must be reviewed and approved (by either the RSM or SPM) before use. The operator should consider using scissor lifts or boom lifts for these activities.

When personnel are elevated on PITs they must be protected from falls. "Order pickers" and "Man-A-Board" type vehicles generally have an operator position that is protected by guardrails. If the operator leaves this position, they must be given fall protection. Additionally, restraint systems such as seat belts must always be worn when operating PITs equipped with such devices.

Modifications to vehicles are not allowed without the manufacturer's written approval. Where provided on battery-powered PITs, the cover of the battery compartment must be closed and locked.

Powered industrial trucks used in any IA, BIA, or BIE facility should be equipped by the manufacturer with the following safety devices:

- Seat belts and similar restraints
- Horn
- Backup alarms that sound when forklift reverses
- Fire extinguisher
- Warning lights that flash
- Directional signals and brake lights
- Mirrors
- Capacity decal

19.6 PIT Operations

When operating PITs, the following guidance must be followed:

- Only trained, certified employees may drive or ride on PITs.
- PITs will not be driven up to anyone.
- People may not pass underneath raised forks or any portion of the PIT.
- Horseplay around or inappropriate use of PITs is not permitted.
- Before operating the PIT, check brakes, steering, horn, gas, oil, and water levels. Irregularities should be reported to a supervisor.
- Only approved industrial trucks will be used in hazardous locations.
- Do not exceed the PIT's rated capacity or the floor load limits. Carefully examine the load before picking it up to consider its weight and balance. If a load appears unsafe, split the load or use other equipment.
- Arms and legs (and other body parts) must remain inside the running lines of the PIT during operation.
- Operators are required to face the direction of travel, keeping a clear view of the travel path.
    - If the load being carried obstructs the forward view, the operator will travel with the load trailing.
    - If ramps or inclines >10% are encountered, the driver will turn the load to the front to prevent the load from slipping.
- Pick up the load squarely, do not make quick or jerky starts and stops.
- On wet or slippery floors, slow down. Use low gear when descending ramps.
- Always travel forward up ramps and in reverse down ramps.
- Be sure the wheels of highway trucks and trailers at loading docks are chocked.
- Make certain that bridge plates into trucks are wide enough, strong enough, and secured.
- Watch out for pedestrians.
- When passing a doorway or turning a blind corner, slow down and sound the horn.

- When entering main aisles, intersections, or roadways, come to a full stop, look, and sound the horn.

- Safe distances from the edge of ramps or platforms must be maintained in dock areas. PITs may not be used to help open or close freight doors.

- An overhead guard will be used when there are hazards from falling objects.

- A load backrest extension may be used to prevent the load from falling rearward.

- Where possible, loads should be tilted back and raised only as far as necessary to clear the floor surface.

- Carry the loads of high-lift forklifts six inches off the floor and tilted backward for better stability.

- When high-lift trucks are traveling unloaded, the forks should be near the floor.

- When elevating loads, watch out for overhead and wall obstructions, fire extinguishers, sprinklers, pipes, electrical conduits, and switches.

- Under all conditions, the speed of the vehicle should be so that it can safely stop. Wet and slippery surfaces must be considered when gauging the speed of the vehicle. Avoid loose objects on the floor.

- Elevators should be entered slowly, only after assuring they are level. While on an elevator, PIT controls should be shut off, and brakes set.

- When the operator dismounts from the vehicle, the load or forks must be fully lowered, the controls neutralized, and the brakes set. The power must be shut off if the vehicle is considered unattended (i.e., operator is out of view of the PIT or more than 25 feet away).

- Turn off the engine before refueling or leaving a gas or diesel truck.

19.7 PIT Fueling

Operators should adhere to the following guidance when fueling a PIT:

- PIT fuel tanks may not be filled while the engine is running.

- Spills must be carefully washed away or completely evaporated before restarting.

- Fuel caps must be in place before starting.

- Leaks must be corrected before using the PIT; leaking vehicles must be immediately removed from service.

- Liquid fuels such as gasoline and diesel fuel must be handled in accordance with the NFPA standards for flammable and combustible liquids.

- Liquefied petroleum gas storage and handling must be in accordance with NFPA standards for the storage and handling of liquefied petroleum gases.

19.8 PIT Battery Charging

Battery-charging is common for PITs and can create a hazardous atmosphere, particularly due to hydrogen gas and battery components. When handling batteries, workers should:

- Always wear the proper PPE when changing a battery.
- Be aware of the nearest eyewash or shower station.
- Shut off the engine.
- Do not smoke or have an open flame in the battery-changing area.
- Make sure the battery-lifting device is secure before lifting.
- Stand clear when moving the battery.
- Make sure that the ventilation system is working properly before charging a battery.
- Always add battery acid to water (never add water to battery acid).
- If charging the battery on the forklift, uncover the battery compartment to prevent the build-up of heat and hydrogen gas.
- Make sure the charger is off before connecting it to the battery.
- Make sure the vent caps are not plugged.
- Make sure charger is properly connected to battery before plugging it into electrical outlet.

19.9 PIT Training

The IA site, school, or facility where PITs are used must implement a training program based on the general principles of safe PIT operation, the types of vehicles used, the hazards of PIT use in the workplace, and the general safety requirements of the OSHA standard.

Trained operators must know how to do the job properly and do it safely. Formal training (lecture, videos) and practical training (demonstration and practical exercises) must be provided. Before operating the PIT in the workplace, supervisors must evaluate the operator's performance and determine if the operator trainee can operate the PIT safely. Once the trainee demonstrates competency, supervisors must certify the operator.

IA supervisors and managers must evaluate each operator at least once every three years to ensure they remain competent. Refresher training (i.e., re-training) is needed whenever an operator demonstrates a safety deficiency when operating the PIT. Refresher training will consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material); practical training (demonstrations performed by the trainer and practical exercises performed by the trainee); and evaluating the operator's performance in the workplace.

Operator training records must be retained for the duration of their service plus three years. Periodic operator evaluations must also be documented, and those records retained.

It is recommended that all IA PIT operators read and sign a statement that indicates they understand and will adhere to all safety rules when operating a PIT. The signed statement should be kept with their training records.

Employers must certify each operator has been trained and evaluated in accordance with the OSHA standard. The certification must include the following:

- Operator name
- Training date
- Evaluation date
- Name of person(s) performing the training or evaluation

19.10 Training Program Content

PIT operators will receive the following initial training:

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate
- Differences between the truck and the automobile
- Truck controls and instrumentation (where they are located, what they do, and how they work)
- Engine or motor operation
- Steering and maneuvering
- Visibility (including restrictions due to loading)
- Fork and attachment adaptation, operation, and use limitations
- Vehicle capacity
- Vehicle stability
- Any vehicle inspection and maintenance that the operator will be required to perform
- Refueling and/or charging and recharging of batteries

- Operating limitations
- Surface conditions where the vehicle will be operated
- Composition of loads to be carried and load stability
- Load manipulation, stacking, and unstacking
- Pedestrian traffic in areas where the vehicle will be operated
- Narrow aisles and other restricted places where the vehicle will be operated
- Hazardous (classified) locations where the vehicle will be operated
- Ramps and other sloped surfaces that could affect the vehicle's stability
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation

If an operator was previously trained in one of these topics, and the training is appropriate to the truck and working conditions encountered, additional training on that topic is not required if the operator has been evaluated and found competent to operate the truck safely.

Trainees may operate a powered industrial truck only under the following conditions:

- Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence.

- Where such operation does not endanger the trainee or other employees.

Refresher training, including evaluating the effectiveness of that training, will be conducted to ensure the operator has the knowledge and skills needed to operate the powered industrial truck safely. Refresher training will be provided under the following conditions:

- The operator has been observed to operate the vehicle in an unsafe manner.

- The operator has been involved in an accident or near-miss incident.

- The operator has received an evaluation that reveals that the operator is not operating the truck safely.

- The operator is assigned to drive a different type of truck.

- A condition in the workplace changes in a manner that could affect safe operation of the truck.

Each operator's performance must be evaluated at least once every three years.

Chapter 20: Powered Platforms

This chapter describes vehicle-mounted aerial devices, including extensible boom platforms, aerial ladders, articulating boom platforms, vertical towers, and combinations of any of these. These devices are collectively known as Mobile Elevating Work Platforms (MEWP).

A powered platform program establishes criteria to train operators and ensure employees' health and safety while operating and/or working around MEWPs, as required by OSHA. Operators must be trained by a qualified person that is experienced with the lift model and must include the following:

- Nature of electrical, fall, and other hazards involved in operating lift
- Dealing with hazards
- Rated load capacity for the lift (including workers, tools, materials, bucket liner)
- Manufacturer requirements, as outlined in operator manual
- Ability to demonstrate skill and knowledge in actual aerial lift operation

20.1 MEWP Operations

Aerial lift/work platform equipment operators will follow all general safety rules and any specific safety rules for operating MEWPs, including all manufacturer's operational requirements and recommendations. Managers and supervisors will ensure all affected employees adhere to the requirements outlined in this chapter. Specifically:

- Aerial lifts must meet A92 standards (Aerial and Work Platforms) from the ANSI and Scaffold and Access Industry Association (SAIA).

- The manufacturer's operating manual for the aerial lift must be available on-site.

- Employees must be authorized to operate aerial lifts and be trained on the specific equipment being used. Successful training on the specific equipment must be verified by the manager or supervisor and documented in individual training records.

- Employees without operator training may use aerial lifts when the lifts are operated by a trained employee. Employees not trained as operators but who use aerials lifts must be trained with respect to the PPE requirements.

- Inspections will be made by the operator at the beginning of each shift during which the equipment is to be used. Inspections must be documented.

- Units that have been damaged or weakened by any cause must be taken out of service until repairs are completed.

- The operator will verify that the vehicle has a reverse signal alarm audible above the surrounding noise level or the vehicle is backed up only when an observer signals that it is safe to do so.

- The lift controls must be tested each day to determine whether they are in safe working order.

- Both lower and platform controls must be plainly marked with their function.

- Immediately before driving the lift, the route must be checked for overhead obstructions, holes, slopes, ditches, bumps, floor obstructions, debris, power lines, and other potential hazards.

- Personnel must wear fall protection in the form of a full body harness and lanyard attached to the manufacturer's prescribed anchorage point. Personnel must never tie off to an adjacent pole, structure, or other object. Fall protection is not required for scissor lifts using standard guardrails unless specifically required by the manufacturer.

- Employees must wear hard hats when in or operating aerial lift equipment.

- When working from an aerial lift, personnel must stand firmly on the floor of the basket. Sitting or climbing on the edge of the basket and/or using planks, ladders, or other devices for work position are prohibited.

- Boom and basket load limits set by the manufacturer must never be exceeded.

- Where insulating barriers that prevent physical contact with overhead wires are not a part of the aerial lift, minimum distances will be maintained from energized power lines and equipment as shown in the summary below.

Voltage: To 50 kilovolts (kV)
Clearance with Boom Raised: 10 feet
Clearance Boom Lowered and No Load in Transit: 4 feet

Voltage: 50 to 345 kV
Clearance with Boom Raised: 10 feet + 0.4 inches per each 1 kV over 50 kV
Clearance Boom Lowered and No Load in Transit: 10 feet

Voltage: 346 to 750 kV
Clearance with Boom Raised: 10 feet + 0.4 inches per each 1 kV over 50 kV
Clearance Boom Lowered and No Load in Transit: 15 feet

Additionally:

- Brakes must be set, and outriggers positioned on flat, solid surfaces before elevating the basket.

- Before using an aerial lift on an incline, wheel chocks must be installed if it is safe to do so.
- Lifts must never be placed in the travel path of overhead cranes.
- Because they are considered energized equipment, aerial lifts must be electrically grounded or barricaded when they are near energized lines or equipment.
- Employees must not operate lower controls unless permission has been obtained from the employee in the basket, except in case of emergency.
- Altering the insulated portion of an aerial lift that may reduce the insulating value is not permitted.
- Aerial lifts may not be "field modified" for uses other than those intended by the manufacturer.
- Scissor lifts must never be moved with the platforms up.
- Outriggers must be in the stored position before any aerial lift is moved.
- Lifts must not be operated while batteries are being charged in place.
- When lifts are used inside buildings, consideration must be given to carbon monoxide emissions. Lifts that are propane driven or have air-purifying scrubbers generate less carbon monoxide.

Chapter 21: Diving

This chapter provides information for both commercial and scientific diving. The number of dives, length of time spent underwater, lack of visibility, and the strenuous nature of the task increase the risks for this type of activity.

IA employees performing commercial diving can be exposed to construction or demolition hazards such as cutting, welding, material handling, cleaning, operating underwater equipment, and general work with power tools. Divers are also exposed to hazards associated with spending extended periods of time underwater, such as drowning, decompression sickness, arterial air embolism, and nitrogen narcosis.

Additionally, divers are at an increased risk of health hazards associated with commercial diving, such as "dysbarism," which is a series of symptoms (such as the bends, headache, or mental disturbance) that accompanies exposure to excessively low or rapidly changing environmental air pressure.

21.1 Scientific and Commercial Dives

The requirements for scientific dives are different from commercial dives. So, the purpose for the dive must be identified while planning the dive to determine the regulatory requirements.

IA has a structured diving program for several reasons. The diving program supports inspection, maintenance, and repairs to dams, canals, and other underwater structures. The diving program allows educational and scientific diving—such as teaching students and conducting underwater research—to be conducted safely and effectively outside the standards created by the OSHA for commercial divers.

In 1982, OSHA exempted scientific diving from commercial diving regulations under certain conditions that are outlined below. OSHA also recognized the American Academy of Underwater Sciences as the scientific diving standard-setting organization.

Scientific diving is defined as diving performed solely for scientific, research, or educational activity by employees whose purpose for diving is to perform scientific research tasks.

OSHA has granted an exemption for scientific diving from the commercial diving regulations under the following guidelines:

- A Diving Control Board for *scientific dives* (different from commercial dives) consisting of active scientific divers that have autonomous and absolute authority over the scientific diving program's operation. The Diving Control Board will have the authority to:
    - Approve and monitor scientific diving projects
    - Assure compliance with the manual
    - Certify the depths to which a diver has been trained
    - Take disciplinary action for unsafe practices
    - Assure adherence to the buddy system (i.e., a diver is accompanied by and is in continuous contact with another diver in the water) for scuba diving.

- The purpose of the project using scientific diving is the advancement of science; therefore, information and data resulting from the project are non-proprietary.

- The tasks of a scientific diver are those of an observer and data gatherer. Construction and trouble-shooting tasks traditionally associated with commercial diving are not included within scientific diving.

- Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment and therefore, are scientists or scientists-in-training.

- A Diving Safety Manual includes procedures covering all diving operations specific to the scientific diving program, including:
  - procedures for emergency care,
  - recompression and evacuation, and
  - criteria for diver training and certification.

21.2 Scuba vs. Surface-Supplied Air (SSA)

Most dive teams use scuba equipment. Scuba training is readily accessible and the equipment relatively inexpensive; the equipment is also easy to maintain and transport.

SSA equipment is more costly, and there is more involved in setting up the equipment, but it has numerous advantages over scuba. As long as the compressor is running, the diver has air. If the compressor stops, the diver has an emergency air supply located on the boat, as well as an emergency bailout bottle mounted on his back.

The diver is attached to an umbilical line, which contains the air hose, as well as a safety line and communication line. The communication is hard-wired; therefore, it is more reliable than wireless systems.

Most DOI/IA teams dive with scuba equipment, which supports scientific diving where the diver may be moving among many different areas. SSA is more common on commercial dives where the diver is working at an underwater location.

21.3 Scuba and Line Tending

OSHA requires a diver to be line-tended (tethered) or accompanied by another diver (buddy team) in the water in continuous visual contact during diving operations. All dives conducted by IA or BIA fall under OSHA jurisdiction.

Tethered scuba diving is a method where the diver in the water is line tended by surface personnel while performing underwater tasks. OSHA also requires the standby divers for working dives to be line tended. This method is much like SSA diving other than the virtually unlimited air supply.

Tethered scuba diving equipment includes standard diving equipment (i.e., wetsuit/dry suit, fins, and weight belt) as well as tethering equipment that includes the following:

- A full-face mask with voice communications
- Tether line with quick release snap shackle
- Hardwired or wireless communications
- Safety harness rated for lifting the diver from the water

- A cutting device within easy reach is recommended for the diver (e.g., emergency medical technician shears mounted on the harness)

The tether is usually marked in intervals for measuring distances. Tethers can be made in most any length, though 200- and 300-foot tethers are typical for most dive operations. Generally, the tether required must be the distance from the dive platform added to the depth to the dive site multiplied by 1.5 (e.g., 50 feet from the dive site at a 50-foot depth would be 150 feet of tether). Tethers should not be longer than 300 feet.

Typically, tethered diving operations consist of a three-person team: the diver, the standby diver, and the divemaster/tender. Each diver will be continuously tended while in the water. Tethered diving operations from vessels require safety procedures, which include the following:

- All boat/ship propellers must be deactivated before beginning dive operations.

- A small boat must be on standby before deploying the tethered diver.

- The dive boat/ship should be anchored using a two-point anchoring system. While this is not required, sudden wind changes may necessitate a two-point anchoring system to safely complete a dive.

- If the boat/ship were to swing on its anchor, it is important that sufficient slack is given and/or tension is kept on the diver to ensure they are not swept away in the current or subjected to sudden changes in pressure.

- When operating near a shipping channel, a "security" call should be made to all concerned traffic over VHF channel 16 and vessel traffic and channel 16 communications should be monitored to determine if large vessels are inbound.

- An alpha flag (blue and white internationally, or red and white in the United States) as well as the standard diver down flag must be flown from the vessel during dive operations.

Before the tethered diver undertakes a working dive, it is important that they have practiced how to free an entangled line, disconnect from the tether, perform an unconscious diver rescue, and clear a flooded mask in a training situation. During the dive briefing, backup communication line pull signals must be reviewed and memorized by the dive crew.

Line signals should also be practiced in case of an emergency. Dive teams use the acronym **OATH** to identify line signals:

1 tug: **O**kay (can be a question or answer).

2 tugs: **A**dvance or give me rope.

3 tugs: **T**ake up rope or I am coming back.

4 tugs: **H**elp!

21.4 Programs for Scientific and Commercial Diving

The scientific diving program must be under the control of a Scientific Diving Control Board that has absolute control over the scientific diving program's operations. The Scientific Diving Control Board will review projects to ensure their purpose is advancing science. Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment and, therefore, are scientists or scientists in training.

Scientific diving programs will, at a minimum, cover the following topics:

- Emergency evacuation and medical treatment
- The criteria for diver training and certification
- Standards written or adopted by IA for each diving mode used, including:
    - safety procedures for diving operations
    - responsibilities of dive team members
    - equipment uses and maintenance
    - emergency procedures

Commercial diving includes underwater work for industrial, construction, maintenance, repair, debris removal, or similar purposes. Commercial diving is undertaken by IA employees whenever the dive is part of their job.

Commercial diving programs will, at a minimum, cover the following topics:

- The IA Diving Safety Manual should be available at each dive location and to each dive team member.

- Safe practices for each diving mode engaged in, including:
    - safety procedures and checklists for diving operations
    - assignments and responsibilities of the dive team members
    - equipment procedures and checklists
    - emergency procedures for fire, equipment failure, adverse environmental conditions, and medical illness and injury.

- Emergency contacts list that includes telephone numbers of the following:
    - An operational decompression chamber (if not at the dive location)
    - Accessible hospitals
    - Available physicians
    - Available means of transportation

    - The nearest USCG Rescue Coordination Center
- Planning a diving operation will include assessing the safety and health aspects of the following:
    - Diving mode
    - Surface and underwater conditions and hazards
    - Breathing gas supply (including reserves)
    - Thermal protection
    - Diving equipment and systems
    - Dive team assignments and physical fitness of dive team members (including any impairment known to the employer)
    - Repetitive dive designation or residual inert gas status of dive team members
    - Decompression and treatment procedures (including altitude corrections)

- Dive team members will be briefed on:
    - The tasks to be undertaken
    - Safety procedures for the diving mode
    - Any unusual hazards or environmental conditions likely to affect the safety of the diving operation
    - Any modifications to operating procedures necessitated by the specific diving operation

Before making individual dive team member assignments, the employer will ask about the dive team member's current state of physical fitness and tell the dive team member the procedure for reporting physical problems or adverse physiological effects during and after the dive.

21.5 IA Dive Manual Outline

The basic contents of an IA diving manual will address, at a minimum:

- Dive hazard analysis
- Dive planning
- Pre-mobilization and dive guidelines
- General diving requirements
- Post-dive requirements
- Night diving
- Standby (safety) diver requirements
- Diving deeper than 100 feet salt water

- Terminating a dive

21.6 Safety Operations

Standard operating procedures are intended to anticipate most operating situations that may be encountered and ensure safe diving operations. The following safety precautions are applicable to all IA diving operations:

- Any systems or equipment at the worksite that may create a hazard for the diver must be managed before the dive begins.

- Boats or watercraft of any kind should not come alongside a vessel from which diving operations are being conducted while a diver is in the water without receiving permission from the dive master.

- Hazardous energy clearances, lockout, warning tags, and equipment position or status will not be modified while divers are in the water.

- Before lifting heavy objects or weights from the bottom, the diver should leave the water or ensure their line tether is clear of the load.

- Every precaution must be taken to prevent the diver from becoming fouled on the bottom.

- Divers must not cut any lines until their purpose is known or until directed by the dive master.

- All work activities near the dive site will be informed before diving operations begin and after diving operations are completed.

- Whenever a diving operation requires a diver to make a penetration into a pipe, structure, or other restricted underwater area, a standby diver will be available at the point of entry to tend the diver who has entered the confined area.

- Divers must be trained to safely operate tools and equipment to be used in the water.

- All tools passed to the diver or recovered from the diver will be turned off.

- Any diver who has a cold, sinus infection, inability to clear ears, or any other physical or mental problem that may interfere with their ability to perform the assigned task in the water in a safe and healthful manner will inform the dive master and will not dive until the conditions have cleared.

21.7 Scuba Operations

The following guidelines will be followed when planning a scuba dive:

- Establish the maximum depth and bottom time.
- Always perform the pre-dive safety check before diving.
- Regularly monitor the depth and pressure gauge. Make sure that there is plenty of air in the tank for ascent.
- Do not plan the dive so that it exceeds the no-decompression limits of the dive table. A no-decompression limit is the maximum time divers are able to spend at certain depths before absorbing too much nitrogen to return to the surface without completing decompression stops.
- Never go beyond the planned depth nor exceed the bottom time.
- For dives beyond the no-decompression limits, a decompression chamber must be available and ready for use.
- Dives in currents greater than one knot should be line-tended.
- Dives in enclosed or physically confining spaces should be line-tended.
- A standby diver will be available while a diver is in the water.
- A diver will be line-tended from the surface or accompanied by another diver in the water in continuous visual contact during the diving operations.
- A diver will be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.
- A diver-carried reserve breathing gas supply will be provided for each diver consisting of:
  - a manual reserve (J valve), or
  - an independent reserve cylinder with a separate regulator or connected to the underwater breathing apparatus.
- The valve of the reserve breathing gas supply will be in the closed position before the dive.
- Upon entering the water, set the dive watch and establish orientation or direction using the compass.
- Once ready, signal to start descending and slowly deflate the buoyancy compensating device (BCD).
- Descend close to the buddy diver if diving in pairs until reaching the planned depth.

- Before beginning the ascent, signal the buddy diver and ascend together.

- Make sure to deflate the BCD when ascending to prevent rapid ascent. Ascend slowly and strictly follow the normal ascent rate no faster than 60 feet per minute.

- Make sure to do a safety stop at 15 feet for three minutes.

21.8 Compressed Gas Cylinder Safety and Diving

Hazards associated with scuba tanks can be avoided by careful handling. Scuba tanks hold large volumes of compressed gas. The contents can be breathing air, enriched air nitrox (higher oxygen and lower nitrogen content), or trimix (three-gas combination) for technical diving. A scuba tank is one of the most important pieces of diving gear.

Scuba tanks are usually made of either steel or aluminum alloy. The steel tanks are tough and resistant to external damage but need proper care to avoid internal rust. They are also negatively buoyant. Aluminum tanks are more susceptible to external dents, dings, and scratches than steel cylinders, but resist internal corrosion better.

A valve controls the flow of air from the tank and connects to the regulator with either a screw-in or yoke/bracket system. An O-ring seals the regulator to the tank valve. Single tank valves, made of chrome-plated brass, are most common. Technical divers may use dual-cylinder manifolds or have Y-valves or H-valves to connect two regulators to one cylinder. Many valves have a burst disk—a thin copper disk—that will rupture, letting air escape if the tank pressure rises too high.

Scuba tanks should have a current visual inspection decal that shows that the tank has been professionally checked for internal and external corrosion within the past year. Tanks also require periodic pressure (hydrostatic) testing. The interval between hydrostatic tests varies in different regions ranging from two to seven years.

A scuba tank's size and pressure rating determine its capacity. Tanks have capacities that range from six cubic feet to 40 cubic feet pony bottles (a small diving cylinder that is fitted with an independent regulator and carried by a scuba diver as an extension to the scuba set) to 45 to 150+ cubic feet main cylinders. Tanks used with enriched air need to meet oxygen service standards and require distinct green and yellow markings to identify what is in them. Cylinder boots—either plastic, vinyl, or rubber—allow tanks with rounded bottoms to stand during storage and help protect surfaces from damage by tanks.

Other accessories for cylinders include mesh protectors that slide over the cylinder, valve covers that help keep water and dust out of the valve opening and handles and carriers that make hauling the tank easier.

Divers should follow these guidelines to ensure tank safety:

- Never use scuba tanks as rollers or supports even if they are empty.

- Never drop or allow tanks to fall or bang together.
- Always open tank valves slowly to allow the pressure to build up evenly and prevent the hammering of regulators.
- Always keep tanks far enough away from hot areas. Aluminum cylinders subjected to more than 350°F must be condemned.
- Always store tanks securely, both full and empty, to prevent them from being knocked over. Store in racks, if available.
- Always store tanks in a ventilated area.
- Always check that tank hydrostatic and annual visual test dates have not lapsed.

21.9 Pneumatic and Hydraulic Power Tool Safety

The safety instructions for each tool should be consulted before any operation. Additionally:

- Hydraulic tools designed for diver use normally have extra seals to prevent salt-water contamination of the hydraulic system. If oil leaks occur or water contamination is suspected, tool use should be stopped, and repairs performed.
- If a hydraulic tool results in an environmental contamination spill, it must be reported as specified in current regulations.
- Hydraulic tools designed for diver use normally have no cooling heat exchangers because the hoses are immersed in water. Prolonged surface use of diver tools should be avoided.
- The following general safety precautions are applicable to all hydraulic and/or pneumatic tools that divers use:
    - Pneumatic and hydraulic tools that are used underwater should be specially designed for diving use.
    - A separate air source should be used to supply pneumatic tools. Diver's air must not be used.
    - Whenever pneumatic or hydraulic tools are used on the surface, eye protection must be worn.
    - Pneumatic tools, when not in use, should be disconnected from the air source.
    - Gloves should be used by the diver when using pneumatic or hydraulic tools underwater.
    - Never use equipment that is in poor working condition.
    - Electrical tools should not be used underwater.
    - Divers should not carry loose items or equipment that could be entangled in the tool.

- The diver must always tend their line tether when working with grinding tools to ensure that an umbilical is not severed.
- Tools should be inspected topside before sending the tool down to the diver.
- Never exceed the maximum operating pressure and flow rating of a tool.
- Always ensure that the tool rotation is proper. Do not reverse the oil flow to reverse the direction of the tool.
- Never clean or inspect a tool with the hydraulic power source connected.
- Always ensure hydraulic chain saws have water supply flow to the tool. Chain saws need a continuous flow to remove the slurry, even underwater.
- Hydraulic chain saws require safety straps to prevent kick back injury.

21.10 Tending Safety

When tending a line to a diver or an umbilical, hose, or similar, tend about one foot to three feet from the side rail, if possible, and hand-over-hand the umbilical over the side. Never let it slip freely through your hands. A backup tender should be used on a heavy umbilical. Additionally:

- If an umbilical, hose, or line starts to run free, do not try to stop it by jumping on it, stepping on it, or grabbing it by hand. Pick it up at the coil or figure 8 stack and use a line to tie it down to a cleat or foundation.

- Care should be taken so that the line tender does not step into the bight (i.e., slack middle part of an extended rope or loop).

- Never tend loosely, always feel the diver.

21.11 Jetting Safety

A jetting nozzle will be fitted with a balanced jet that should be taken over the diver's shoulder in a manner preventing blowing off the diver's mask or causing injury. Divers and tenders must be extra alert when working in reduced visibility situations.

21.12 Lift Bag Safety

There are many potential safety hazards when divers are using lift bags. If a lift bag should get away from the diver or break loose from whatever it is attached to, the lift bag could snag the diver or the diver's umbilical, and bring the diver to the surface, creating a blowup situation. The following safety procedures must be observed when using lift bags:

- Lower lift bags deflated. Attach the bag securely to the object being lifted.

- Use a safety line from the bottom to the lift if possible.

- Divers should always control the lift bag, and ensure they are clear and not fouled in either the object being lifted or the lift bag. If control is lost, the diver should get clear and maintain a normal ascent.
- Always deflate bags when finished. Send them to the surface with a crane, tugger, or tied off to the down line. Never cut bags loose and allow them to rise to the surface free.

- Always calculate the amount of lift required and use the proper size lift bag. Oversized bags will continue to expand as they rise through the water column and accelerate rapidly toward the surface.

- If the object to be lifted is large, attach the lift bags as low as possible and in a manner that will keep the object stable and floating on the surface.

- On soft or muddy bottoms, suction must be overcome between the mud and the object. If the object is light, pull up firmly after each burst to break the suction. On heavy items, the lift bags are located near the surface (10 feet) and rigging is extended to the object requiring lift. Once the object is off the bottom, the object can be moved to the surface by repeating this procedure with additional lift bags.

21.13 Diver Qualifications

IA employee divers engaged in scuba or SSA diving will have the necessary training, experience, and proficiency to safely perform assigned work. Divers must be at least 21 years old. The dive team leader must have some method of documenting experience or training for the following:

- Divers exposed to hyperbaric conditions are trained in diving-related physics or physiology
- Scuba or SSA diving techniques and procedures
- Scuba or SSA diving operations and emergency procedures
- Training to use tools, equipment, and systems relevant to assigned tasks
- Additional training includes the following:
    - Entry level/basic scuba by a nationally recognized dive-training agency
    - Checkout dive
    - Diver rescue training
    - Advanced training
    - Periodic diving-related training
    - First-aid and CPR training.

21.14 Medical Emergencies

The following organizations are involved with preventing and investigating diving medical emergencies:

- U.S. Navy Experimental Diving Unit
- U.S. Naval Medical Research Institute
- General information may also be obtained from the following:
  - Undersea and Hyperbaric Medical Society
  - National Board of Diving and Hyperbaric Medical Technology

Chapter 22: Walking and Working Surfaces

This chapter describes the general safety and housekeeping requirements for aisles and passageways, stairs, and guardrails. It includes floor-loading protection and protecting open sided floors and platforms. The program targets uneven surfaces and renovation/construction areas where walking and working surface hazards are more likely to be present.

22.1 Aisles and Passageways

Where mechanical handling equipment is used, sufficient safe clearances must be maintained for aisles, at loading docks, through doorways, and wherever turns or passage must be made.

Aisles and passageways must be kept clear and in good repair with no obstructions across or in aisles that could create a hazard. Permanent aisles and passageways will be appropriately marked.

22.2 Covers and Guardrails

Covers and guardrails should be provided to protect employees from falling hazards. Work areas, including the following, should be properly guarded, covered, cordoned off, or marked to prevent injury:

- Stairways
- Ladder way floor openings
- Hatchway and chute floor opening
- Skylight floor openings
- Pit and trapdoor floor openings
- Manhole floor openings
- Temporary floor openings
- Floor holes/openings
- Chute wall openings
- Window wall openings

- Temporary wall openings
- Open-sided floor or platforms

22.3 Floor Loading Protection

The safe load capacity of floor areas, roofing structures, or mezzanine storage areas will be determined before loads or single items weighing more than 350 pounds are placed.

Safe floor loading capacities will have visible signs posted. Floor load capacity signs should not be removed or defaced. If lost, removed, or defaced they must be reported to the supervisor, CDSO, or SCM and be replaced immediately.

All employees will be told that it is code violation to place a load on a floor, roof, or mezzanine heavier than its rating.

22.4 Guarding Floor/Wall Openings and Holes

Floor opening protections will follow these guidelines:

- Stairway floor openings will be guarded by a standard railing on all exposed sides (except at entrances to stairways). A standard railing is 42 inches high, equal to or plus three inches.

- For infrequently used stairways where traffic across the opening prevents using a fixed standard railing (such as aisle spaces), the guard will consist of removable standard railings on all exposed sides.

- Ladder-way floor openings or platforms will be guarded by a standard railing with standard toe-board on all exposed sides with a passage through the railing provided by a swinging gate or offset so that a person cannot walk directly into the opening.

- Hatchway and chute floor openings will be guarded by one of the following:
  - Hinged floor opening cover and standard railings.
  - A removable railing with toe-board on not more than two sides of the opening and fixed standard railings with toe-boards on all other exposed sides.

- Skylight floor openings and holes will be guarded by a standard skylight screen or a fixed standard railing on all exposed sides.
  - A standard skylight screen is constructed and mounted so that it can withstand a 200-pound load applied anywhere on the screen.
  - Skylight screens should not deflect downward sufficiently to break the glass below them under normal loads.
  - The construction will consist of grillwork with openings not exceeding four inches long or of slat-work with openings not more than two inches wide with unrestricted length.

- Pit and trapdoor floor openings will be guarded by a floor opening cover. While the cover is not in place, the pit or trapdoor opening will be attended by someone or will be protected on all exposed sides by removable standard railings.
- Manhole floor openings will be guarded by a standard manhole cover. While the cover is not in place, the manhole opening will be attended by someone or will be protected by removable standard railings.

- Temporary floor openings will have standard railings or will be constantly attended by someone.

- Floor holes into which people can accidentally walk will be guarded by either of the following:
  - A standard railing with standard toe-board on all exposed sides.
  - A floor-hole cover of standard strength and construction. While the cover is not in place, the floor hole will be constantly attended by someone or will be protected by a removable standard railing.
  - No floor hole cover should leave an opening more than one inch wide. The cover will be securely held in place to prevent tools or materials from falling through.

- Floor opening covers may be of any material that meets the following strength requirements:
  - Trench or conduit covers and their supports, when located in roadways, will be designed to carry a truck rear-axle load of at least 20,000 pounds.
  - Manhole covers and their supports, when located in roadways, will comply with local standard highway requirements, if any; otherwise, they will be designed to carry a truck rear-axle load of at least 20,000 pounds.
  - Floor opening covers may be constructed of any material that meets the strength requirements. Covers projecting not more than one inch above the floor level may be used providing all edges are chamfered to an angle with the horizontal of not more than 30 degrees. All hinges, handles, bolts, or other parts will set flush with the floor or cover surface.

- Doors or gates that open directly on a stairway will have a platform and the swing of the door will not reduce the effective width to less than 20 inches.

22.5 Protecting Wall Openings and Holes

Wall openings from which there is a drop of more than four feet, will be guarded by one of the following:

- Standard railing
- Picket fence

- Half door
- Equivalent barriers

Where there is exposure below to falling materials, a removable toe should also be provided.

When the opening is not in use for handling materials, the guard will be kept in place. In addition, a grab handle should be provided on each side of the opening with its center approximately four feet above floor level.

Extension platforms onto which materials can be hoisted for handling will have standard guardrails on the exposed sides. Wall opening barriers will be constructed and mounted so that the barrier can withstand a load of at least 200 pounds applied in any direction at any point.

Wall opening grab handles will be not less than 12 inches in length and will be mounted to give three inches clearance from the side framing of the wall opening. The size, material, and anchoring of the grab handle will be such that the completed structure can withstand a load of at least 200 pounds applied in any direction at any point of the handle.

Wall opening screens will be constructed and mounted to withstand a load of at least 200 pounds applied horizontally at any point on the near side of the screen. They may be of solid construction, of grillwork with openings not exceeding eight inches long, or of slat-work with openings not more than four inches wide with unrestricted length.

Chute wall openings from which there is a drop of more than four feet will be guarded by one or more barriers.

Window wall openings at stairway landings, floors, platforms, or balconies from which there is a drop of more than four feet and where the bottom of the opening is less than three feet above the platform or landing will be guarded by standard slats, standard grill work, or standard railing. Where the window opening is below the landing or platform, a standard toe-board will be provided.

Temporary wall openings will have adequate guards. Where there is a hazard of materials falling through a wall hole, and the lower edge of the near side of the hole is less than four inches above the floor, and the far side of the hole more than five feet above the next lower level, the hole will be protected by a standard toe-board, or an enclosing screen either of solid construction.

22.6 Protecting Open-Sided Floors, Platforms, and Runways

Open-sided floors or platforms four feet or more above adjacent floor or ground level will be guarded by a standard railing on all open sides. The railing will be provided with a toe-board under the following conditions:

- Persons can pass.
- There is moving machinery.

- There is equipment with which falling materials could create a hazard.

Runways will be guarded by a standard railing on all open sides four feet or more above floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toe-board will also be provided on each exposed side.
Runways used exclusively for special purposes (such as oiling, shafting, or filling tank cars) may have the railing on one side omitted where operating conditions necessitate such omission, providing the falling hazard is minimized by using a runway of not less than 18 inches wide.

Regardless of height, open-sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, pickling or galvanizing tanks, degreasing units, and similar hazards will be guarded with a standard railing and toe-board.

22.7 Stair Safety

Flights of stairs having four or more risers will be equipped with standard stair railings or standard handrails. Additionally:

- On stairways less than 44 inches wide having both sides enclosed, there will be at least one handrail, preferably on the right-side descending.

- On stairways less than 44 inches wide, having one side open, there will be at least one stair railing on the open side.

- On stairways less than 44 inches wide having both sides open, there will be one stair railing on each side.

- On stairways more than 44 inches wide but less than 88 inches wide, there will be one handrail on each enclosed side and one stair railing on each open side.

- On stairways 88 or more inches wide, there will be one handrail on each enclosed side, one stair railing on each open side, and one intermediate stair railing located approximately midway of the width.

- Winding stairs will be equipped with a handrail offset to prevent walking on all portions of the treads having width less than six inches.

22.8 Railing Safety

A standard railing will consist of top rail, intermediate rail, and posts, and will have a vertical height of 42 inches equal to or plus three inches nominal from upper surface of top rail to floor, platform, runway, or ramp level. Additionally:

- The top rail will be smooth surfaced throughout the length of the railing. The intermediate rail will be approximately halfway between the top rail and the floor, platform, runway, or ramp.

- The ends of the rails will not overhang the terminal posts except where such overhang does not constitute a projection hazard.

- A stair handrail will be of construction like a standard railing.
    - The vertical height of the stairway handrailing will not be more than 38 inches or less than 30 inches from upper surface of handrail to surface of tread.

- The posts for wood railings will be of at least two x four stock spaced not to exceed six feet; the top and intermediate rails will also be of at least two x four stock.
    - If the top rail is made of two right-angle pieces of one-inch by four-inch stock, posts may be spaced on eight-foot centers, with a two x four intermediate rail.

- Pipe railings, posts, and top and intermediate railings will be at least 1½ inches nominal diameter with posts spaced not more than eight feet on center.

- Structural steel railings, posts and top and intermediate rails will be of two inches by two inches by ⅜-inch angles or other metal shapes of equivalent bending strength with posts spaced not more than eight feet on centers.

22.9 Housekeeping

All offices, workstations, work areas, passageways, storerooms, restrooms, and service rooms will be kept clean, orderly, sanitary, and free of known hazards. Additionally:

- The floor of every workroom will be maintained in a clean and, so far as possible, a dry condition. Sources of standing water should be eliminated as they create slip hazards and can be breeding grounds for mold and insects.

- Where wet processes are used, drainage will be maintained and false floors, platforms, mats, or other dry standing places will be provided where practicable.

- To facilitate cleaning, every floor, workplace, and passageway will be kept free from protruding nails, splinters, holes, or loose boards or other hindrances that would prevent efficient maintenance.

- Ample illumination will always be provided in all areas. Employees discovering lighting deficiencies will report them to their supervisor for correction.

- All employees are responsible for maintaining their immediate work areas in a clean, orderly manner and for notifying maintenance of conditions beyond their control.

- Supervisors will ensure machines and equipment under their control are maintained in a clean, orderly manner. Crowding should be avoided wherever possible.

- All employees are responsible to ensure aisles are kept clean, free of material, finished parts, scrap, or any type of debris.

- Maintenance will ensure all floor spaces are maintained in a clean, orderly manner.

- Maintenance will ensure all wall spaces are properly painted and maintained in a clean, orderly manner. Postings will be confined to bulletin boards and other appropriate areas.

- Storage facilities will be maintained following appropriate procedures based on the type of storage facility.

- Lockers will be used to protect personal belongings from theft. Locker areas will be kept clean and orderly. Belongings found insecure will be turned over to the area supervisor for disposition.

- Emergency exit doors will be kept free of all obstacles. Any employee finding an emergency door blocked should immediately report the condition to their supervisor, CDSO, or SCM for correction.

- Exit lights and signs will be maintained in proper condition and employees should immediately report issues to their supervisor.

- Spills will be contained immediately by employees trained in spill containment and immediately reported to the area supervisor.

- Spills will be immediately reported to the CDSO, a SCM, or the area supervisor by any employee discovering the spill not trained in containment measures.

Chapter 23: Watercraft Safety

This chapter establishes the minimum requirements to safely operate watercraft by IA employees and to train IA and BIA watercraft operators. The information and guidance in this chapter will protect IA employees from the hazards associated with working on, in, or overwater. Maritime work has risks similar to those associated with landside activities, plus the additional risks of drowning and hypothermia.

Employees performing official duties on commercially licensed watercraft (i.e., ferries, tour boats, commercial vessels) will abide by established maritime standards for those vessels, orders issued by the captain of the vessel, and in accordance with all relevant safety standards and authorities noted in this chapter.

The BIA Regional Directors are responsible for implementing a watercraft safety program within their respective regions in compliance with this chapter. BIA RSMs work with DSRM to implement the program throughout their respective regions.

The AS-IA will appoint an IA Watercraft Safety Coordinator. The Coordinator will review requests for deviations to personal flotation device (PFD) requirements. The Coordinator will also manage participation in DOI's Motorboat Operator's Certification Course (MOCC), and identify internet-based or other courses approved to complete the refresher training educational module.

Managers, supervisors, CDSOs, and SCMs support their operating locations to ensure identified controls are implemented and maintained and work environments are safe. Supervisors establish the protocols that ensure all IA employees and volunteers are trained to do the following:

- Conduct watercraft operations in a safe manner and in compliance with established policies and procedures.
- Maintain equipment in compliance with existing policies and procedures.
- Ensure that operators have the skills needed for the conditions in which they are reasonably expected to operate watercraft.
- Provide safety and survival equipment that the watercraft operator identifies, as necessary.

Supervisors will ensure employees who operate and work in watercraft have training in watercraft operations appropriate for the following:

- Type and size of watercraft used
- Geographic, climatic, and physical nature of the operations
- Operational tasks being performed

Watercraft operators will successfully complete the training requirements outlined in this chapter. They will also ensure the safety of employees on board and operate the watercraft in compliance with existing policies, guidelines, and training. IA employees riding in watercraft or working in watercraft will:

- obey the instructions of the watercraft operator,
- adhere to all safety regulations, and
- always conduct themselves in a reasonable and prudent manner.

23.1 Safe Watercraft Operation

IA watercraft will be operated in a safe and prudent manner and in accordance with federal standards in addition to the requirements in this chapter. IA watercraft will meet or exceed applicable USCG design and equipment requirements.

In addition to basic safety devices required by federal regulations, IA watercraft will be outfitted, based on expected conditions, with other equipment necessary for safe operation and may

include communications gear, navigation aids, satellite navigation, and location tracking systems.

Periodic inspection and maintenance programs will be established for all Departmental watercraft and will adhere to the same requirements for motor vehicles in 412 DM 1 – Motor Vehicle Management. Records of inspections and maintenance will also follow the same process required for motor vehicles in 412 DM 1.

23.2 Limitations

Personnel may perform work from a small watercraft (less than 26 feet, or 7.9 meters long) under the following conditions:

- The watercraft used for the work must be appropriate to the type of work and can safely carry the workers necessary for the task.
- The work site must be in a bay, sound, lake, or similar body of water that is protected from open-sea weather conditions.
- The work site must be within sight of land and never more than two miles (3.2 kilometers) from shore.
- All operations will be completed in daylight hours under reasonable weather conditions with good visibility.
- The watercraft operator must have the experience and knowledge to operate the watercraft at the work site location.
- There must be at least two people in the watercraft any time it is in motion.
- The watercraft and personnel must be properly equipped.
- The watercraft operator must be familiar with all aspects of the watercraft, its intended use, the local area, and expected weather conditions.
- The watercraft must be monitored from the shore, either directly by a supervisor or team member, or by filing a “float plan” with the Project Manager or other responsible person before getting under way.

Before departing the dock, the watercraft should be checked for the following:

- Watertight integrity
- Machinery operating correctly (ahead and astern, throttle, ignition cut-off)
- Appropriate safety gear

- Proper watercraft loading (personnel and equipment) so vessel is stable
- Enough fuel on board for the duration of the trip and site work
- All electrical and electronic equipment in good working order (lights, radios, horns)
- A float plan is required to be completed any time small craft will be operating beyond the confines of a shore-supported work site. The float plan should be completed and given to a shore supervisor, who will know what actions to take in the event the vessel is overdue.

While under way, the watercraft operator will do the following:

- Maintain communications with shore support as specified in the float plan.
- Periodically monitor the weather on the VHF radio (or equivalent).
- Close out the float plan when the voyage is terminated, and the watercraft moored.

23.3 Float Plans

Before using a watercraft, the operator must provide verbal or written notification to a dispatcher, supervisor, or manager, with at least the following information:

- Description of watercraft
- List of occupants
- Emergency equipment on board
- Point of departure
- Planned route
- Estimated time of departure
- Estimated time of return
- Means of contact (e.g., VHF radio, mobile phone), and contact schedule
- Purpose of the trip
- Description of vehicle(s) left at launch site(s)
- Recommended plan of action if overdue

23.4 Watercraft Requirements

All watercraft must be properly registered for waterways in local, state, or federal jurisdictions as required by law. All watercraft trailers and towing vehicles will be properly licensed and in good working order.

The watercraft will be operated safely, and all waterway regulations will be obeyed. No alcoholic beverages are permitted on the watercraft.

No recreational equipment for fishing, hunting, water skiing, or scuba diving will be allowed on the boat unless specifically authorized as part of the work-related equipment.

23.5 Boating Safety Equipment

All people on the watercraft will wear a USCG-approved Type III commercial PFD. At least one throwable Type IV device should also be readily available for use. At least one B-II USCG-approved handheld portable fire extinguisher will be on the boat, readily available for use.

Visual distress signal flares and a battery-operated light in good working order should be readily available on the watercraft. A sound-producing distress signal, in the form of a bell, whistle, or horn, in good working order should also be readily available on the watercraft.

A first-aid kit will be available on the watercraft. First-aid kits will be inspected regularly to ensure items are intact and not expired.

All fuel (gasoline or diesel) will be contained in fuel tanks or approved (manufacturer, UL, or equivalent) containers that supply fuel to the engine via approved fuel lines. No fuel transfers between containers are to be conducted aboard the watercraft. A secondary means of propulsion should also be available on the boat (multiple engines, oars, or paddles for smaller vessels).

A boat hook, anchors, and proper mooring lines will be available on the watercraft.

A VHF radio (or equivalent) is required for any watercraft working more than one mile offshore, or at any site where there is no shore-side support for the boat crew. The radio may have to be licensed by the Federal Communications Commission or equivalent regulatory agency depending upon transmission strength and installation. When operating less than one mile (1.6 kilometers) from shore, a citizen's band radio, cellular telephone, or a UHF radio may be used to communicate with shore-side support.

23.6 Requirements for PFDs

IA employees working on watercraft will only use commercial PFDs. Recreational PDFs are not authorized for employee use on government business. There are five types of PFDs:

1) Type I PFD is an offshore life jacket.
    - This device will right an unconscious wearer and will usually keep the wearer's face out of the water.
    - This device is bulky and uncomfortable to wear for long periods of time.

2) Type II PFD is a near-shore buoyancy vest.
    - This device will right an unconscious wearer and will usually keep the wearer's face out of the water.
    - This device is bulky and uncomfortable to wear for long periods of time.

3) Type III PFD is a flotation aid.
    - This device is generally the most comfortable PFD and has at least 15.5 pounds of buoyancy in the adult size.
    - This device provides adequate buoyancy but will not turn the wearer face-up in the water.
    - This device is comfortable to wear and is designed to be worn as work attire.
    - Common Type III devices are work vests and harnesses with built-in pneumatic floatation.

4) Type IV PFD is a throwable device.
    - This device includes the horseshoe collar, ring buoy, and seat cushion.
    - This device has at least 16.5 pounds of buoyancy and must offer immediate access.

5) Type V PFD is a hybrid inflatable or special use device.
    - This device is for special purpose flotation.
    - This device is a full body insulating flotation suit that is suitable for work in cold weather.
    - This device is designed to survive high-speed impacts (like falling from a motorboat on step).
    - Some Type V PFDs are water-activated and are very low profile until inflated. A further subset of these devices activates (inflate) automatically when submerged.

In general, the two most common hazards associated with maritime work are drowning and hypothermia. All other hazards are similar to landside activities and the PPE requirements are identical (hard hat, safety glasses, hearing protection, steel-toed safety shoes).

Wearing a PFD mitigates the risk of drowning. IA employees are required to wear a Type III commercial PFD any time they are aboard a watercraft and are outside of an enclosed cabin.

IA employees are required to wear a PFD on the open weather decks of watercraft less than 65 feet long. An operator can require occupants to wear a PFD in any area of the watercraft regardless of the length of the watercraft. A manually inflatable PFD is recommended for use in enclosed areas of watercraft to reduce the risk of entrapment in the event of capsizing. PFD use is also mandatory for non-motorized watercraft use.

PFDs must be USCG-approved and appropriately rated for the type of watercraft, and designed for operational applications, durability, and mission requirements.

The outer shell of PFDs will be international orange unless a different high-visibility color is required for special uses. In accordance with 46 CFR 25.25-15, each PFD is required to have at least 200 square centimeters (31 square inches) of retroreflective material attached to its front side, at least 200 square centimeters of material on its back side, and, if the item is reversible, at least 200 square centimeters of material on each of its reversible sides.

The material attached on each side of the item must be divided equally between the upper quadrants of the side, and the material in each quadrant must be attached as closely as possible to the shoulder area of the item.

In accordance with 46 CFR 25.25-13, each PFD is to be equipped with a light securely attached to the front shoulder when on board watercraft being operated in coastal waters, the ocean, sea, or large lake.

Deviation from the high-visibility color requirements in this chapter may be permitted if special mission requirements, such as those involved in law enforcement, cannot be otherwise satisfied. Deviations must be requested in writing by the supervisor of the organizational unit conducting the operation before conducting the activity. The written request will identify alternate safety measures to be taken. Deviations will be authorized on a case-by-case basis by the Watercraft Safety Coordinator for a period not to exceed one year.

All PFDs must be inspected and maintained in accordance with the manufacturer's instructions. PFDs should be stored in a cool, dry place out of direct sunlight. A "dry" area is considered any suitable area where water will not condense on a PFD. All PFDs should be kept away from oil, paint, and greasy substances.

23.7 Cold Weather PPE

The risk of hypothermia is mitigated by wearing appropriate insulated floating outerwear when cold weather or cold water is a threat. A Type V PFD, usually referred to as a "mustang suit," is a full-body PFD with insulation qualities and will extend the wearer's survivability in the event of immersion or dowsing with spray when in cold weather.

Type V PFDs are required when the air temperature and the water temperature combined are less than 100°F and when the craft is less than 26 feet (7.9 meters) long. When the watercraft is longer than 26 feet (7.9 meters), wearing a mustang suit is at the discretion of the boat captain or the site supervisor.

An exception to this requirement may be made if the operator determines that risks associated with wearing cold weather PPE (e.g., crew performance degradation, thermal stress) are offset by the benefits of not wearing cold weather PPE. Before using the equipment, personnel will be trained to use it.

23.8 Watercraft Incidents

Federal and state regulations require incident reports if property damage or significant injuries occur. Examples of situations requiring reporting include grounding, material damage affecting the seaworthiness or efficiency of the vessel, significant injuries, or loss of life.

The definition of a reportable incident varies between state and federal authorities. The vessel operator must be familiar with accident reporting requirements (available through the USCG for commercial vessels, or a state's Department of Motor Vehicles for small craft).
Any incident or accident should also be reported according to the IA accident/incident reporting and investigation process. IA uses the DOI SMIS to report and track accidents, injuries, near misses, and occupational illnesses throughout the organization. Information related to the process and use of SMIS is available at https://smis.doi.net.

23.9 Watercraft Training

IA personnel must complete the MOCC before operating motorboats or motorized watercraft while conducting official duties, and the MOCC must be completed by anyone operating motorboats for which IA is responsible. Motorboat operator certification will be valid for five years. To be recertified, operators will successfully complete the refresher training outlined in the MOCC instructor manual.

Successfully completing the MOCC does not imply that personnel are competent to operate any motorboat in all conditions that they may encounter. Supervisors must ensure watercraft operators receive safety and operations training on the watercraft, in the environmental conditions, and in the areas, in which they will be operating. MOCC modules, developed by DOI to help meet some specialized training needs, are outlined in the MOCC instructor manual.

Operators of non-motorized watercraft are exempt from the requirement to complete the MOCC but must be provided practical operator safety training related to the watercraft and environmental conditions in which the watercraft is operated. Examples of how this need might be met include completing the non-motorized version of the MOCC River Module, or one of the American Canoe Association (http://www.americancanoe.org) Water Safety and Rescue Courses.

To prepare for taking the MOCC or a MOCC module, IA personnel may practice elementary operating skills under the on-board supervision of an experienced operator who has completed the corresponding training.

The MOCC and MOCC modules will be conducted in accordance with the objectives outlined in the MOCC instructor manual.

IA personnel successfully completing the MOICC will be qualified to teach the MOCC as outlined in the MOCC instructor manual.

Another watercraft training may be substituted for the Departmental MOCC and Motorboat Operator Instructor Certification Course (MOICC). Requests for substitutions must be submitted to the watercraft coordinator. Any training that is substituted must be comparable to MOCC or MOICC objectives.

Chapter 24: Welding, Cutting, and Brazing

This chapter describes the requirements for welding, cutting, and brazing processes performed by IA employees. It identifies the specific hazards where hot work is performed, describes the associated hazards, and establishes appropriate procedures and protective measures for employees.

24.1 Fire Prevention and Protection

To prevent fires in welding shops or areas where welding, cutting, and brazing processes are performed, combustible materials should be removed from the work area within a radius of 35 feet, or the work moved to a location far away from combustible materials. If relocating the work or materials is not possible, the combustible materials should be covered with fire-resistant materials.

Before cutting or welding is permitted, the area will be inspected by the welding supervisor. The supervisor will designate precautions to be followed before allowing welding activities to proceed, preferably in the form of a written permit.

Additionally, the following basic precautions must be followed when doing welding, cutting, and brazing work. If these requirements cannot be followed, then welding, cutting, and brazing work should not be performed:

- If the object to be welded, cut, or brazed cannot easily be moved, then all the movable fire hazards in the vicinity will be taken to a safe place.

- If the object to be welded, cut, or brazed cannot be moved and if all the fire hazards cannot be removed, then guards should be used to confine the heat, sparks, and slag, and protect fire hazards in the vicinity, or the combustible materials should be covered with fire-resistant material.

- Wherever there are floor openings that cannot be closed, precautions must be taken so that the floor below is not exposed to sparks that may drop through the opening.

- Holes in walls, open doorways, and window openings should be protected so that sparks do not travel to nearby rooms.

- Suitable fire extinguishing equipment will be maintained and ready for instant use. This equipment may include pails of water, buckets of sand, hoses, or portable extinguishers depending upon the nature and quantity of the combustible material exposed.

- Where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, the floor will be swept clean for a radius of 35 feet.

- Combustible floors will be kept wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc welding or cutting equipment will be protected from possible shock.

Cutting, welding, or brazing are not permitted in the following situations:

- In areas not authorized by management.

- In sprinkler-protected buildings while the sprinkler protection is impaired.

- In the presence of explosive atmospheres or in situations where explosive atmospheres may develop inside contaminated tanks or equipment.

- In areas near large quantities of exposed, readily ignitable materials are stored, such as bulk sulfur, baled paper, dust, or cotton.

Ducts and conveyor systems that might carry sparks to distant combustibles will be suitably protected or shut down.

Welding will not be performed on a metal partition, wall, ceiling, or roof having a combustible covering or on walls or partitions of combustible, sandwich-type panel construction.

Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings, or roofs will not be done if the work is close enough to cause ignition by conduction.

24.2 Fire Watches

A fire watch is required whenever welding or cutting is performed in locations where a fire might develop, or when any of the following conditions exist:

- Combustible material is closer than 35 feet to the point of welding, cutting, or brazing.

- Combustibles are more than 35 feet away but are easily ignited by sparks.

- Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas.

- Combustible materials exist on the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

- Fire watchers will have fire extinguishing equipment readily available and be trained in its use.

24.3 Welding or Cutting Containers

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

All pipelines or connections to the drum or vessel will be disconnected or blanked. All hollow spaces, cavities, or containers will be vented to permit air or gases to escape before preheating, cutting, or welding. Purging with inert gas is recommended.

24.4 Confined Spaces

A confined space is a relatively small or restricted space such as a tank, boiler, or pressure vessel. Ventilation is required when working in a confined space.

Welding, cutting, or brazing in confined spaces require the gas cylinders and welding machines be left outside the space.

If a welder must enter a confined space through a manhole or other small opening, there must be a way to quickly remove the welder in case of emergency. When safety belts and lifelines are used for this purpose, they will be attached so that the welder cannot be jammed in a small exit opening during retrieval. An attendant with a preplanned rescue procedure will be stationed outside to observe the welder and put the rescue operations into effect if required.

During gas welding or cutting operations, to eliminate the possibility of gas escaping through leaks of improperly closed valves, the torch valves will be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined space whenever the torch is not to be used for a substantial period of time, such as during a lunch hour or overnight. Where practicable, the torch and hose should be removed from the confined space.

After welding operations are completed, the welder should mark the hot metal or provide some other means of warning other workers.

24.5 Safety Requirements

A. Walkways.

A welder or helper working on platforms, scaffolds, or runways will be protected against falling. This may be done using railings, safety belts, lifelines, or some other equally effective safeguards.

Welders will place welding cable and other equipment so that it is clear of passageways, ladders, and stairways.

B. Head Protection.

Helmets or hand shields will be used during all arc welding or arc cutting operations and will be made of a material that is an insulator for heat and electricity. Helmets and hand shields should be arranged to protect the face, neck, and ears from direct radiant energy from the arc.

Helmets will be provided with filter plates and cover plates designed for easy removal.

Helmets, shields, and goggles should be capable of withstanding sterilization. All parts will be constructed of a material that will not readily corrode or discolor the skin.

C. Eye Protection.

Goggles or other suitable eye protection will be used during gas welding or oxygen cutting operations. Helpers or attendants will also be provided with proper eye protection.

Spectacles without side shields, with suitable filter lenses, are permitted for use during gas welding operations on light work, for torch brazing, or for inspection.

All operators and attendants of resistance welding or resistance brazing equipment will use transparent face shields or goggles to protect their faces and eyes.

Eye protection in the form of suitable goggles will be provided where needed for brazing operations. Goggles will be ventilated to prevent lens from fogging as much as practicable. All glass for lenses will be tempered and substantially free from flaws.

Except when a lens is ground to provide optical correction for defective vision, the front and rear surfaces of lenses and windows will be smooth and parallel. Lenses will bear some permanent distinctive marking by which the source and shade may be readily identified.

All filter lenses and plates will meet the test for transmitting radiant energy prescribed in ANSI Z87.1, American National Standard for Occupational and Educational Eye and Face Protection.

To protect from arc welding rays, the welder should be enclosed in an individual booth painted with a low-reflectivity finish such as zinc oxide (an important factor for absorbing ultraviolet radiations) and lamp black, or will be enclosed with noncombustible screens similarly painted. Additionally, booths and screens should permit circulation of air at the floor level.

Employees adjacent to the welding areas will be protected from the rays by noncombustible or flameproof screens or shields or will be required to wear appropriate goggles.

The summary below shows the correct shade level for welding operations. These recommendations may be varied to suit the individual’s needs.

Welding Operation		Shade #
Shielded metal-arc welding	1/16, 3/32, 1/8, 5/32-inch electrodes	10
Gas-shielded arc welding-nonferrous	1/16, 3/32, 1/8, 5/32-inch electrodes	11
Gas-shielded arc welding-ferrous	1/16, 3/32, 1/8, 5/32-inch electrodes	12
Shielded metal-arc welding	3/16, 7/32, 1/4-inch electrodes	12
	5/16, 3/8-inch electrodes	14
Atomic hydrogen welding		10-14
Carbon arc welding		14
Soldering		2
Torch brazing		3 or 4
Light cutting	up to 1 inch	3 or 4
Medium cutting	1 inch to 6 inches	4 or 5
Heavy cutting	6 inches and over	5 or 6
Gas welding (light)	up to 1/8 inch	4 or 5
Gas welding (medium)	1/8 inch to 1/2 inch	5 or 6
Gas welding (heavy)	1/2 inch and over	6 or 8

Note: In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter or lens that absorbs the yellow or sodium line in the visible light of the operation.

24.6 Protective Clothing

Employees exposed to the hazards created by welding, cutting, or brazing operations will be protected by specific clothing, such as the following:

- Clothing made from heavyweight, tightly woven, 100% wool or cotton to protect from ultraviolet (UV) radiation, hot metal, sparks, and open flames. Note: Flame-retardant treatments may become less effective with repeated laundering.
- Clothing should be kept clean and free of oils, greases, and combustible contaminants.
- Long-sleeved shirts with buttoned cuffs and a collar should be worn to protect the neck. Dark colors prevent light reflection.
- Shirt pockets should be kept closed to avoid collecting sparks or hot metal.
- Pant legs must not have cuffs and must cover the tops of the boots. Cuffs may collect sparks.
- All clothing with frayed edges, tears, or holes should be repaired.
- High-top boots must be worn fully laced to prevent sparks from entering the boots.
- Fire-resistant boot protectors or spats strapped around the pant legs and boot tops should be worn to prevent sparks from bouncing into the top of the boots.

- All ignition sources such as matches and butane lighters should be removed from pockets. Hot welding sparks may light the matches or ignite leaking lighter fuel.

- Gauntlet-type cuff leather gloves or protective sleeves of similar material should be worn to protect wrists and forearms. Leather is a good electrical insulator if kept dry.

- Using a shield can help keep any sparks spray away from clothing.

- Leather aprons should be worn to protect the chest and lap from sparks when standing or sitting.

- Wear layers of clothing but avoid overdressing in cold weather. Sweaty clothes cause rapid heat loss. Leather welding jackets are not very breathable and can make the individual welder perspire more in cold weather.

- A fire-resistant skull cap or balaclava hood should be worn under the helmet to protect the head from burns and UV radiation.

- A welder's face shield should be worn to protect the face from radiation and flying particles.

24.7 Health Protection and Ventilation

The requirements for protecting the welder's health and ensuring proper ventilation have been established based on the following three factors that govern the amount of contamination to which welders may be exposed:

1) Dimensions of space in which welding is to be done (with special regard to height of ceiling).

2) Number of welders.

3) Possible evolution of hazardous fumes, gases, or dust according to the metals involved.

When performing welding in a space entirely screened on all sides, the screens will be arranged so that ventilation is not seriously restricted. It is desirable to mount screens about two feet above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding.

Local exhaust or general ventilating systems will be provided and arranged to reduce the levels of toxic fumes, gases, or dusts. Local exhaust ventilation is preferred as it captures contaminants at the source – see the sections below for more information. A number of potentially hazardous materials are employed in fluxes, coatings, coverings, and filler metals used in welding and cutting or are released to the atmosphere during welding and cutting.

The welding material suppliers should provide information on the hazards, if any, associated with using their materials in welding, cutting, and brazing. If not on the product label, ensure the

SDSs for materials used are readily accessible and that welders are trained on the information. Refer to the HCS, section 13.7 in this handbook for more guidance on SDSs.

All filler metals and fusible granular materials will carry the following notice, at a minimum, on tags, boxes, or other containers:

"CAUTION
Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z49.1 Safety in Welding and Cutting published by the American Welding Society."

Brazing (welding) filler metals containing cadmium in significant amounts will carry the following notice on tags, boxes, or other containers:

"WARNING
CONTAINS CADMIUM -
POISONOUS FUMES MAY BE FORMED ON HEATING
Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1.
If chest pain, cough, or fever develops after use, call a physician immediately."

Brazing and gas welding fluxes containing fluorine compounds must have a cautionary wording to indicate that they contain such compounds. One such cautionary wording recommended by the American Welding Society for brazing and gas welding fluxes reads as follows:

"CAUTION
CONTAINS FLUORIDES
This flux when heated gives off fumes that may irritate eyes, nose and throat.
Avoid fumes - use only in well-ventilated spaces.
Avoid contact of flux with eyes or skin.
Do not take internally."

First-aid equipment must always be available, and all injuries must be reported as soon as possible for medical attention. First aid will be rendered until medical attention can be provided.

A. Ventilation for General Welding and Cutting.

Mechanical ventilation will be provided when welding or cutting is done on specific metals or when any of the following conditions are met:

- In a space of less than 10,000 cubic feet per welder.
- In a room having a ceiling height of less than 16 feet.
- In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation.

Ventilation will be at the minimum rate of 2,000 cubic feet per minute per welder, except where local exhaust hoods and booths or airline respirators approved by the National Institute for Occupational Safety and Health (NIOSH) for such purposes are provided.

If the work area is open enough to not meet any of the above conditions or if it is outside, natural ventilation is considered sufficient for welding or cutting operations. However, local exhaust ventilation is always encouraged to capture contaminants at the source.

When cutting stainless steel and using oxygen cutting, a chemical flux, iron powder, or gas-shielded arc, mechanical ventilation must be used and be adequate to remove the fumes generated.

B. Local Exhaust Hoods and Booth.

Local exhaust ventilation may be by either of the following:

- Freely movable hoods intended to be placed by the welder as near as practicable to the work being welded and provided with an air flow sufficient to maintain a velocity in the direction of the hood.
    - The air flow should be a minimum of 100 linear feet per minute in the zone of welding when the hood is at its most remote distance from the point of welding.

- A fixed enclosure with a top and not less than two sides that surround the welding or cutting operations and with a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet per minute.

- The placement of the local exhaust hood should not bring the contaminant through the workers' breathing zones. Some overhead exhaust hoods can cause the fumes to flow through the worker's breathing zone on the way to the hood, which increases exposure. Site supervisors or CDSOs will evaluate the hood placement and airflow to verify proper configuration.

- There is specialized equipment to measure air velocity which can be rented to verify proper ventilation at the source. A qualitative assessment can be equally as helpful: take a video during a welding operation to see if smoke/fumes are captured by the exhaust hood. If they swirl or form clouds near the worker's breathing zone, the exhaust is inadequate. For guidance on technical airflow and velocity measurements, the supervisor should consult the exhaust hood manufacturer, RSM, or SPM.

C. Ventilation in Confined Spaces.

All welding, cutting, and brazing operations in confined spaces will be adequately ventilated to prevent accumulating toxic materials or creating a possible oxygen deficiency. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. Makeup air will be clean and breathable.

In circumstances for which it is impossible to provide such ventilation, NIOSH-approved airline respirators or hose masks must be used.

In areas immediately hazardous to life, a full-face piece, pressure-demand, self-contained breathing apparatus or a combination full-face piece, pressure-demand supplied-air respirator with an auxiliary, self-contained air supply approved by NIOSH must be used.

Where welding operations are done in confined spaces and where welders and helpers are provided with hose masks, hose masks with blowers or self-contained breathing equipment approved by the Mine Safety and Health Administration or NIOSH, a worker will be stationed on the outside to ensure the safety of those working within. Oxygen will never be used for ventilation.

24.8 Cleaning Compounds

When using cleaning materials, because of their possible toxicity or flammability, appropriate precautions and the manufacturer's instructions must be followed.

Degreasing and other cleaning operations involving chlorinated hydrocarbons will be located so that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation.

Trichloroethene and perchloroethene should be kept out of atmospheres penetrated by the UV radiation of gas-shielded welding operations.

24.9 Industrial Operations – Transmission Pipelines

Where IA employees are involved with the fabrication of fittings, pipelines, and pumping or compressor stations, the requirements for fire prevention and protection, protecting personnel, ventilation, oxygen-fuel gas welding and cutting, and arc welding and cutting will be observed. When arc welding is performed in wet conditions, or under conditions of high humidity, special protection against electric shock will be supplied.

When pressure testing pipelines, employees will be protected against injury by bursting pipe. Protection will also be provided against expulsions of loose dirt that may be expelled from a pipe when it is first pressurized.

The pipeline welded construction will meet the requirements of American Petroleum Institute (API) 1104, Standard for Welding Pipelines and Related Facilities.

The connection of branches to pipelines carrying flammable substances will be performed in accordance with API PSD No. 2201 Welding or Hot Tapping on Equipment Containing Flammables.

Using x-rays and radioactive isotopes to inspect welded pipeline joints will conform with ANSI Z54.1, Non-Medical X-ray, and Sealed Gamma-Ray Sources.

24.10 Hot Work

Hot work is any work that involves burning, welding, cutting, brazing, soldering, grinding, using fire- or spark-producing tools, or other work that produces a source of ignition. Hot work should only be performed when it can be done without risk of fires or other hazards.

Hot work is normally done in welding shops or other areas designated for this type of work. These areas are designed to reduce fire risk and generally are not part of a hot work permit system.

Facilities should have a hot work permit system for operations that involve hot work outside of areas permanently designated for hot work operations. Hot work permits provide a step-by-step checklist for hot work fire safety, and remind workers of their fire prevention responsibilities before, during, and after any hot work is performed. A hot work permit program includes the following:

- Policies
  - Where hot work is permitted
  - When hot work is permitted
  - Who authorizes, performs, and monitors hot work activities
- Procedures
  - What must be assessed before permitting/performing hot work in an area or on a process piece of equipment or area
  - What to do to prepare an area for hot work
  - What to do if hot work cannot be avoided in a particularly hazardous area
  - What hot work tools are required
  - How to obtain a hot work permit, when they are required, and who can administer them
- Training
  - Employees, supervisors, maintenance individuals, fire wardens, trained fire watch individuals, and contractors all have different roles, and must be trained accordingly.
- Communications
  - Posting procedures
  - Posting policies
  - Posting signs in areas that are prohibited from having hot work performed in them

Once the hot work is completed, a fire watch must be maintained for at least 30 minutes to detect and extinguish possible smoldering fires. Completed hot work permits, including hot work designated-area inspections, will be maintained by facilities for at least one year.

24.11 Safety Training and Information

Welders should have training on the following topics:

- Welding and cutting processes
- Welding shop safety
- Oxy/acetylene welding equipment
- Shielded metal arc welding equipment
- Gas metal arc welding equipment
- Gas tungsten arc welding positions: flat horizontal, vertical, and overhead positions
- Resistance welding equipment
- Welding shop safety precautions help prevent welding-related incidents and injuries.

To reduce the most common welding hazards, welders should practice the following:

- **Be familiar with the Manual.** The welder manufacturer's operating manual has information on the machine's operation as well as important safety information.

- **Consider Auto Darkening Helmets.** Auto darkening helmets are an alternative to traditional helmets that require lens changes for different operations. The sensors on an auto-darkening helmet should darken the lens in 1/10,000 to 1/20,000 of a second. Auto darkening helmets must meet ANSI Z87.1-2003. Newer auto darkening helmets have different modes, allowing the same helmet to be used for welding, cutting, and grinding. Cold weather can be a negative factor and delay the darkening time on auto darkening helmets.

- **Fire extinguisher.** Make sure there is a Class ABC fire extinguisher close to welding operations.

- **Housekeeping.** The weld area should only contain the tools and equipment that an operator uses, nothing more. Welding debris should be cleaned up and removed from the area to reduce slips, trips, and falls. Care should be taken when lifting heavy items.

- **Report concerns.** Safety concerns should be reported to the site manager, supervisor, CDSO, or SCM.

Chapter 25: Portable Fire Extinguishers

Portable fire extinguishers are an effective means for response to a small fire. Almost all fires are small in their incipient stage, and most can be quickly extinguished by a trained employee with a portable fire extinguisher.

Unless they are required by a specific standard (i.e., welding), extinguishers are not required in workplaces where everyone is required to evacuate the facility (total evacuation) when the fire alarm sounds.

Portable fire extinguishers must be located so they are clearly visible and readily accessible to the employees trained to use them. If employees are not required to use fire extinguishers, they should be told that the fire extinguishers are for trained fire fighter use only, and the fire extinguishers should be marked "For Fire Department Use Only."

If employees are required to use extinguishers, they must be trained annually in the general principles of fire extinguisher use and the hazards involved in the beginning stage of firefighting. Extinguishers must be maintained in a fully charged and operable condition. Signs and floor markings may be used to highlight the fire extinguisher location. Extinguishers must be appropriate to the type (or class) of fire hazard likely to be found in the work area.

There are five classes or types of fire extinguishers. Each class has a unique distance that an employee should travel to access the fire extinguisher (see the summary below).

Fire Extinguisher Class	**Use**	**Distance to Hazard**
A	Used on ordinary combustibles (wood, paper, cloth).	75 feet
B	Used for flammable or combustible liquids (gasoline, paint, solvents, propane).	50 feet
C	Used for electrical equipment.	50 feet
D	Used for metals (magnesium, potassium, and sodium).	75 feet
K	Used for commercial cooking equipment (cooking oils, animal fats, vegetable oils).	30 feet

Portable fire extinguishers must be inspected by location staff monthly and include the following:

- Proper fire extinguisher mounting
- Clearly labeled fire class marking(s) on the label
- Clear operating instructions that face outward
- Be in good working condition
    - Are the discharge openings clear?
    - Is the fire extinguisher fully charged (is the gauge in the green)?
    - Has there been any damage or tampering?
    - Is the ring pin in place?
    - Is the seal intact?
- Fire extinguisher tag showing the dates of monthly inspections and the name of the person who did the inspection.

Portable fire extinguishers must be maintained annually and hydrostatically tested every five years or 12 years depending on the type of extinguisher.

Written records showing maintenance items such as serial number and type of extinguishers, location, inspection date, description of tests, date of next inspection, date of annual service, comments, and inspector's signature should be kept on-site.

Reports and Forms

1) All forms and other templates referenced throughout this handbook are located on the IA Online Forms webpage here (select the "Indian Affairs Specific Forms and Guidance" tab): https://www.bia.gov/policy-forms/online-forms and/or on the IA Safety Management System SharePoint site here: https://doimspp.sharepoint.com/sites/bia-ems/iasafety.

2) The Occupational Safety and Health Training report must be submitted within the IA automated Recordkeeping and Reporting App by the RSM and BIE SPM to the DSRM no later than the 15th day following the end of the fiscal year (FY) quarter (this is for reporting on the previous quarter). The App is found on the IA Safety Management System SharePoint site here: https://doimspp.sharepoint.com/sites/bia-ems/iasafety.

3) The Occupational Safety and Health Program Evaluation Corrective Action Plan (CAP) must be submitted by the RSM and BIE SPM to the DSRM no later than the 15th day following the end of the FY quarter (this is for reporting on the previous quarter). The CAP is generated within the IA automated Occupational Safety and Health Program Evaluation App, that populates the recommendations and is included with the overall evaluation report that is transmitted to the official in charge.

Definitions

Aerial ladder is a MEWP consisting of a single or multiple section extendible ladders.

Aerial lift is any vehicle-mounted MEWP, telescoping or articulating, or both, used to elevate personnel.

Affected employee is one whose job requires him or her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him or her to work in an area in which such servicing or maintenance is being performed.

Articulating boom platform is an aerial MEWP with two or more hinged boom sections.

Attended is a motor vehicle carrying explosives when an attendant is physically on or in the vehicle or has the vehicle within his or her field of vision and can reach it quickly and without any kind of interference. The attendant must be awake, alert, and not engaged in other duties or activities that may divert his or her attention from the vehicle.

Authorized employee is one who locks out or tags out machines or equipment to perform servicing or maintenance on that machine or equipment

Crew are personnel other than the operator essential to the operation of the watercraft.

Dealer is a business that rents or leases MEWPs.

Electrical qualified person is an electrician or employee specifically trained by an electrician.

Energized means connected to an energy source or containing residual or stored energy. Energy-isolating device is capable of being locked out if it has a hasp or attachment to which a lock can be affixed. It is a mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a disconnect switch; a manually operated switch that disconnects circuit conductors from all ungrounded supply conductors; a line valve; a block or any similar device used to block or isolate energy; or extraneous electricity.

Energy source is any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or potential energy.

Extraneous electricity is any unwanted electrical energy that may enter blasting circuits from any source.

Extendible boom platform is an aerial MEWP (except ladders) with a telescopic or extendible boom. A telescopic derrick with personnel platform attachment will be considered an extendible boom.

Fumes are toxic gases produced by all explosives.

Highway is any public street, alley, or road, including reservation roads.

Hot tap is a procedure used in repair, maintenance, and services activities that involves welding on a piece of equipment under pressure, to install connections or appurtenances.

Inhabited building is any structure used for human habitation. This includes churches, schools, stores, railway passenger stations, airport terminals, and any other structure where people congregate or assemble, but does not include structures used to manufacture, transport, store, or use explosives.

Lockout means placing an energy-isolating device that ensures the equipment being controlled cannot be operated until the device is removed.

Lockout device uses a lock to hold an energy-isolating device in the safe position and prevent a machine or equipment from energizing.

Manlift is an MEWP consisting of a power-driven endless belt moving in one direction only with steps or platforms and attached handholds for the transportation of personnel from floor to floor.

Manufacturer is a business that produces MEWPs.

Mobile elevating work platform (MEWP) is a device intended for moving persons, tools, and material vertically. The device consists of a work platform with controls, an extending structure, and a chassis. MEWPs are classified into two groups: (1) **Group A -** Platforms that move vertically but stay inside the tipping lines of the device. And (2) **Group B -** All other MEWPs. Typically boom-type MEWPs where the platform extends past the machine's chassis.

Mobile unit is a combination of an aerial MEWP, its vehicle, and related equipment.

Motorboat is any motorized watercraft less than 65 feet long that does not require a USCG license or certification to operate.

Motorboat operator is an individual in physical control of the watercraft.

Normal production operation means using a machine or equipment to perform its intended production function.

Occupant is an employee on the work platform.

Operator is an employee qualified to control the movement of a MEWP.

Personal Flotation Device (PFD) is commonly known as a life jacket. Various types of PFDs are available, the type of PFD selected depends on user activity, weather conditions, and user preference.

Powered platform is a platform designed for indoor and outdoor building maintenance, such as window washing or painting (i.e., a mechanical scaffold).

Responsible (primary) authorized employee is the person who will coordinate, conduct, and implement hazardous energy isolation for multiple source/multiple crew LOTO procedures as required by this program.

Semi-conductive hose is a hose with an electrical resistance high enough to limit the flow of stray electric currents to safe levels, yet not so high as to prevent draining static electric charges to ground. Hoses of not more than two megaohms resistance over their entire length and of not less than 5,000 ohms per foot meet the requirements.

Servicing and/or maintenance activities include lubricating, cleaning, unjamming, repairing, replacing, and adjusting, or changing tools where employees may be exposed to the unexpected energization or startup or release of hazardous energy.

Setting up means work performed to prepare a machine or equipment to perform its normal operation.

Snag refers to a standing, dead or dying tree, often missing a top or most of the smaller branches.

Stemming is fine stone, dirt, or drill cuttings used to plug the unloaded portion of a drill hole.

Tagout means placing a tagout device on an energy-isolating device, in accordance with an established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout device is a prominent warning device that can be securely fastened to an energy-isolating device to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

User is an employee that has custody of the MEWP.

Vehicle is any carrier that is not propelled manually.

Vertical tower is an aerial device designed to elevate a platform in a primarily vertical axis.

Watercraft means boats and ships, collectively, that are propelled manually, by wind, or machinery (i.e., airboats, sailboats).

Work platform is a **c**omponent of the MEWP intended for carrying employees and their tools and materials.

Acronyms

ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act
ADAABAAG	Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines
ADD	Associate Deputy Director
ANSI	American National Standards Institute
API	American Petroleum Institute
APR	Air Purifying Respirator
AS-IA	Assistant Secretary - Indian Affairs
BCD	Buoyancy Compensating Device
BIA	Bureau of Indian Affairs
BIE	Bureau of Indian Education
CDL	Commercial Driver's License
CDSO	Collateral Duty Safety Officer
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CO	Contracting Officer
COR	Contracting Officer's Representative
CPR	Cardiopulmonary Resuscitation
DM	Departmental Manual
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DSRM	Division of Safety and Risk Management
GFCI	Ground Fault Circuit Interrupter
GSA	General Services Administration
HCP	Hazard Communication Program
HCS	Hazard Communication Standard
IA	Indian Affairs
IDLH	Immediately Dangerous to Life or Health
ISEA	International Safety Equipment Association
JHA	Job Hazard Analysis
LFL	Lower Flammable Limit
LOTO	Lockout/Tagout
LP	Liquified Petroleum
MEWP	Mobile Elevating Work Platforms
MMH	Manual Material Handling

MOCC	Motorboat Operator's Certification Course
MOICC	Motorboat Operator Instruction Certification Course
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
OIC	Official-in-Charge
OJS	Office of Justice Services
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PFD	Personal Flotation Device
PIT	Powered Industrial Trucks
PPE	Personal Protective Equipment
RF	Radio Frequency
RPP	Respiratory Protection Program
RSM	Regional Safety Manager
RWL	Recommended Weight Limit
SCBA	Self-Contained Breathing Apparatus
SCM	Safety Committee Member
SDS	Safety Data Sheet
SMIS	Safety Management Information System
SPM	Safety Program Manager
SSA	Surface-Supplied Air
STS	Standard Threshold Shift
TWA	Time Weighted Average
UL	Underwriters Laboratories
USCG	U.S. Coast Guard
VFR	Visual Flight Rules