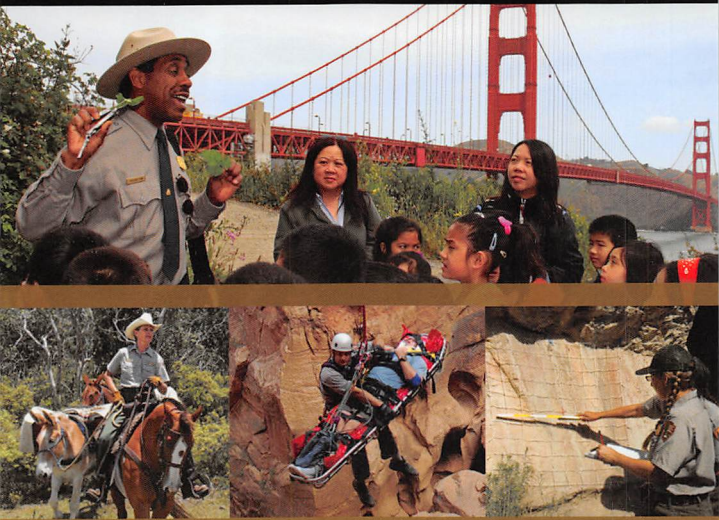
NATIONAL PARK SERVICE

OCCUPATIONAL SAFETY AND HEALTH FIELD MANUAL

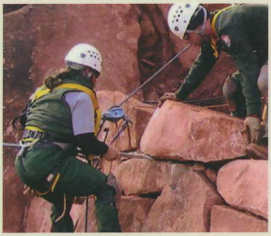


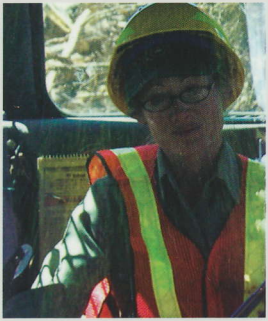
Introduction

The purpose of this guide is to provide basic occupational safety and health information needed by National Park Service (NPS) employees working in the field to safely accomplish work projects and tasks. This guide is not intended to be all-inclusive.

This guide also assists supervisors in providing a safe and healthful workplace for NPS employees working in the field. Every NPS supervisor, employee and volunteer is responsible for following safe work practices and procedures, and identifying and reporting unsafe conditions. This guide is intended to provide assistance in carrying out those responsibilities.

In this Guide





Procedures

Policy, procedures and standards must be developed for identifying permit-required confined space and associated hazards and controlling such hazards to allow safe entry. Employees must be trained and certified before entry into a permit-required confined space. If the area has any element, treat it as a permitted confined space.

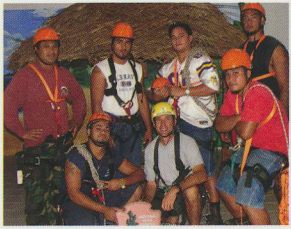
Contact your safety manager before entry into a permit-required confined space. Do not enter these areas to rescue downed personnel until they are cleared of potential hazardous gases, or you can become a victim as well.

Program Elements for Confined Space Entry

As a minimum, program elements consist of:

- Identification of confined spaces, including permit-required confined spaces
- Hazard identification/risk assessment
- Hazard control
- Permit system
- Employee information and training
- Site control
- Authorized and unauthorized entry
- Equipment
- Rescue
- Protection from internal hazards
- Duty to other employees

Caving

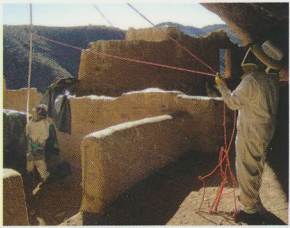


Cave management responsibilities include consideration for employee and public health and safety while in a cave. A safety orientation based on the following guidelines is required for NPS employees who enter caves as part of their duties.

Program Elements

- Cave Safety Standards
- Job Hazard Analyses (JHAs)
- Search and Rescue Procedures/Pre-Planning

Inactive/Abandoned Mines



Confined space entry requirements have been expanded to include entry into inactive/abandoned mines. Due to the high potential of exposure to hazardous conditions during mine entry and examination, it is recommended that the entry requirements outlined under the Confined Space Policy be followed to ensure the safety of those employees required to enter mines to perform their duties. Pre-evaluation for hazards shall be done until it is determined that no hazardous conditions exist. Continuous monitoring for hazards (i.e., lower explosive limits, oxygen deficiency, toxic gases) is recommended when in the mine. Use the JHA evaluation process for all entry situations.

General Procedures and Safe Practices

"Construction work" refers to work projects and activities for general construction, maintenance, alteration or repair.

Ensure personnel are trained for tasks, such as fall protection if working over six feet above the next lower level, trenching and excavation, respiratory protection, proper ladder use, power tools, etc., before performing or being assigned to that task.

Procedures

The first line supervisor and employees shall prepare a Job Hazard Analysis (JHA) and discuss it with all employees involved in the project before beginning any construction work projects or activities. A JHA should be completed for:

- Jobs or work practices that have potential hazards, or where injuries have occurred in the past.
- New, non-routine or hazardous tasks to be performed where potential hazards exist.
- Jobs that may require employees to use out-of-the-ordinary personal protective equipment (PPE).
- Changes in equipment, work environment, conditions, practices, policies or materials.
- Projects that involve interrelated work groups and mixed supervision (e.g., a Maintenance Division road crew performing work on a Natural Resource Division-supervised project).

Safe Practices

- Identify personnel on each project that have current first aid/CPR training. Identify the location of the nearest first aid kit and fire extinguisher. Provide for adequate communications on all projects.
- Sample all sources of potential lead- or asbestos-containing materials and properly identify before proceeding with any construction work in buildings and facilities. Make sure that this information has been communicated to all construction personnel and building occupants.
- Obtain the safety data sheets (SDS) as required for any hazardous materials used and discuss with employees. Read and follow manufacturer's recommendations, including use of PPE, ventilation, preparation of surfaces and materials, application of materials and components, and use of flammables/combustibles. Make sure that a copy of the SDS is retained on the construction work site.
- Mark with signs and barricades all work that may be potentially hazardous to the public and employees in the area. Clean up and secure the area after each work shift.
- Ensure construction adjacent to a highway or street is marked with signs and barricades that comply with required standards. Ensure personnel are properly equipped with reflective clothing/equipment and traffic control devices. Make sure construction is well lit when adjacent to roads with nighttime traffic.
- Make sure all electrical services, components, tools, etc., used on construction sites are UL approved for outdoor use and are ground fault protected (GFCI).
- Hantavirus can be a significant health risk. Refer to the Hantavirus section in the "Industrial Hygiene" tab.

Excavations

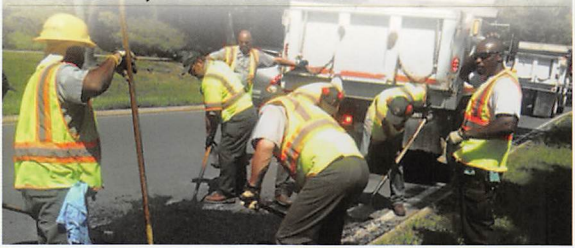
Procedures

Locate utility service (electrical, gas, sewer, water, telephone, cable, etc.) lines prior to excavations. Before excavation begins, a competent person shall inspect the site for conditions requiring special precautions. This is especially important in unstable soils and in the vicinity of roadways or utility structures. Conduct daily inspections of excavations, adjacent areas and protective systems for evidence of potential hazards.

Safe Practices

Employees working in excavations shall be observed at all times by a trained competent person who is not in the excavation. Be aware of the following hazards:

- Variable soil conditions and the effect of ground water. Inspect banks hourly or more if it rains or freezes.
- Comply with mandatory requirements that sides of excavations 5 feet or more in depth shall be shored, sheeted, braced, sloped or otherwise supported by means of sufficient strength.
- Locate a stairway, ladder, ramp or other safe means of egress in trench excavations 4 feet or deeper, so employees have to travel laterally no more than 25 feet.



- When excavating equipment is required, keep employees clear of all equipment working in the area.
- Where vehicles are required to back up to open pits, provide an 8-inch wheel stop and anchor it to a firm, stable and solid surface.
- Maintain proper storage of excavation materials and equipment.
- Remove surface material that may fall into an excavation.
- Place excavation materials and equipment at least 2 feet from the edge of excavations, or use retaining devices or a combination of both methods if necessary.
- Erect guardrails, barricades or fences to prevent accidents and injuries.
- When employees or equipment are required to cross over excavations, provide walkways or bridges with standard guardrails.
- Provide physical barrier protection at all remote excavations.
- Do not touch loose or downed power lines that are hanging from buildings or poles until it is certain that they are not "hot."

Walking and Working Surfaces

Procedures

Prepare and discuss the JHA with employees. The JHA shall address all associated hazards pertaining to walking/working surfaces and corrective actions or abatements.

Safe Practices

- Use properly secured ladders, scaffolding or lifts for activities above floor or ground level.
- Provide the proper clearances in front of all electrical service panels and disconnects as required by the National Electrical Code (NEC).
- Provide ample lighting and ensure that ingress/egress is available at all times.
- Keep workrooms and storerooms clean, orderly and free of tripping hazards. Keep aisles and passageways clear of materials and well lit for safe access. Clearly mark permanent aisles and passageways.
- Clean up spills immediately. Provide signs to indicate wet floors.
- Maintain drainage in areas where wet processes are used. If a dry standing workstation cannot be provided, supply appropriate waterproof footwear and/or floor coverings.

Guarding Openings

Procedures

The JHA shall address hazards associated with guarding floor openings and excavations.

Safe Practices

- Guard every wall, platform and floor opening from which there is a drop of more than four feet with a standard railing, toeboard or equivalent barrier. Skylights should also be guarded.
- Equip flights of stairs with four or more risers with hand railings. For flights with less than four risers, consider on a case-by-case basis.
- Provide covers and/or guardrails to protect employees from open pits, tanks, vats and ditches.
- When excavations or unguarded openings must be left between work shifts, fence them off with standard construction fencing.

Ladders

Procedures

The proper use of ladders can prevent a serious accident. Accident analyses reveal the following four principal causes of ladder accidents:

- Ascending or descending improperly
- Failing to secure the ladder at the top, bottom or both
- Holding objects while ascending or descending
- Structural failing of the ladder

Safe Practices

Ladders are for temporary use only. Replace ladders with stairways, proper guardrails and landings whenever possible.

- Select a ladder that meets applicable Occupational Safety and Health (OSHA)/American National Standards Institute (ANSI) standards and is right for the job.
- Inspect ladders for defects before use each day, and after any occurrence that could damage the ladder. Inspect and test any ladder that has been accidentally dropped, exposed to heat or otherwise damaged.
- Defective ladders must be withdrawn from service for repair or destruction and marked "DANGEROUS, DO NOT USE."
- Wood ladders must not have cracked rungs or split rails, must be free of splinters, and must have smooth edges.
- Metal ladders are electrical conductors and shall not be used around electrical circuits or for electrical arc welding operations.
- Avoid dangerous overreaching. Move the ladder to a new location when you must lean more than one foot to the side.

- Never "walk" a ladder while standing on it.
- Set the ladder on firm, level ground. Use nonskid ladder feet for added safety, especially when working on ice or snow.
- When using stepladders, ensure that the ladder is fully opened and locked with the pail shelf in position.

- When using extension ladders, make sure ladder extension locks work correctly, the top of the ladder extends at least three feet beyond its resting edge, and that the rope and other accessories are properly affixed and in good condition.
- Never step, stand or sit on the ladder top, braces or back section.
- Never straddle the top or stand on the top two steps of a ladder.
- Ensure that ladder feet are firmly supported. Have a person on the ground hold the ladder to prevent slipping or, where possible, secure a board to the floor against which the foot of the ladder can rest.
- Always face the ladder when ascending or descending; use both hands.
- Protect ladders from inclement weather. Store them in a dry place, away from excessive heat and possible physical damage.
- Store ladders vertically. Wooden ladders stored horizontally should be supported at both ends and in the middle to prevent sagging.

Fall Protection: Body Harnesses, Lifelines and Lanyards

A personal fall arrest system is used to suspend a person in the event of a fall from a working level. The system consists of an anchorage, connectors and a body harness, and may include a lanyard, deceleration device, lifeline or suitable combinations of these. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

General

- Provide employees with personal fall arrest systems, safety net systems, or guardrail systems as standard fall protection when working 6 feet or more above lower levels, on moving machinery, or when working over water. Also use this equipment on steep slopes or other areas as warranted. Select the system that best suits the particular work situation. OSHA fall protection is required for work that exposes employees to fall hazards.
- Provide safety net systems when work places are more than 25 feet above the ground, over a water surface or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines or body harnesses is impractical.

Personal Fall Arrest Systems

Thorough employee training in the selection and use of personal fall arrest systems is imperative. Careless or improper use of the equipment can result in serious injury or death.

- Inspect personal fall arrest system components for wear, damage and other deterioration prior to each use. Defective components shall be removed from service and destroyed.

- Personal fall arrest system components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

Safety Ropes

- Inspect safety ropes before and after every use and carefully store them. Check ropes daily during periods of use for broken fibers. To check, twist the strands back, and immediately destroy any rope that shows signs of damage or wear.
- Lifelines shall be secured above the point of operation to an anchorage or structural member capable of supporting a minimum of 5,400 pounds.
- Lifelines used for rock scaling operations or in areas where the lifeline may be subject to cutting or abrasion shall be a minimum of 7/8-inch wire core manila rope. For all other lifeline applications, a minimum of 5/8-inch nylon/polyester rope, with a minimum breaking strength of 5,400 pounds shall be used.

Safety Nets

Safety nets must:

- Extend 8 feet beyond the edge of the work.
- Never be lower than 25 feet below the level of the work.
- Be hung to prevent the user's contact with surface below.
- Be impact-load tested before use.

Scaffolding

Procedures

Scaffolds and supports shall be designed by a structural engineer. The structural engineer shall also prepare the work plan. If the scaffolding is for a structure under 125 feet, it does not need to be designed by an engineer, rather any qualified person. Complete a JHA and discuss it with all employees before using the scaffolding.

Safe Practices

- Ensure that a competent person supervises the building, installation, moving, dismantling and alteration of any scaffold.
- Have an engineer or other designated, competent person inspect all scaffolds before each workday. Do not allow a scaffold built by one crew to be used by another crew until it has been inspected and pronounced safe by a competent person.
- Prohibit the use of shore or lean-to scaffolds.

*A **shore scaffold** is a supported scaffold that is placed against a building or structure and held in place with a prop. A **lean-to scaffold** is a supported scaffold that is kept erect by tilting it toward and resting it against a building or structure.*

- Prohibit work on scaffolds during storms or high winds.
- When working on a scaffold, do not use your leg or other body parts for support when cutting. Instead, use a stable bench, sawhorse or other secured platform.
- Install guardrails and toeboards at all open sides on all scaffolds more than 6 feet above the ground or floor, except needle beam scaffolds and floats. Toeboards are not required if there is a construction fence 10 feet around the base of the scaffolding.
- Where persons are required to work or pass under the scaffold, provide a screen, consisting of no. 18 gauge U.S. Standard wire, 1/2-inch mesh or equivalent between the toeboard and the guardrail that extend along the entire opening.
- Music radios are not allowed on the jobsite.

Procedures

All employees whose work assignment in the field places them beyond reasonable accessibility to a medical facility in terms of time and distance (15 minutes and/or 10 miles) must be trained to render first aid or be accompanied by someone who has a valid certificate in first aid and CPR.

Camp Safety. First aid kits should be available in two central areas (e.g., kitchen, shop area, recreation tent, project leader's tent). Kits should be large enough to accommodate the number of people in the crew.

Poisonous Plants

Instruct all employees subject to exposure to poison sumac, oak and ivy on how to identify each. Take extra precautions with persons known to be highly sensitive to poison sumac, oak and ivy.

Identifying Poisonous Plants

Precautions Against Poisonous Plants

1. **Wear proper field attire.** Wash clothing at regular intervals – daily if you are very sensitive – since dried poison oak resin on clothing can cause a rash if it touches the skin.
2. **The palms of the hands rarely are affected,** but poison oak resin can be transferred from the hands to other parts of the body. Remove it by rinsing the affected area with water. Wash hands before using the restroom.
3. **DO NOT use unidentified leaves** as emergency field toilet paper.
4. **Tools can be contaminated with the resin.** This can be removed by rinsing them with water.
5. **DO NOT stand in the smoke of fires made of brush;** it may contain unburned particles of poison oak.
6. **DO NOT use a leaf mulcher in areas with poison oak** unless your legs and arms are covered and you are wearing a face shield.

Poisonous Insects (Arthropod Stings and Bites)

Employees assigned to areas of heavy arthropod (i.e., ticks, chiggers, spiders, scorpions, bees, wasps, yellow jackets) infestation should do the following:

- Wear proper field attire as defined in the "Field Work" tab.
- Additional protective clothing or equipment for specific activities will be determined by the Job Hazard Analysis (JHA) process.
- Tuck pant legs into socks, or use other method, to prevent insects from going up pant legs.

Hair sprays, hair tonics, sun tan lotions, other perfumed toiletries, and suede or leather odors attract these insects and should be avoided. Bright colors and metal objects, such as jewelry, belt buckles, etc., also attract bees.

- Swatting or running appears to aggravate stinging insects. Shield your face with your arms and move slowly out of a danger zone, or lie face down on the ground if under attack. DO NOT poke at bee or wasp nests.

First Aid for Bee Stings: The following applies also to stings from bumblebees, hornets and wasps. Of these, the honeybee has a barbed stinger that could be left in the skin. The venom sac of the honeybee stinger may be attached and continue to inject venom for some time after the bee has left. To avoid injecting more venom the stinger should be removed by scraping the skin surface with a knife blade or a fingernail.

- Single stings from any of these insects rarely require medical attention. Cool water will reduce the intensity and duration of the swelling.

- Moderate to severe medical emergencies may result from single or multiple bites. Tolerance to bee stings may vary by individual. If a noticeable reaction occurs, the victim should be transported for medical care.

- Some individuals become sensitized to these stings and react with a widespread rash, asthmatic breathing, tissue swelling, a fall in blood pressure, and sometimes unconsciousness. This is known as anaphylactic shock. Such employees should carry an appropriate prescription medication and inform supervisors and coworkers of its location and use. These individuals should be advised to wear a MedicAlert tag or similar device containing information about their sensitivity and emergency phone numbers.

Ticks

When working in areas infested with ticks:

- Tuck your pant legs into your socks.
- Tuck your shirt into your pants.
- Use a tick repellent on your clothes.
- Do a body check at the end of each workday, paying particular attention to armpits, the navel, behind the ears, and the groin area.

Tick Removal: The sooner ticks are removed, the better.

1. Tweezers work best at removing ticks.
2. Grasp the tick as close to the skin surface as possible and pull outward with steady, even pressure. DO NOT jerk or twist, as this may cause the head of the tick to break off in the skin.

3. Take care not to squeeze, crush or puncture the body of the tick, as this may cause the injection of fluids from the tick to enter the wound.
4. After removing the tick, disinfect the area with alcohol or soap and water. You may want to keep the tick in a small jar for later identification in case you become sick with Lyme disease or another illness.
5. Folklore methods of tick removal, such as applying Vaseline, nail polish, alcohol or a hot match to the tick may increase the risk of disease transmission.
6. Record the presence of a tick occurring during duty in the park's tick log (if appl.) and in the Safety Management Information System (SMIS) as a non-recordable incident until prescription-strength medication is prescribed by a physician or until diagnosed with a tick-borne illness.

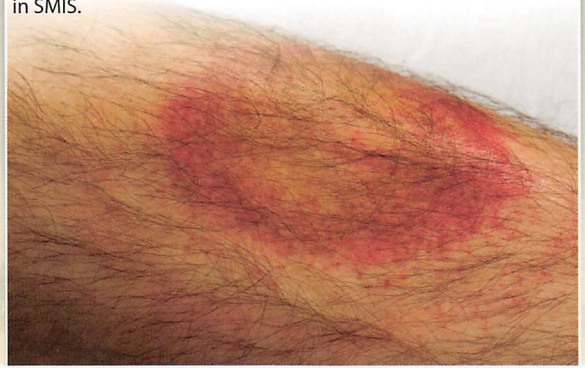
Lyme Disease. Ticks carrying Lyme disease can be found in many parts of the United States. The carriers are black-legged ticks and can be identified by their small size and color (black and reddish-brown).

Ticks must be attached to the skin for 12 to 24 hours to transmit the spirochete that causes Lyme disease, so prompt removal is a safeguard against disease. Symptoms usually develop within a few days to a few weeks after the bite of an infected tick.

Symptoms include:

- Muscle ache
- Headache
- Flu-like symptoms
- Stiff neck
- General malaise
- Fever
- In approximately 70% of Lyme disease cases, a "bull's eye" rash or lesion is exhibited

If these symptoms occur following tick exposure, seek medical attention and ensure proper reporting and record keeping in SMIS.



Poisonous Snakes

Snakes tend to be temperature-sensitive. At cool to cold temperatures, they are slow and lethargic; at hot temperatures, they are quick, but also uncomfortable and will seek cool shelter. On a cool morning, the snake may be sunning on a warm ledge; in the heat of the day, it might be under a rock or brush where it is cool. Be aware also of these other characteristics:

- Snakes have excellent camouflage, so train your eye to see the correct shapes and colorations.
- Don't underestimate the speed and agility of a snake. Rattlesnakes can strike over a distance of about one half their length and can strike faster than you can jump. Give them a wide margin.
- Wear clothing and appropriate boots. Be careful when walking in back country, especially if ground is obscured by foliage. Walk on clear paths as much as possible. Don't step over a large log without looking on the other side first.
- Watch where you are putting your feet and hands at all times. Don't pick up rocks or other objects that might conceal a snake. Use a tool to turn the rock over first.
- If a rattlesnake is encountered, stop and back away slowly.

First Aid for Snake Bites. Secure medical help as soon as possible. First-aid measures include:

1. Get away from the snake.
2. Keep still; don't panic.
3. Remove any constrictive items or clothing from the area in case swelling occurs.
4. Loosely immobilize the affected extremity.
5. Do not take aspirin.

Not all strikes by rattlesnakes deposit venom. If there is an absence of pain and swelling shortly after the strike, it was probably a "dry bite." In such a case, extraordinary measures are not required. Dry bites occur about 20% to 25% of the time.

Cold Injuries

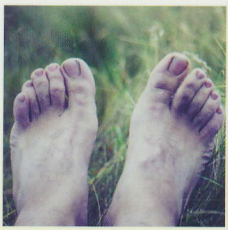
Hypothermia and frostbite are the two most common types of cold injuries an employee or volunteer may encounter working in the field.

Types of Frostbite

Frostnip is the first stage of frostbite, brought about by direct contact with a cold object or exposure of a body part to cold air. Wind chill and water chill also can be major factors. This condition is not serious. Frostnip develops slowly, and often a person is not aware of the condition until someone calls attention to it. The affected part becomes discolored or pale. As the cooling process continues, numbness replaces any sensation of cold or discomfort.

Treatment. Gently warm the affected body part, holding it with bare hands, blowing warm air on it, or, if fingertips are involved, holding them in the armpits. Transfer the frostnip victim to a medical facility if it appears he or she has suffered more than a mild case of frostnip.

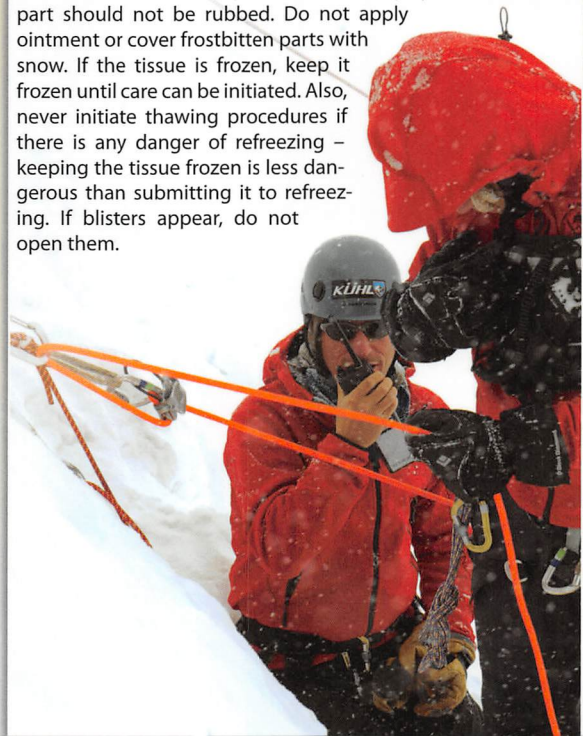
Superficial Frostbite is where the outer and inner layers of skin become involved. If frostnip goes untreated, it becomes superficial frostbite. The affected part becomes discolored and pale. It will feel frozen to your gentle touch. However, when the skin is gently pressed, it will feel soft and pliable beneath the frozen area.



Treatment. Apply a cover and gently handle the affected part. If transportation to a hospital is delayed, apply steady warmth by submerging the body part in warm water. The skin turns purple during thawing and can be painful. The person should receive follow-up medical care.

Deep Frostbite affects the inner and outer layers of the skin and the deeper structures of the body. Muscles, bones, deep blood vessels and organ membranes can become frozen. The affected part becomes a mottled or blotchy blue or gray. The tissue feels frozen to the touch, without the underlying resilience that is characteristic of superficial frostbite.

Treatment. Emergency care for deep frostbite requires the victim to be immediately transported to a hospital. Dry clothing over frostbite will help prevent further injury. The frostbitten part should not be rubbed. Do not apply ointment or cover frostbitten parts with snow. If the tissue is frozen, keep it frozen until care can be initiated. Also, never initiate thawing procedures if there is any danger of refreezing – keeping the tissue frozen is less dangerous than submitting it to refreezing. If blisters appear, do not open them.



Types of Hypothermia

Hypothermia is caused by exposure to cold. The condition occurs when the inner body temperature drops to a subnormal level. It impairs a person's ability to think and act rationally and can cause death. It is accelerated by wet or damp clothing, wind, exhaustion or sudden contact with cold water.

Symptoms of hypothermia include:

- Uncontrollable or continuous shivering
- Slurred or slow speech; incoherent and vague statements
- Memory lapses
- Fumbling hands
- Frequent stumbling; lurching gait
- Drowsiness
- Exhaustion; inability to get up after resting

Treatment: Move the victim to shelter and warmth as quickly as possible. If shelter is not readily available, immediately build a fire to warm the person. Prevent further heat loss.

- Prevent the victim from walking around.
- If the victim is only mildly impaired, give warm drinks (no alcohol) and get him or her into dry clothes and a warm sleeping bag.
- If the victim is semiconscious or worse, try to keep him or her awake. Direct person-to-person contact allows body heat to warm the victim.
- Transport the victim to the nearest medical facility.
- Never assume a person suffering from severe hypothermia is dead, even though he or she may appear to be. There may be no detectable heartbeat, breathing or any other sign of life. Give CPR en route to a hospital.

Prevention: The best defense against hypothermia is to avoid exposure. Recognize hypothermia-producing weather and dress for it. Choose clothing that will keep the body dry and warm. Prepare a survival kit to be carried by each person.

Heat-Related Injuries

Hyperthermia, or elevated body temperature, occurs when the body produces or absorbs more heat than it can dissipate. When elevated body temperatures are sufficiently high, hyperthermia is a medical emergency and requires immediate treatment to prevent disability or death.

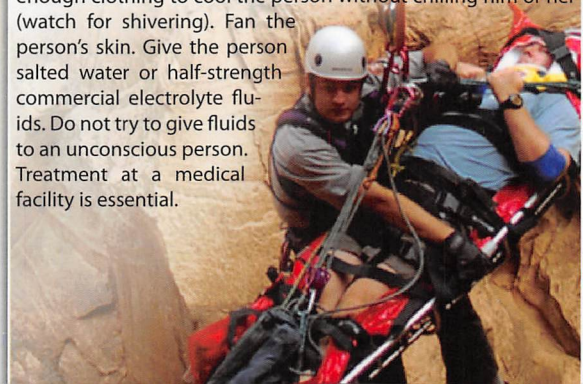
Possible heat-induced illnesses include:

Heat Cramps: Severe muscle cramps, usually in the legs or abdomen, brought about by dehydration and exhaustion, and sometimes accompanied by dizziness and periods of faintness.

Treatment: Move the victim to a nearby cool place. Give the person water to drink, or half-strength commercial electrolyte fluids. Massage the cramped muscle to help ease the person's discomfort.

Heat Exhaustion: Symptoms include rapid and shallow breathing, weak pulse, cold and clammy skin, heavy perspiration, total body weakness, and dizziness that sometimes leads to unconsciousness.

Treatment: Move the person to a nearby cool place. Remove enough clothing to cool the person without chilling him or her (watch for shivering). Fan the person's skin. Give the person salted water or half-strength commercial electrolyte fluids. Do not try to give fluids to an unconscious person. Treatment at a medical facility is essential.

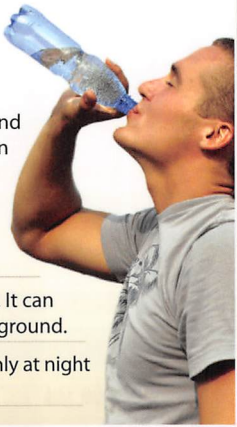


Heat Stroke: Symptoms include deep breaths, followed by shallow breathing, then a rapid, strong pulse, followed by a rapid weak pulse. The skin becomes hot and dry. The victim may lose consciousness. Seizures or muscular twitching may occur.

Treatment: Cool the victim rapidly in any manner. Move the victim out of the sun or away from the heat source. Remove the victim's clothing and wrap him or her in wet towels and sheets. Pour cold water over these wrappings. Body heat must be lowered rapidly or brain cells will die.

- If cold packs or ice bags are available, wrap them and place them under the victim's armpits, behind each knee, on the groin, on each wrist and ankle, and on each side of the neck.
- Transport the victim to a hospital as soon as possible. Should transport be delayed, immerse the person up to the face in a tub or container of cool (not cold) water. Watch the victim so he or she does not drown. This is a life-threatening emergency. CPR may need to be given.

Prevention: Reduce activity level immediately and seek a cooler environment. Stay in the shade. Keep food intake, especially intake of protein, to a minimum if sufficient water is not available, since protein increases metabolic heat production and water loss.



- Keep clothing on, including shirt and hat. Clothing slows the perspiration evaporation rate and prolongs the cooling effect.
- Drink water to prevent dehydration.
- Do not sit or lie on the hot ground. It can be up to 30 degrees hotter on the ground.
- If foot travel is unavoidable, walk only at night and rest often.

Lightning-Strike Injuries

The passage of electricity through the body can either burn tissues, or cause muscle spasms or contractions. Vital nerve centers may be blocked, causing the heart or breathing to stop. Immediate revival should be attempted using appropriate CPR techniques. A lightning-strike victim can be touched without any risk of shock. Treat all lightning strikes on personnel as a medical emergency requiring immediate transport.

Altitude-Related Problems (above 8,000 feet)

Most difficulties at high altitude are a direct result of the lowered concentration of oxygen in the atmosphere. High altitude pulmonary edema (excessive fluid in the lungs) usually occurs in the unacclimatized individual who rapidly ascends to an altitude that exceeds 8,000 feet, particularly if heavy exertion is involved.

Symptoms include:

- Shortness of breath
- Coughing up white phlegm
- Weakness
- Easy fatigue
- Rapid heart rate (greater than 90 to 100 beats per minute at rest)
- Nausea
- Vomiting
- Headache
- Insomnia
- Acidic taste in mouth

Treatment: Descend to a lower altitude at which there were previously no symptoms. Administer oxygen, if available, by mask at 10 liters per minute. Do not take sleeping pills, drink alcohol or smoke cigarettes. Stop strenuous activity.

Prevention: When working at high altitudes, work at a moderate pace, acclimatize and alternate between light and heavy work.

Blood-Borne Pathogens

Blood-borne pathogens are infectious microorganisms in human blood that can cause disease in humans. These pathogens include, but are not limited to, hepatitis B and C and human immunodeficiency virus (HIV). Needlesticks and other sharps-related injuries may expose workers to blood-borne pathogens. Workers in many occupations, including first responders, housekeeping maintenance personnel or law enforcement personnel may be at higher risk of exposure to blood-borne pathogens.

Housekeeping and Work Practice Controls. Provide antiseptic hand cleaner and/or towelettes, as well as paper towels, where hand-washing facilities are not available. Contaminated equipment must be decontaminated. Contaminated equipment must be labeled or bagged as a biohazard.

Sharps Handling. Procedures must be developed for handling sharp objects, such as needles, glass, etc., and for prohibiting eating, drinking, smoking, etc., in work areas.

Personal Protective Equipment (PPE). Provide, at no cost to the employee, appropriate PPE such as gloves, CPR face shields, bag type resuscitators, etc. NPS employees shall use PPE when there's potential exposure to body fluids. Disposable masks, gloves, etc., shall not be washed for reuse.

Training. Training must be provided for all employees whose job puts them at risk for occupational exposure. Training must be provided upon assignment and must cover the major elements of the blood-borne pathogens regulation.

Hepatitis B Vaccination. This vaccination shall be made available, at no cost, to all employees who have the potential for occupational exposure to blood or other potentially infectious material. The vaccination should be administered within 10 working days of assignment. Employees who choose not to be vaccinated must sign a waiver form; they may later opt to receive the vaccination at no cost. The operating unit must evaluate the controls used by employees under the plan each year to ensure the safest methods are practiced.

Post-Exposure Incident Evaluation

This will address medical evaluation for exposed employees and incident evaluation to ensure corrective measures are taken and source testing is conducted. See RM 50B, Section 4.6, Appendix E for more information.

Procedures

NPS activities sometimes require employees to travel and work alone in remote and hazardous areas. At least two employees must be assigned to work in such areas, and always with dependable, established communications. Assessing field hazards is a continual process. The Job Hazard Analysis (JHA) process and Operational Leadership (flip to the "Operational Leadership" tab) will assist both supervisors and employees in minimizing or eliminating identified hazards. Safety orientation is mandatory for employees involved in field activities.

Check-Out/Check-In System

The check-out/check-in system requires maintaining a written record containing the itinerary, name of employee, work area, estimated time of return, emergency contact and miscellaneous information such as names of other crew members, etc. In the event an employee does not return or contact the office at the designated times, the emergency contact will be called, and search-and-rescue procedures shall be initiated. All field camps must have established communications to request assistance.

Field Attire

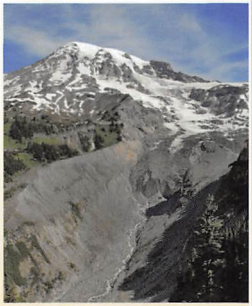
Safe field attire will be determined by management, risk assessment, or as required by specific activity. For general working conditions, the recommended attire is the following:

- 6- to 8-inch ankle-high protective footwear with nonslip soles and heels, and steel toes
- Long trousers
- Long-sleeved shirt
- Safety glasses or goggles (as appropriate)
- Hard hat (as appropriate)
- Hearing protection (as appropriate)
- Gloves (as appropriate)
- Safety vest (as appropriate)

Foot Travel

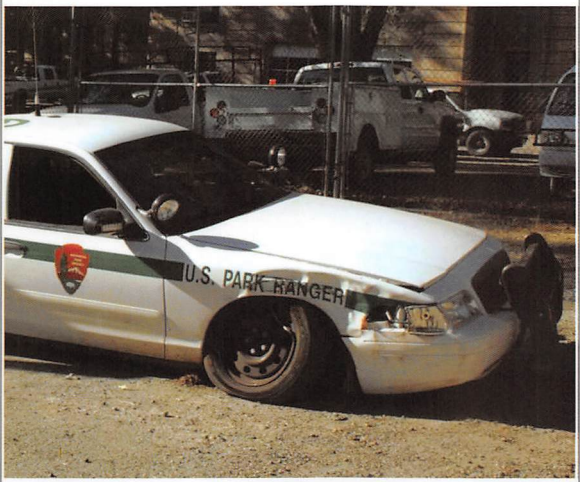
Always notify supervisor of intended route and destination, and work close enough to, or have means to contact, others to allow for a quick response to a call for assistance.

- Avoid travel, resting or camping in snag or high windfall areas when windy weather or lightning may endanger life and property.
- Avoid using rotten or loose-barked logs as foot logs over creeks or gullies. Have secure footing at all times. Rocky slopes, especially slide rock and steep country, can be treacherous. Have one hand free to protect against falls or obstructions. When walking along contours or slopes, carry hand tools on lower side with tool blade or edge away from body.
- Always be on guard against injury from falling trees, snags, limbs, rolling logs or rocks. Don't run blindly from a falling rock, log or tree. Determine its falling direction, get out of its path and alert others.
- Eye protection is required for walking through wooded or brushy areas. Watch for twigs or branches striking the face and protect coworkers from similar whiplashes.
- When possible, detour around hazardous areas such as rock slides, lava flows, rim rock, sand dunes, steep or undercut river banks, quicksand, dense brush, deep gullies, canyons, bear dens, hornet nests, poison ivy or poison oak, etc. If a hazardous area cannot be avoided, contact the supervisor when entering and leaving the hazardous area.



Vehicle Travel

In the case of a disabled or stuck vehicle, remain with the vehicle. The vehicle can be more easily seen from the air than a person can alone, and it also provides shelter from the sun or the cold. If lost and without radio contact, sweep the horizon during the daytime with the light beam of a signal mirror. This beam is visible over a great distance and might be seen by someone. Flash vehicle headlights (three rapid flashes) at night, especially if aircraft can be heard.



Note: *NPS operators of a government-owned or -leased vehicle must have a valid state driver's license for the vehicle operated and NPS authorization.*

Winter Travel

Prior to winter travel, follow office check-out/check-in procedures for personnel and winter-survival equipment. Always drive at a speed that matches visibility, traffic and road conditions.

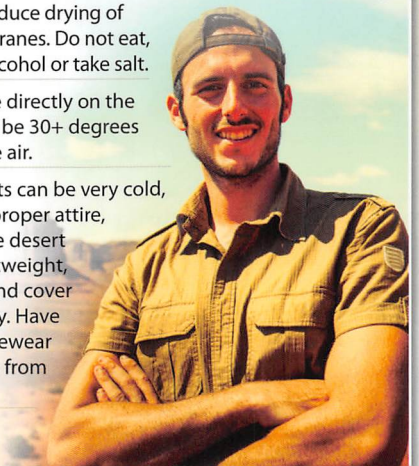
- To see and be seen by others requires the driver to clean all snow and ice from the entire vehicle – hood, roof, trunk, lights and windows. Snow left on any of these areas increases the possibility that visibility will be affected when the vehicle is in motion.
- Follow manufacturers' recommendations when equipping vehicles 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.
- Equip vehicle with extra PPE, boots, gloves, candles, water and snacks for cold-weather survival. Be sure to also pack a shovel, lighter, flashlight, tow strap, phone, blanket and sleeping bag.
- If your vehicle breaks down and you are stranded, it is best to stay with your vehicle. You should run your heat for only 10 minutes every hour to conserve fuel. Make sure the exhaust pipe is clear of snow. Open a window every once in a while to let in fresh air.
- Beware of carbon monoxide poisoning. The odorless, colorless gas found in combustion fumes builds up in closed spaces and can cause immediate illness and death. Symptoms may include nausea, dizziness, weakness, vomiting, shortness of breath and confusion.

Desert and Arid Area Travel

Never go into the desert without first informing someone of your destination, your route and when you will return (check-out/check-in).

Plan

- Carry at least one gallon of water per person, per day of your trip. Plastic jugs are handy and portable.
- Be sure your vehicle is in good operating condition.
- Keep an eye on the sky. Flash floods may occur any time you are downslope from thunderheads, even if it's not raining where you are.
- If your vehicle breaks down, stay with it and your emergency supplies. Such supplies include water and snacks, a shovel, lighter, flashlight, tow strap, phone and blanket.
- If water is limited, keep your mouth shut and breathe through your nose to reduce drying of mucous membranes. Do not eat, smoke, drink alcohol or take salt.
- Do not sit or lie directly on the ground. It may be 30+ degrees hotter than the air.
- Although nights can be very cold, necessitating proper attire, clothing for the desert should be lightweight, light colored and cover the whole body. Have appropriate eyewear to protect eyes from sun glare.



Remote Camp Safety and Sanitation

All sites used for camps must be adequately drained. They shall not be subject to periodic flooding, located within 200 feet of swamps, pools, sinkholes or other surface collections of water unless mosquitoes can be controlled on such still-water surfaces. 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.

Gray Water. Gray water disposal pits shall be constructed within 24 hours to permit leaching. If leaching doesn't occur because of water table, a series of small, shallow canals shall be constructed for evaporation and leaching. Gray water disposal area will be located at least 50 feet down gradient from water source.

Potable Water. Transported potable water must be obtained from a treated source, or chlorinated if obtained from a non-treated source. Request local health consultant advice prior to using any surface water such as lakes, springs, rivers and streams. Empty canteens must be disinfected and dried. Portable hand pumps may be used as appropriate (Katadyn filters, etc.).

Toilet Facilities. Approved toilet facilities adequate for the capacity of the camp must be provided and must be located 200 feet or more from any water source. A description of toilet facilities requirements is stated in 29 CFR 1910.142(d).

Kitchen Tents. Keep kitchen tents clean and tidy. Keep foodstuffs away from cleaning supplies. Two fire extinguishers should be present and ready for use.

- Store foodstuffs in animal and pest-proof containers.
- Make sure pots and pans are clean and inverted for dust and germ control. Silverware should be clean and covered.
- Freezer temperature should be set at zero or below; refrigerators should be set to 37°F to 41°F.
- Employees should follow "leave no trace" principles

Propane Tanks and Generators. Propane tanks must be properly anchored. Generators should be placed downwind, preferably with plywood noise control. Electrical panel boxes are to be protected from the weather. Propane tank and other fuel storage containers must be outside at least 50 feet away from camps and properly posted with "No Smoking" signs.

Camp Aviation Procedures

When established, a camp fueling site must have the proper fuel containment. Both fuel bladders and barreled fuel must be kept in secondary containment (diked) in case of a fuel spill. The daily fuel log must be kept current.

- "No Smoking" and "Warning: Flammable" signs must be posted and visible at any approach to the site (smoking is not allowed within 50 feet of a fueling site).
- Fuel sources must be grounded and bonded through machinery (filters, pumps, etc.) to aircraft.
- The site must be located a minimum of 100 feet from personnel quarters and must be kept tidy. Loose articles that might be blown into helicopter rotors or aircraft propellers should not be allowed in the area.
- A windsock shall be installed in accordance with Aviation Management heliport specifications.
- The fuel tank pump will be equipped with a remote switch. Remote fuel sources may also include hand pumps.

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 human body offers a path of least resistance. Lightning hazards can be either as a direct hit or as a ground current.

General Guidelines During Lightning Storms

- Seek shelter inside a building.
- Select fiberglass or plastic hard hats.
- Don't work on metal fences, electrical lines or structural steel fabrication.
- Don't use metal objects such as soil augers, well-logging equipment, etc.
- 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.
- Seek lower elevation, as in valleys or canyons. Lightning tends to strike the highest electrically conductive object in the area: peaks, ridges, towers, trees, isolated sheds (especially with metal roof or siding), wire fences, etc.
- Avoid streams and lakes. If in a low area, be cautious of flash floods and sloughing off of earthen or rock materials from above.
- Sit on some insulating material if possible, such as coiled rope, a wooden pack board, a folded sleeping bag, a wool shirt, etc.
- A crouched position – squatting on your feet with 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.

Procedures

The superintendent/site manager must assure that buildings and facilities are inspected annually by qualified fire inspectors. Local management has the responsibility to conduct annual inspections; supervisors have daily workplace inspection requirements; and regional safety managers have a three-year inspection requirement of facilities.

Detection and Suppression Devices: All facilities used to house employees and their families must be equipped with approved smoke detection devices, residential sprinkler systems and multipurpose fire extinguishers. Trailers and other facilities used as sleeping quarters by field crews must be similarly equipped.

Fire Extinguishers: Approved and appropriate fire extinguishers must be placed inside repair shops and storage areas, near oil or gas dispensers and in other potentially hazardous areas. Fire extinguishers need to be placed near doors or other areas that have quick accessibility and in a position that does not endanger personnel when a fire emergency arises.

Exits: Buildings designed for human occupancy must be provided with exits sufficient to permit the prompt escape of occupants in case of emergency. Refer to National Fire Protection Association (NFPA) 101, Life Safety Code (LSC).

- Exits and the way of approach and travel from exits must be maintained and unobstructed.
- All exits must discharge directly to the street or other open space that gives safe access to a public way.
- Exits must be marked by readily visible or suitably illuminated exit signs. Specifications for color and size of exit signs can be found in NFPA 101 LSC.

Evacuation Plans

Every facility for NPS employees, volunteers or other personnel must have a current Emergency Procedures and Evacuation Plan posted on site. The plan shall address procedures for fire and other emergencies such as bomb threats, chemical spills, earthquakes, sabotage/ecotage and civil disobedience. The plan must be updated annually and include:

1. Building evacuation routes.
2. Procedures to account for evacuated employees.
3. Special duties (rescue, medical, physically challenged assistance) and names of designated personnel.
4. Proper reporting procedures.
5. Names and job titles of emergency procedures personnel.

Vehicle Fires

The inherent danger from vehicle fires is from explosions, burns and asphyxiation. Immediate response is key to survival. Getting away from the fire is the best course. A frequent cause of vehicle fires is ignition of dry grass by hot vehicle parts, such as exhaust systems. The following actions should be taken if time permits:

1. Turn off ignition and exit the vehicle and use a fire extinguisher if safe to do so.
2. Smoke from vehicle fires may emit noxious and/or fatal emissions from fabrics, petroleum, rubber and plastics. Avoid these emissions or minimize exposure.
3. Be extremely cautious when opening the hood of the car. A flash fire can occur, therefore precaution needs to be taken.

Wildland Fire Safety

Refer to Director's Order #18: Wildland Fire Management.

Structural Fire Safety

Refer to Director's Order #58: Structural Fire Management.

Chain Saw

A gasoline or electric powered machine with a special sharpened chain for cutting trees, brush and other wood items. This description includes pole-mounted chain saws. Chain saw operations include, but are not limited to, felling, bucking, limbing and specialized uses.

Qualifications

- The supervisor shall ensure that a Job Hazard Analysis (JHA) is prepared for all activities using a chain saw and that operators possess the skills required for the work.
- Prior to use of the chain saw, qualified personnel shall evaluate the proficiency level of the operator.
- Operators shall receive training in the use of a chain saw that includes classroom instruction and practical field exercise or demonstration of knowledge and skills.
- Follow the manufacturer's safety, operation and maintenance recommendations for the specific chain saw to be used.
- All operators must be CPR and first aid certified.

Personal Protective Equipment (PPE)

- PPE required for chain saw operators are chaps and ear, eye, face, head, foot and hand protection.
- Wear snug-fitting clothing. **Do not** wear scarves, loose jewelry or neckties.

Other Required Equipment

- Fire extinguisher
- First aid kit

Operation

Always carry the chain saw with the engine stopped, the guide bar and saw chain to the rear, and the muffler away from your body.

It is recommended that a chain saw be operated only when 2 people are present – never alone.

Starting/Operating Saw: The following basic precautions generally apply, regardless of the saw model:

1. Maintain a secure grip on the saw with both hands at all times.
2. Always start the saw with the chain brake engaged.
3. Start the saw on the ground or where otherwise firmly supported. **Do not** "drop start" a chain saw. Make sure the saw chain is not contacting anything before starting.
4. Be sure the area in which you are cutting is free from obstructions.
5. Throttle up to full speed before letting the chain contact the wood. Do not throttle down before the cut has been completed.
6. Avoid cutting with the power head positioned between the waist and shoulders, which is considered a danger zone.
7. **Do not** cut with the power head positioned above shoulder height (do not overreach or cut above shoulder height).

Fueling Saw:

- Allow the saw to cool at least 5 minutes before refueling. Fill the tank on bare ground or on another noncombustible surface.
- Refuel outdoors and at least 10 feet from an open flame or other sources of ignition.
- Start the saw at least 10 feet from the fueling area.

Chain Saw (Cont'd)

Escape Paths

Before felling or bucking any tree or snag, always provide for escape in emergencies. Establish firm footing.

- Never start cutting until you have a clear work area.
- Determine the lean of the tree.
- Recheck the primary and secondary escape routes and alternates.
- As the tree lift begins, check the direction the tree is falling. (Note: Stop cutting as soon as lifting begins.)Proceed along the predetermined escape path to your safety zone. Keep alert for falling debris.
- When cutting a limb that is under tension, be alert for spring-back so that you will not be struck when the tension is released.
- Ensure that adequate traffic control measures are taken, such as signs, cones, barricades, vehicles or personnel when felling or working across or alongside any traveled route.

Felling, Bucking and Limbing

- The project supervisor and the sawyer shall determine jointly if spotters are needed during tree-felling operations.
- No employee shall approach a faller closer than two tree lengths until the faller has acknowledged that it is safe to do so, unless it is demonstrated that a team of employees is necessary to manually fell a particular tree.
- Consider bucking hazards, including overhead hazards.
- Anticipate the log's reaction when it is cut. When trees on sloping ground are bucked, use blocking devices that prevent bucked sections from rolling or sliding. Always work from the uphill side.

- Beware of other logs, branches or rocks immediately behind the area where you are bucking, brushing or limbing for possible kickback potential or rocking of the chain.
- Remember that touching any object with the tip of the chain and bar can cause a kickback.
- Know where the tip of the bar is at all times.
- Remove limbs and brush before bucking.
- When brushing or limbing, be cautious about any tree held off the ground by its branches.
- Do not cut limbs or branches that support the tree off the ground.
- Be aware of side, top, bottom and internal bind due to natural unevenness of the ground and objects, such as stumps, windfalls and rocks. Initiate bucking slowly.
- Observe kerf closely to determine the bind.
- Cut a sapling or branch that is bound down only when it is necessary for safety. Make a series of small cuts on the decompressed side of the sapling or branch to release the bind.
- Completely saw off log chunks.
- Buck windfalls only after examining each tree to be cut for strains, breaks, binds and the chance of root wads falling, rolling or setting upright when the weight of the tree is removed. Be aware of trees that are underneath the one you are bucking as they may be under pressure and could move in any direction when the overhead weight is cut or removed.

Mower

A gasoline- or electric-powered machine with rotary blades, reels or flails used to cut turf grass, weeds and other succulent growth. This includes push, self-propelled and riding mowers.

Qualifications

- The supervisor shall ensure that a JHA is prepared for all projects or activities using mowers and the operators possess the skills required for the work project or activity.
- Only qualified and authorized employees shall operate a mower. Qualifications include being trained by the supervisor for the job to be completed and a thorough review of the manufacturer's operating manual.
- Prior to use of the mower, the supervisor shall conduct an evaluation to identify the proficiency level of the operator.
- Operators shall receive training in the use of a mower that includes classroom instruction and practical field exercise or demonstration of proficiency. Operators must be skilled and trained in how to drive on hillsides before mowing slopes.

Personal Protective Equipment

- PPE required for mower operators are ear, eye, foot and hand protection.
- Always wear long pants. **Do not** wear loose-fitting clothing.
- A hard hat is advisable.

Other Required Equipment

- Fire extinguisher
- First aid kit

Loading and Hauling

- Use a hauling vehicle of adequately rated capacity and capability.
- Use loading ramps or hydraulic lift gates that are sufficiently wide and that secure firmly to the truck bed.
- While transporting a mower, put it in gear, set the parking brake, securely tie it to the hauling vehicle and close the tailgate.
- Tanks must always be secured upright during operation and storage.
- Address fire watch requirements.

Mower (Cont'd)

Operation

1. Conduct a risk assessment of mowing area for hazards (e.g., slope, drop-offs, protrusions). Remove all debris and objects that could be picked up and thrown by cutter blades.
2. Check the fuel and lubricant levels and fill while engine is cool.
3. Thoroughly inspect the mower and tighten loose bolts, nuts and linkage at the beginning of the day. Ensure that mower blades are sharp.
4. Ensure that all guards/shields and safety devices are kept in place, are secure and operating properly.
5. When operating a machine with Roll-Over Protection System (ROPS), always use a seat belt and make sure the seat pivot retaining pin is installed.
6. Keep the area clear of bystanders, children and pets.
7. Plan the cutting operation so it is not necessary to pull the mower backward towards you, particularly on a downgrade.
8. Mow across the face of slopes, never up and down. Exercise extreme caution when changing direction on slopes.
9. Check carefully for overhead clearances, such as branches, doorways and electrical wires, or before driving under any objects and do not contact them.
10. Do not rely entirely on safety switches; on riding mowers, shut off the engine before getting off the seat.
11. Shut off the engine and make certain the blade and all moving parts have stopped whenever you leave the machine and when making any adjustments, repairs, inspections or when cleaning the mower.
12. Do not leave the running engine unattended.

String Trimmer

A gasoline- or electric-powered machine, hand carried, with a drive extension connected to a trimmer head using plastic or nylon string to cut vegetation at ground level.

Qualifications

- The supervisor shall ensure that a JHA is prepared for all projects or activities using a string trimmer and that the operators possess the skills required for the work project or activity.
- Only qualified and authorized employees shall operate a string trimmer. Qualifications include being trained by the supervisor for the job to be completed and a thorough review of the manufacturer's operating manual.
- Prior to use of the string trimmer, the supervisor shall conduct an evaluation to identify the proficiency level of the operator.
- Operators shall receive training in the use of a string trimmer that includes classroom instruction and practical field exercise or demonstration of proficiency.

Personal Protective Equipment

Eye, ear, hand, foot and leg protection is required. Wear snug fitting, durable clothing, e.g., pants with long legs and long-sleeved shirts.

Other Required Equipment

- First aid kit

String Trimmer (Cont'd)

Operation

1. Thoroughly inspect the line trimmer and tighten loose bolts, nuts and linkage at the beginning of the day. Ensure that all guards/shields and safety devices are in place, secure and operating properly.
2. Start the unit on the ground, not in the operating position, by holding it firmly down with one hand while cranking the engine with other.
3. Do not raise the cutting head above knee height. The trimmer head should be kept at the same elevation as the feet.
4. Check area to be trimmed and remove objects trimmer could throw.
5. Keep the area clear of bystanders, children and pets. Do not allow anyone to enter the operating **danger zone**, a distance of 50 feet in radius (about 16 paces).
6. Keep a firm grip with both hands on handles.
7. Maintain a solid stance with firm footing and balance at all times.

Stump Grinder

A stump grinder is any machine used to cut, grind or otherwise reduce tree stumps and roots to small chips.

Qualifications

- The supervisor shall ensure that a JHA is prepared for all projects or activities using a stump grinder and that the operators possess the skills required for the work project or activity.
- Only qualified and authorized employees shall operate a stump grinder. Qualifications include being trained by the supervisor for the job to be completed and a thorough review of the manufacturer's operating manual.
- Prior to use of the stump grinder, the supervisor shall conduct an evaluation to identify the proficiency level of the operator.

- Operators shall receive training in the use of and the hitching/unhitching of the stump grinder that includes classroom instruction and practical field exercise or demonstration of proficiency.

Personal Protective Equipment

- PPE required for stump grinder operators are ear, eye, face, head, foot and hand protection.
- Always wear long pants. **Do not** wear loose-fitting clothing.

Operation

1. Thoroughly inspect the stump grinder and tighten loose bolts, nuts and linkage at the beginning of the day.
2. Make sure the stump grinder is properly attached to the towing vehicle before moving and that it is secure for operation. Safety chains should be secured to tow the vehicle at all times.
3. Ensure that all guards and safety devices are in place, secure and operating properly.
4. Before operating the stump grinder, check the area and remove any foreign debris or objects that may be on or adjacent to the stump to be ground.
5. Stand behind shields or guards on the machine, never in front of the grinder.
6. Keep the area clear of bystanders, children and pets.
7. If the stump grinder is disconnected from the towing vehicle for operation, ensure that all legs are fully extended and that the wheels are blocked before operation.
8. Shut off the engine (motor) and make certain the blade and all moving parts have stopped before leaving the operator's position/controls.

Wood Chipper

A wood chipper is any machine used to cut, grind or otherwise reduce wood from tree trunks, branches, leaves and roots to small chips.

Qualifications

- The supervisor shall ensure that a JHA is prepared for all projects or activities using a wood chipper and that the operators possess the skills required for the work project or activity.
- Only qualified and authorized employees shall operate a wood chipper. Qualifications include being trained by the supervisor for the job to be performed and a thorough review of the manufacturer's operating manual.
- Prior to use of the chipper, the supervisor shall conduct an evaluation to identify the proficiency level of the operator.
- Operators shall receive training in the use of and the hitching/unhitching of the chipper that includes classroom instruction and practical field exercise or demonstration of proficiency.

Personal Protective Equipment

- PPE required for chipper operators are ear, eye, face, head, foot and hand protection. Gloves with cuffs are prohibited.
- Always wear long pants. **Do not** wear loose-fitting clothing.
- Do not have anything hanging from your body, such as cords on glasses, necklaces, etc.

Other Required Equipment

- Chain saw
- First aid kit

Operation

1. Thoroughly inspect the chipper and tighten loose bolts, nuts and linkage at the beginning of the day. Ensure that all guards and safety devices are in place, secure and operating properly.
2. Before operating the chipper, check the feed chute and remove any foreign debris or anything that may have been put into the machine openings while it was unattended.
3. Approach the chipper from the side when in operation. Never approach the chipper from the direction the discharge chute is pointed.
4. Never lean or reach into the feed chute. Do not stand on or put feet into the chute.
5. If the chipper is disconnected from the towing vehicle for operation, ensure that all legs are fully extended and that the wheels are blocked before operation.
6. Allow only one person at a time to feed the chipper, and always feed the material from the side by inserting material butt end first into the hopper.
7. Feed short pieces into the hopper with a long push stick and use the push stick or another limb to clear the hopper. Dislodge limbs and debris that hang up in the conveyor mechanism in the same manner. Never use metal objects as push sticks.
8. Check material being fed into the chipper for embedded rocks or other foreign objects before the material is put into the hopper.
9. Ensure that the material discharge area is clear before starting the blower.
10. The operator should ensure that the disc cover is closed and the manufacturer's disc cover pin is in place and locked before starting the engine or operating the chipper.
11. Maintain all safety decals and ensure that missing or damaged decals are replaced.

Procedures

Heavy Equipment Operators

NPS operators of government-owned or leased heavy equipment must have a valid state driver's license and NPS authorization. Prior to authorization, operators must study and comprehend the operator's manuals for the equipment they will be authorized to operate. Prior to operating specialized equipment, including dozer, loader, grader, etc., proper training will be completed and documented, including demonstration of operating skills.

Hazardous Conditions

Under hazardous conditions or in hazardous locations (i.e., weather conditions or environmental features that increase risk), radio contact should be maintained with operators. When contact cannot be maintained, another employee should accompany operators. Under hazardous conditions, there must be at least two operators/employees present.

Compliance with Applicable Regulations

Load weight, width, height limits and other requirements for transporting equipment and materials shall be observed. Loads shall be secured and flagged as required per Department of Transportation (DOT) standards.

Job Hazard Analysis

Prior to operating equipment and performing job tasks, a Job Hazard Analysis (JHA) will be completed initially and reviewed thereafter.

Personal Protective Equipment and Other Safety Equipment

Personal protective equipment (PPE) will be provided and used in accordance with Occupational Safety and Health Administration (OSHA) requirements and NPS Reference Manual 50B, Section 6.1, Rollover Protective Structures (ROPS) and Falling Object Protective Structures (FOPS) will be installed on equipment as required by the OSHA standards previously referenced. Seat belts will be installed and used on all equipment equipped with ROPS or FOPS. Backup alarms will be installed on all bidirectional heavy equipment such as rollers, compactors, loaders, track-mounted excavators, dump trucks, bulldozers, etc. Alarms will be maintained and operable at all times, and will be audible above the background noise at the work site. Modifications to any equipment safety features are strictly prohibited.

Timber Operations

Tractors/crawlers used in fire suppression work, brushing or pioneering will be equipped with a logging package including sweeps, side screens, additional uprights, rollover protection, etc. Work area should be assessed for hazards, such as dangerous snags, green trees, trees uprooted while piling brush, blowdown, etc.

Other Machinery – General

Investigate and correct hazards before moving machines into operating positions. Locate and operate machines where there is no danger of blasts, cave-ins, etc.

Basic Safety Rules

1. Provide heavy-equipment operator with an observer when needed to ensure safety or to assist with work.
2. When changing operators, make sure that the person in charge discusses plan of work, existing hazards, hand signals, etc., with the new operator and crew.
3. Don't stand directly in front or in back of a self-propelled machine while it is being started.
4. Don't go under or around equipment without notifying the operator. Look out for hazards.
5. Never get on or off moving equipment.
6. Rope off area of swing to provide ample clearance for a person between any solid material and tail swing of a dragline, shovel or crane.
7. Stop all engines before refueling. When filling the gasoline tank, keep the funnel or container in contact with tank to prevent static spark. Never fill the tank over a hot engine. Provide grounding as appropriate.

8. Always leave machines with movable parts that are lowered by gravity, such as shovels, buckets and skip loaders, resting on the ground while not operating.

9. Don't operate internal combustion engines indoors, except with proper ventilation.

10. Always use the proper equipment for the assigned task – don't cut corners to get the job done quickly.

11. Have a qualified person inspect machinery or equipment, including that under contract, when it's received or repaired. Be sure it's in safe operating condition before turning it over to the operator.

12. Equipment will be inspected prior to each use, at the conclusion of the workday and as needed throughout the workday, paying particular attention to proper operation of safety devices. Remove defective equipment from service until repaired.

13. All gears, sprockets, shafts, augers, drive belts or chains, pulleys, drums, gears, fans, or other hazardous moving parts must have guards. Replace guards after any repairs are completed.

Machinery Basic Safety Rules (Cont'd)

14. Install operating platforms surfaced with nonskid materials on foot walks, ladders, steps, handholds, guardrails and toeboards before operating machine.

15. Provide suitable protection for the operator against falling objects, swinging loads and similar hazards.

16. Use safety glass in shields, cabs or enclosures on machines.

17. Post signalman at dangerous or congested points near crews, blind areas, camp, etc.

18. Check route of travel for hazards such as insufficient overhead and side clearance, bridges, high-tension lines, etc.

19. Without exception, the operator will conduct a complete 360-degree safety walk-around of the equipment prior to mounting, starting or operating.

Procedures

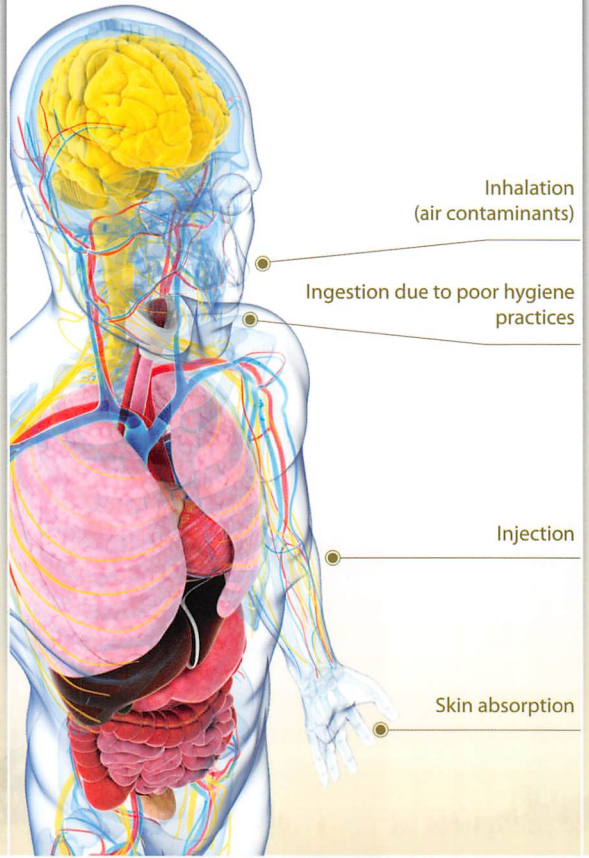
Due to the potential for exposing employees and volunteers to unhealthful, noisy and physically challenging work environments, it is imperative that safety managers or other qualified personnel assist in designing workplace settings that inhibit such conditions. Employee exposure and medical records will be maintained in accordance with 29 CFR 1910.1020.

Health Hazards

Health hazards may exist in a wide spectrum of chemical forms, including: mist, liquid, vapor, gas, dust and fumes.

Routes of Entry

Employees may be exposed to health hazards in the following ways:



Standards of Exposure

To safeguard workers against health hazards, there are specific standards and exposure limits for each type of exposure. The limits sometimes have very strict boundaries between what is safe and unsafe.

The safety manager, Regional Risk Manager or WASO Risk Management should be consulted concerning standards of exposure and how to properly assess the level of exposure to a specific contaminant.

Reducing or Eliminating Employee Exposure

Once an industrial hygiene evaluation has been conducted and a hazardous exposure has been identified, immediate action must be taken to reduce the exposure, as outlined below:

Substitution/Isolation Controls: Eliminate or minimize, to the extent possible, hazardous materials, equipment or processes by replacing all or part of the hazardous elements. Carefully investigate all substitutions to ensure that new hazards are not introduced.

Engineering Controls: The most effective engineering controls are designed into the facility or process before construction. One of the most effective safety control measures is to implement controls that do not require employee interface and that remove the hazard through mechanical means. Examples of these include automatic direct exhaust ventilation, sound insulation/barriers, vibration reduction padding, etc. All preplanning activities should include weather-engineering controls to make the process safer.

Administrative Controls: Administrative controls assist in reducing employee exposure through safe work practices. Time exposure limitation is achieved by rotating jobs or by reducing work periods. At best, administrative controls should only be used for brief periods until engineering corrections can be implemented.

Personal Protective Equipment (PPE) Controls: When engineering and administrative controls are not practical, PPE may be the only means to limit employee exposure. In any case, PPE should be a last alternative. It is essential that PPE be fitted to the individual employee and that the employee is carefully trained in the use and limitations of the equipment.

Respiratory Protection Program

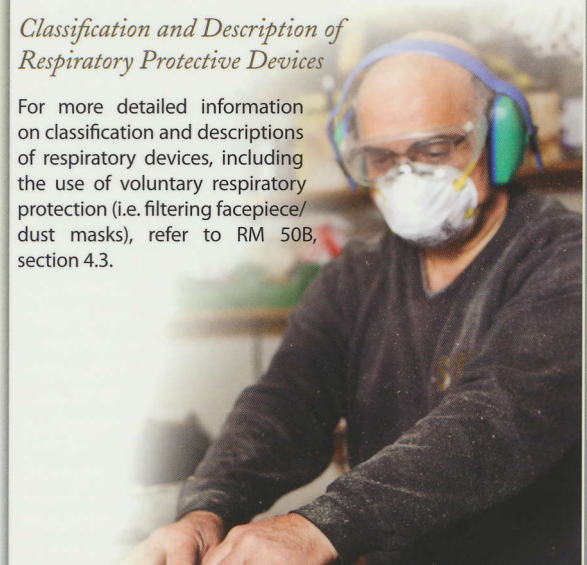
This program is intended to prevent employee exposure to airborne contaminants greater than the Occupational Safety and Hazard Administration's (OSHA) permissible exposure limits (See RM 50B).

General Requirements

Assign respirators only to workers who have been determined by a physician or other licensed healthcare professional to be physically able to perform the work and use the equipment. The physician must determine which health and physical conditions are limiting. The respirator user's medical status should be reviewed annually by a physician.

Classification and Description of Respiratory Protective Devices

For more detailed information on classification and descriptions of respiratory devices, including the use of voluntary respiratory protection (i.e. filtering facepiece/ dust masks), refer to RM 50B, section 4.3.



Facepiece Fit and Leak Testing

***Note:** This section does not apply to the voluntary use of filtering facepiece type respirators.*

Each employee required to wear a respirator must receive fitting instructions, including demonstrations and practice on how the respirator is to be worn, how to adjust it and how to determine whether it fits properly.

- Before initial use, each respirator must be properly fitted, leakage tests performed, and the facepiece seal tested.
- Good facepiece-to-face seals cannot normally be obtained when the wearer has a beard, long sideburns, or a skull cap that project under the facepiece. Facial deformities, such as scars, deep skin creases, prominent cheekbones, severe acne and the lack of teeth or dentures can prevent a respirator from sealing properly. Individuals with any of these conditions should be precluded from using respiratory protection devices.
- Sealing tests for routine donning of respirators, which consist of both positive and negative pressure tests, must be performed each time the respirator is worn.
- Warning properties. Odor, as well as eye and respiratory irritation, should alert the wearer that the respiratory protection is malfunctioning or inadequate. This may be the result of improper facepiece fitting, old or incorrect cartridges or canisters, etc. The worker should leave the hazardous area and rectify the problem. The worker must notify the supervisor if the condition persists. Note: Some chemicals and substances have no warning properties.

Maintenance and Cleaning

When respirators are issued to individuals, the responsibility for primary maintenance and cleaning of the respirator rests with the user. Equipment must be properly maintained, in accordance with manufacturer's specifications, to retain its original effectiveness.

Hearing Conservation Program

The hearing conservation program must comply with 29 CFR 1910.95 and address the points identified in the following:

General Requirements

Implement hearing conservation programs at workplaces where noise exposures for an 8-hour time-weighted average (TWA) are 85 decibels measured on the A scale (dBA) or higher. The exposed employees must be provided with, and required to use, hearing protectors. Workplaces where exposure to noise equals or exceeds an 8-hour TWA of 85 dBA (permissible exposure during an 8-hour shift) must be identified and employees' hearing tested annually.

- Warning signs indicating high noise levels and the requirement that hearing protectors must be worn shall be posted in work areas or on equipment where the noise level is 85 dBA or higher.
- Audiometric test results will be maintained in the employee's medical folder as required by 29 CFR 1910.95.
- No employee will be exposed to noise levels without protection in excess of 115 dBA for 1/4 hour or in excess of 85 dBA 8-hour TWA.
- Employees or their representatives will be provided noise measurements upon request. Audiogram results will be provided to tested employees.

Hazard Communication Program

The Hazard Communication Program (Employee Right-to-Know) encompasses handling and storage of hazardous materials (products) in the workplace. The Hazard Communication Program does not apply to hazardous waste, tobacco or tobacco products, wood or wood products, articles (as defined in 29 CFR 1910.1200(c)), food, drugs, cosmetics, alcoholic beverages, or products/substances used in the workplace in the same manner as household use.

Manufacturers' Instructions

Follow manufacturers' instructions for safe handling and storage of hazardous materials.

Hazard Determination

The manufacturer, supplier or employer must evaluate chemicals to determine the hazards. Normally, this evaluation is done by the manufacturer and provided via a Safety Data Sheet (SDS).

Safety Data Sheet

The SDSs are to be readily available. Consult the product SDS for information regarding:

- Physical and chemical characteristics (flash point, vapor pressure)
- Physical hazards (fire, explosion, reactivity)
- Health hazards
- Primary routes of entry
- Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV)
- Carcinogenicity
- Safe handling procedures
- Control measures (engineering controls, work practices, PPE)
- Emergency and first aid procedures

Waste Minimization

It is essential that employees, supervisors and managers incorporate waste-minimization practices into procurement, use and disposal of hazardous substances. Waste minimization should be promoted by:

- Substituting less hazardous products when feasible.
- Reducing the number and variety of products used.
- Purchasing only the amount absolutely needed.
- Controlling product storage and handling practices.
- Separating incompatible products during handling and storage and ensuring storage facilities are properly built.

Labeling

All products must be properly labeled to include:

- Contents
- Name and address of manufacturer
- Appropriate warning

Note: *While not through the HAZCOM standard, pesticides* ***are*** *required to be labeled.*

Hazardous Materials Management

NPS is required to comply with all Federal environmental and safety laws and regulations governing storage, handling and use of hazardous materials, and governing disposal of hazardous waste. NPS must also comply with state hazardous materials laws and regulations, as required.

Hazardous Materials in the Field

Hazardous materials or waste may be found on public lands in a variety of forms, such as clandestine drug lab waste, mining wastes, midnight dumping and transportation accidents. Prior to starting work, check for hazardous materials such as mold and PCPs. Employees who may encounter such materials in the field must be trained as First Responder Awareness Level, as required in 29 CFR 1910.120(q), to recognize, retreat upwind and report any discovery:

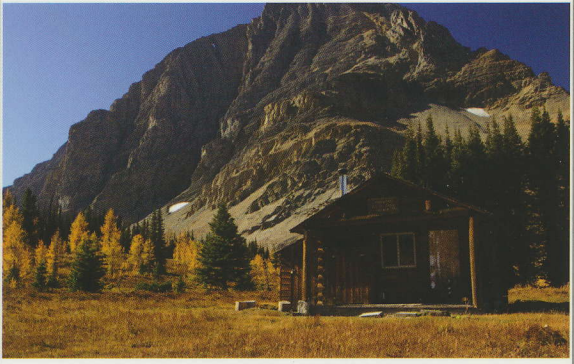
- **Clandestine Drug Lab Waste.** This waste material is often the result of illegal manufacturing of the drug methamphetamine commonly known as "crystal meth" or "crank." The waste may look like household garbage at first glance. Drug lab waste can be identified by the presence of one-gallon plastic jugs, large plastic bags, five-gallon buckets and various laboratory equipment (beakers and tubes). Drug lab waste may contain any number of chemical combinations and should be considered dangerous. Employees shall retreat from the area immediately and report to the program manager (e.g., supervisor, hazmat, law enforcement ranger or special agent). Do not examine, investigate, touch, smell or taste such waste for any reason.

- **Midnight Dumping.** The presence of barrels or other containers, discoloration of land, plants or water, and the presence of dead vegetation or animals may indicate a midnight dumping on public lands. If you discover a midnight dumping site, remember that self-protection is your primary responsibility. Upon discovery of midnight dumping waste, retreat from the area immediately and report to the program manager (e.g., supervisor, hazmat, law enforcement ranger or special agent).

Hantavirus

Hantavirus respiratory syndrome is a disease caused by a virus carried by deer mice, white-footed mice, cotton rats and rice rats. Humans acquire the infection after exposure to rodent excreta, especially after it dries and becomes airborne and is directly introduced into broken skin, eyes, nose, mouth or possibly ingested with contaminated food or water.

Employees who enter structures such as barns, sheds or seasonal cabins or who assist in renovating old buildings or cleaning existing areas that may have rodent excreta may be at risk of contracting the disease. All rodents should be treated as if they carry the virus.



General Precautions

Avoid direct contact with rodents (live or dead), their droppings, urine, saliva, nests or other items that may be contaminated by them. Do not feed rodents. Preventive measures should be taken to eliminate rodents from buildings by reducing the availability of food sources, nesting sites and access routes into a building. Refer to the NPS Rodent Exclusion Manual for more information.

Elimination of Rodents Inside Buildings and Reducing Rodent Access

Rodent infestation can be determined by direct observation of animals, from the presence of feces, and from evidence that rodents have been gnawing at food. If rodent infestation is detected inside a building, undertake abatement measures.

1. **Prior to any cleanup,** ventilate closed buildings or areas inside buildings by opening doors and windows for at least 30 minutes. Use an exhaust fan or cross-ventilation if possible. Leave the area until airing-out period is completed.

2. **With a disinfectant wipe,** clean every surface or object that dust has settled on. Ensure appropriate PPE is used during the cleaning process.

3. **Seal, screen or otherwise cover** all openings into the building that have a diameter of one-quarter inch or greater, because rodents can enter through holes this small. Pay special attention to openings where pipes and wires enter the building. It is best to plug holes with sheet metal or metal screening material. Refer to the NPS Rodent Exclusion Manual for tips on sealing for numerous applications.

4. **Trap rodents using spring-loaded traps.** Traps should be placed on a newspaper, along suspected paths like baseboards, or near the corner of a room. Place the trap perpendicular to the wall, with the baited end closest to the wall. Do not use live traps.

Ergonomics

Types of Injuries

Pulled or strained muscles, ligaments, tendons and disks are the most common back problems. The majority of workplace back disorders result from chronic or long-term injury to the back rather than from one specific incident. Back disorders are frequently caused by:

- Excessive or repetitive twisting, bending and reaching
- Carrying, moving or lifting loads that are too heavy or bulky
- Staying in one position, or using one muscle group for too long
- Poor physical condition
- Poor posture

A **cumulative trauma disorder (CTD)** is a disorder of the musculoskeletal and nervous systems that is caused or made worse by repetitive motions or prolonged activities. The combined effects of several risk factors often result in CTDs.

Other risk factors for CTDs include:

- Forceful exertions, usually with the hands
- Pinch grips
- Prolonged static postures, either sitting or standing
- Awkward postures of the upper body, including reaching above the shoulders or behind the back
- Excessive bending or twisting of the wrist
- Continued elevation of the elbow
- Inappropriate or inadequate hand tools
- Restrictive workstations and inadequate clearances
- Vibration from power tools
- Lifting heavy objects or objects of abnormal sizes

Hazard Prevention and Control

Ergonomic hazards are prevented primarily by the effective design of a job or jobsite and the tools or equipment used in that job. Based on information obtained in an analysis of the work site, procedures can be established to correct or control ergonomic hazards using the following methods:

1. **Engineering Controls.** Workstations should be designed to accommodate the full range of required movements of the workers who are actually using them to perform the job.

2. Attention should be given to prolonged or sustained exertion of a body part, proper work activity height, the reach at which tasks are performed and the force requirements. Other factors to look at include hard or sharp edges, contact with thermally conductive work surfaces, proper seating, work-piece orientation, lighting, vibration, noise, weight of load, and layout of the workstation.

3. **Work Practice Controls.** Key elements include instruction in proper work techniques, employee training and conditioning, regular monitoring, feedback, adjustments, modification and maintenance.

4. **Tool Selection.** Tool selection is a key element in preventing ergonomic injuries. For example, opt for low vibration tools, with lighter weights and better handle designs. While working, try altering methods to further prevent ergonomic injuries.

Procedures

Machines and tools shall be properly maintained, operated, stored and inspected.

Portable Hand Tools

Chopping Tools (Ax, Pulaski, Hoedad, etc.)

- Use the right tool for the job.
- Treat the ends of ax handles and other swinging tools to prevent slippage. Inspect wedges for tightness.
- When swinging an ax or similar tool, place feet firmly shoulder-width apart. Grip handle near the end. Make sure there is ample clearance from objects and persons near the swing arc. Always chop away from feet, legs and body. Guard against loss of grip or control of tool if a glancing blow is struck against the target object.
- Sheathe all chopping tools when not in use.
- Observe safe spacing between crew members carrying sharp or pointed tools. Travel on foot in single file. Sheathe tools and hand-carry on the downhill side. Do not carry on shoulder. Keep other hand free. If tripping, slipping or falling, throw the tool to the downhill side. Use both hands to regain balance or break fall.
- Be watchful of the force released by cutting a sapling that is being held in a bowed position by adjacent trees or brush.
- Maintain safe intervals between workers using tools.
- Allow overhead clearance when using a brush-cutting tool. Use the proper handhold. Keep body well-braced and balanced. Make each stroke productive.

Portable Hand Tools (Cont'd)

Wrenches

- Place the wrench on the nut so that pressure on the handle tends to force the jaws further onto the nut.
- Pull, don't push, the wrench when turning the nut.

Screwdrivers

- Never use a screwdriver as a chisel.
- Use a screwdriver with an insulated handle and shaft for all electrical work.

Hammers

- Select suitable hammers with secure heads and a proper handle length for the job to be done.
- Allow sufficient working space.

Picks

- Use picks with handles that are not damaged and securely fastened to the head.
- When swinging a pick, make sure that you have overhead and side clearance.

Files

- Fit files with substantial handles and guards.
- Never use a file as a pry.
- Keep files clean to reduce slipping.
- Protect hands when filing sharp objects.

Handsaws

- Keep handsaws properly sharpened.
- Use the thumb to guide the handsaw in starting a cut.
- Use teeth guards when carrying a crosscut or ripsaw.

Air Tools

- Wear specified personal protective equipment (PPE): safety eyewear, earplugs, protective shoes, respirator, gloves, etc.
- Do not use air tools unless a fixture on the tool retains the replaceable bit or jack set. Inspect retainers daily for cracks.
- Air hose couplings must have safety chains to keep them from whipping loose if coupling fails.
- Place line oilers so oil cannot drain back into the air tank.
- Release pressure before connections are broken; do not kink hose.
- Make sure no one is in line of airflow. Never aim an air hose at anyone.
- Never use pressurized air to blow dust or chips from hair or clothing.
- Compressed air used for cleaning purposes must be regulated to a maximum output of 30 psi or equipped with a safety, pressure-relief nozzle. Blowguns must have chip-guarding mechanisms.

Chain Saws

Follow manufacturer's operating and safety instructions. Training and PPE are required for chain saw operators. Required PPE for chain saw operators are chaps, ear, eye, face, head, foot and hand protection.

1. Never carry a chain saw on your shoulder.
2. Stop and place the bar vertically before carrying a saw. The chain must be guarded. Carry saw on downhill side with bar to rear. Secure saw when transporting it in a vehicle.
3. Stop the engine and cool for 5 minutes before refueling. Fill the fuel tank on bare ground. Wipe spilled fuel off the engine. Start saw at least 10 feet away from refueling area. Do not smoke while fueling or while saw is running.
4. Safe chain saw starting techniques should be established and followed, always keeping the saw away from the body. Keep coworkers away from chain saw starting and operation.
5. Stop engine for cleaning, adjustments or repair.
6. Fuel tanks shall be purged prior to storage.
7. Refer to the Chain Saw section in the "Grounds Maintenance" tab.

Portable Electric Tools

- Inspect and test all power tools regularly and maintain in good condition. Establish a definite schedule for inspection, testing, maintenance and repairs.
- All electric tools must be three-wire grounded or double insulated.
- Ground fault-interrupters are required for all construction work using electric tools. This may be an outlet, a cord connected type, or an integral part of a generator.
- Use only electric tools with cords and plugs in good condition. Those with damaged insulation or a missing grounding prong must be replaced or repaired by a qualified electrician.

- Make sure tool cords are not tripping hazards. Protect tool cords against insulation damage during use. Unplug tools when not in use.
- Do not operate power tools without training and authorization.
- Do not operate portable electric tools where flammable vapors or gases are present or in wet areas.
- All portable electric circular saws must have automatic guards that completely cover the cutting edge when saw is not in use. Do not use cracked, bent, dull or damaged blades.
- Drill-chuck wrenches may be an ejecting type. Unplug the tool when changing bits or accessories. Anchor any material being drilled.
- Keep portable grinder guards in place. Tool rest must be one-eighth inch away from stone; tongue guard must be one-quarter inch away.
- Inspect motor-driven grinding stones at least weekly for cracks or rutting/grooves. Keep stones free from oil and properly dressed. Discard defective stones.
- Grinding wheels used to grind aluminum must be designed for that purpose. Using aluminum on a standard wheel will clog pores, causing the wheel to overheat and eventually shatter.

Radio Equipment

AC-powered radio equipment cabinets must be locked, and keys must be available only to specially instructed and authorized radio technicians or personnel.

- Never use any radio or extend any antenna on a portable set if a lightning storm is within 1 mile.
- Do not use radio transmitters within 300 feet of any electric blasting or any area where electric detonators are handled or stored.
- Provide unextended whip antennas with safety knobs, closed loops or other protective devices to prevent injury.
- Only those qualified and trained may climb high radio structures. Wear appropriate PPE, such as safety harness, etc., when climbing high structures.
- When there is a chance of a vertical fall, you are prohibited from using body belts. Towers should be equipped with a ladder-climbing safety device and a full-body harness with a frontal D ring.
- Do not work on energized antennas.
- Use an intrinsically safe radio where explosive vapors may be present.

Fixed Machines

Woodworking and Metalworking

Only qualified and authorized personnel may operate shop equipment. Personnel must not wear loose clothing, ties or jewelry, or have loose hair that may catch in moving machinery. Required PPE must be used.

- Machines will be located to ensure adequate space for movement of the operator and handling of stock. Safety zones must be marked around each machine. Machine switches must be within immediate reach of the operator.

- Work areas must be kept free of sawdust, scrap and excess material.
- Machines designed for a fixed location (equipment base supplied by manufacturer with pre-drilled anchor holes) shall be anchored.
- Machines must be shut down and locked, in accordance with lockout/tagout requirements, before authorized persons make repairs.
- Machines that are operating must be attended at all times.
- No machines may be operated unless required guards are in place and functional.
- Switches on fixed machines shall be of a type that will prevent restart in the event of a power failure.

Compressors

All tanks must comply with the American Society of Mechanical Engineers (ASME) standard and with state laws.

- Make thorough monthly inspections for leaks and signs of corrosion on surfaces. Replace any worn parts and remove corrosion.
- Don't replace the brass fusible plug with an ordinary pipe plug.
- Clean or replace air filters as needed.
- Make sure that all pressure tanks or lines have safety valves, air-pressure gauges and a drain cock at the lowest point on the tank that is opened at least monthly to drain the condensation.
- Compressed air used for cleaning purposes must be regulated to a maximum output of 30 psi or equipped with a safety, pressure-relief nozzle.

Welding and Cutting

Allow only certified welders, mechanics, machinists or specially certified personnel to use welding equipment. Only certified welders are allowed to make structural welds.

Welders shall:

- Wear appropriate PPE.
- Confine welding activities to well-ventilated areas and away from flammable and combustible materials.
- Keep sparks and flames away from cylinders and hose lines. All flammable or explosive material in the areas of welding operations must be removed.
- Keep the correct type of fire-extinguishing equipment easily accessible at all times during welding operations.
- Use a respirator or point-of-operation exhaust ventilation when welding on metals coated with paint containing lead or zinc or when welding brass, because fumes from these metals are toxic. Adequate exhaust systems must be provided to ensure removal of injurious fumes and gases. If a respirator is used, make sure that it is appropriately matched to the toxicity types and levels being generated, and that it meets all respiratory protection requirements.
- Inspect hose lines and/or power cables frequently. Replace or repair as needed.
- Use curtains or screens around all welding locations. Transparent welding screens must meet AWS F2.3M Specification for Use and Performance of Transparent Welding Curtains and Screens.
- Store cylinders vertically with valve cover caps, if so equipped. Cylinders must be secured to prevent accidental falling or damage.

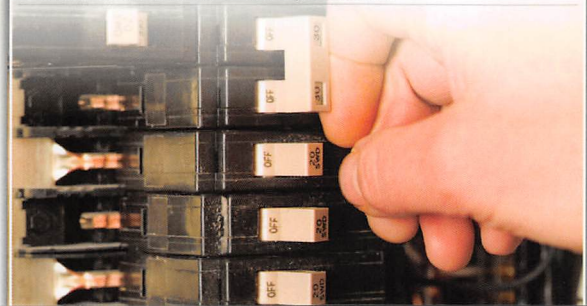
Electrical Work at NPS Facilities

All work, repair or maintenance will be performed only by licensed electricians.

Electrical Safety

Use only UL-listed wires and apparatus, and use them only as intended.

- Treat all loose wires hanging from buildings or poles as "hot," unless certain they are not connected to a live source of electricity.
- Exercise caution when installing or using fixed power equipment or portable power tools in hazardous or damp locations due to shock, electrocution or explosion hazards.
- De-energize switch before removing or replacing cartridge-type fuses or breakers.
- Damaged electrical cords must be removed from the jobsite and tagged as unserviceable to prevent reuse.
- Don't overload circuits. Where excessive use of appliances results in frequent fuse failure, redistribute plug-in appliances or install additional circuits. Don't change fuses to a higher rating than the wire size permits and do not use an alternate item as a fuse replacement.



Electrical Equipment

- Keep electrical test equipment and hand tools in good repair. Restrict them to proper use. Test in accordance with manufacturer's recommendations. Test equipment should be tested on a known source before and after use. Gloves require periodic testing.
- Use only nonconducting ladders for electrical work.
- Keep ladders clean and free from dirt.
- Do not use extension cords in lieu of permanent wiring.

Power Lines

- Treat all power lines as dangerous.
- Notify the power company in advance concerning work on or near power lines or installations. Have the electrical utility perform work for which they are responsible, such as tree trimming or other maintenance activities.

Hazardous Energy Control (Lockout/Tagout)

This policy establishes the minimum requirements for the lockout using energy-isolating devices whenever maintenance or servicing is done. It ensures that the machine or equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before employees perform any servicing or maintenance, when the unexpected energization or startup of the machine, or release of stored energy, could cause injury.

Note: *Lockout/tagout procedures are used for all hazardous energy sources, not solely electrical, but can also include stored energy (springs) mechanical motion, pressurized air, and hot and cold temperatures.*

Authorized employees or contractors shall do servicing with these procedures followed at all times. All employees, upon observing a machine or piece of equipment that is locked out for servicing or maintenance, shall not attempt to start, energize or use that machine or equipment.

This policy does not apply to cord-and-plug-connected electric equipment where unexpected energization of the equipment is controlled by unplugging the equipment and under the exclusive control of the person performing the service or maintenance.

Sequence of Lockout System Procedure

1. Notify all affected employees that a lockout system is going to be utilized and the reason for this step. The authorized employee will know the type and magnitude of energy that the machine or equipment utilizes and will understand the hazards.
2. If the machine or equipment is operating, shut it down by the normal stopping procedure (e.g., depress stop button, open toggle switch, etc.).
3. Operate the switch, valve or other energy isolation device(s) so that the equipment is isolated from its energy source(s). Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleed down, etc.
4. Lock out the energy-isolating devices with assigned individual locks with attached identification tags.
5. After ensuring that no personnel are exposed, confirm the energy sources are disconnected by operating the on button or other controls to make certain the equipment will not operate.
6. The equipment is now locked out.

Restoring Equipment to Normal Operation

- After the servicing and/or maintenance is complete and equipment is ready for production, check the area around the machines or equipment to ensure that components are operational.
- Check the work area to ensure that all employees have safely been positioned or removed from the area. Remove the lockout devices and tags, then reenergize the machine or equipment.

Multiple Lockout Procedures

If more than one individual is required to lock out equipment, each will place his/her own personal lockout device and identification tag on the energy-isolating device(s). When an energy-isolating device cannot accept multiple locks, a multiple lockout device (hasp) must be used that allows the use of multiple locks to secure it. Each employee will use his/her own lock to secure the multiple lockout device complete with his/her identification tag.

When work is completed and each person no longer needs to maintain his/her lockout protection, that person will remove his/her lock and tag from the multiple lockout device. This is the only procedure to be used for multiple lockout.

Shift or Personnel Change

If a machine or piece of equipment must be locked out beyond the end of one shift, the supervisor of the shift going off duty must place his/her lock and tag on the machinery. Then all other employees who had locked the machine out may remove their locks and tags. The maintenance supervisor on the next shift will then place his/her lock and tag on the machine. When all employees who may be working on the machinery the next shift, have placed their locks and tags on the machine, the supervisor of the present shift may then remove his/her lock.

If a machine will be locked out for several shifts and no work will be done during that time, then a supervisor's lock must be left on the machine. In this case, the importance of the identification tag is paramount.

Outside Contractors

When outside service personnel are engaged in service or maintenance activities that require energy control procedures, management and the outside contractor shall inform each other of their respective lockout procedures.

Management shall ensure that all employees understand and comply with the restrictions and prohibitions of the outside contractors' lockout procedures.

Procedures

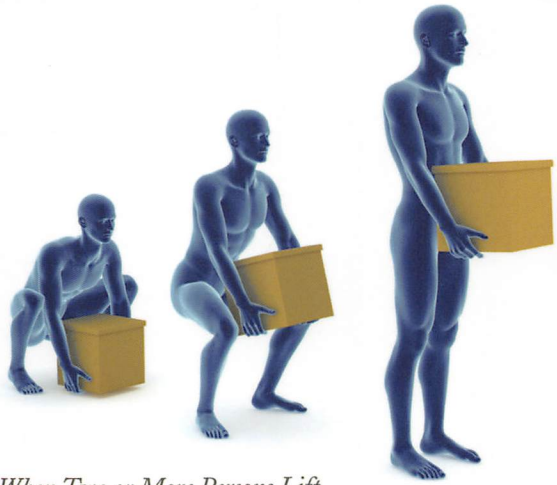
Observe established procedures and precautions when lifting, carrying or otherwise handling heavy loads. Remember that weight, shape and size of objects determine limits of safe handling. Don't overexert. If help is needed, get it. Use personal protective equipment (PPE) as required.

Lifting Heavy Loads

- Inspect ground or floor area immediately around object and route of travel for clearance and tripping hazards.
- Examine object to determine safest way to handle. Check for snags, burrs, splinters, greasy surfaces, etc.
- Wear protective gloves and safety shoes.

Lifting in a Proper Manner

1. Make a trial lift to be sure load can be handled safely.
2. Stand close to object, with feet solid and slightly apart.
3. Assume a crouching position close to load. Bend legs at knee.
4. Keep back as straight as possible without arching. Leg and arm muscles should do the work.
5. Secure a firm grip on object. Lift by straightening legs.
6. Rest object on a bench or ledge. Shift hands and boost.
7. Don't twist. Shift feet to turn body.
8. Take precautions to avoid bruising or crushing hands and arms.
9. Lower object in same manner in which it was raised. Take necessary precautions to keep fingers clear when placing object.



When Two or More Persons Lift

- Select persons of similar size and strength.
- Station one person at rear to give predetermined signals or orders.
- Carry long objects such as ladders, pipes and lumber on shoulders on same side.
- Handle packaged articles in boxes by grasping them at opposite top and bottom corners. Grasp sacked 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.
- Provide help for handling odd-shaped objects if combination of irregularities and weight makes them hazardous for one person.

Storage Yards

Use a level, well-drained yard for storage purposes. The storage yard should be fenced in with an 8-foot high, vandal-proof fence.

- Provide adequate roadways and walkways for safe movement of personnel, trucks, lifts and cranes, etc.
- Keep storage yards free of surplus material and obsolete equipment that clutter the area.
- Provide and maintain approved types of fire extinguishers in storage yards.
- Provide 5- to 8-foot corridors both inside and outside of perimeter fence to facilitate fire control and keep out rodents and snakes.
- Keep storage area free of vegetation, debris and rubbish.
- Use cribbing to prevent direct contact with the ground. Dunnage may inhibit bottom ventilation.
- Use tarpaulins to protect materials subject to weather and sun damage.
- Arrange heavy pieces and material on pallets in a manner that will allow for mechanical handling.
- Block or nest round objects to prevent roll.
- If drums and kegs are piled on end, use planks between layers.
- Stack piles of lumber. Make the height of the pile no greater than the width.
- Use cross-binding and step-back methods when storing bagged material and masonry products.
- Store reinforcing steel and small-diameter pipe on racks.
- Make permanent separations to prevent pulling from the pile.
- Provide hand trucks for moving heavy and bulky items.
- Label all barrels according to their contents.
- Sign flammable storage areas as "No Smoking" areas.

Motor Vehicle & Equipment Safety

Precautions

Prior to departure, refer to NPS RM 50B for more detailed information to include authorized uses of cell phones. Also refer to the NPS Driving Policy to determine authorized work and driving limits.

Equipment

Government-owned or -leased vehicles will be maintained in good mechanical condition.

Defective Vehicle. Vehicles with mechanical or unsafe conditions shall be removed from service until repaired and the condition shall be immediately reported to the supervisor and fleet manager. Their keys shall be red-tagged and secured.

Disabled Vehicle. The operator may make only authorized emergency repairs to a government vehicle. The operator shall have it towed, if necessary.

Vehicle Inspections. Monthly vehicle inspections shall be performed and documented. The inspection shall include checking vehicle lights (brake, tail and backup), mirrors, wipers, washers, defroster, gauges, brakes, fluids and belts. Operators will ensure emergency equipment (first aid kit, reflectors, jack/lug wrench) is in the vehicle.

Seat Belts. Seat belts must be available and used in NPS motor vehicles.

- Without exception, seat belts must be worn at all times by motor vehicle operators and passengers. Failure to comply may subject the employee(s) to disciplinary action as determined by local management.

- All heavy, self-propelled equipment fitted with rollover protective structures (ROPS) must have a seat belt for the operator. Without exception, heavy equipment without ROPS protection should not be operated.

Safety/Survival Equipment. Every field vehicle shall be equipped with warning flags or reflectors, a tool kit and a first aid kit. Additional emergency equipment may be carried in each vehicle as determined by local need.

Fire Extinguishers. Approved fire extinguishers are required in buses, ambulances, fire engines, fire trucks, heavy motorized mobile equipment, special-use vehicles, and as required by the Department of Transportation (e.g., hauling of hazardous materials, such as gasoline, explosives, chemicals, etc.). All government-owned or -leased vehicles shall be equipped with fire extinguishers that are properly maintained and inspected.

Transporting Fuel. Use only approved-type safety cans for storage and transportation of gasoline and other flammable liquids. Approved metal cans carried in a pickup bed with a plastic liner can become highly charged with static electricity. Grounding is to be done by placing the safety can on the ground or by using grounding devices in accordance with NFPA requirements.

Accident Reporting Kit. All NPS-owned or -operated motor vehicles, including off-highway vehicles (OHV) and special-use equipment, will carry a packet containing all accident report forms and other information needed by the driver in case of an accident or other emergency. Accidents will be reported using the Safety Management Information System (SMIS).

Trailers Less than 10,000 lbs

All drivers towing trailers less than 10,000 lbs gross vehicle weight (GVW) must be properly qualified and authorized.

- Vehicles towing trailers must comply with local, state and Interstate Commerce Commission (ICC) regulations concerning the size and weight of the towing vehicle. Towing vehicles must have sufficiently heavy brakes and be heavy enough to ensure complete braking control in stopping and holding the trailer.
- All trailers shall be equipped with suitable warning devices (e.g., reflective triangles) for use in emergency situations.
- All trailers shall be equipped with standard workable taillights and brake lights.
- All horse and similar trailers shall be equipped with trailer jacks or loading gear.
- Use of a safety chain is mandatory.

Off-Highway Vehicles

An off-highway vehicle (OHV) is an all-terrain vehicle (ATV) or utility terrain vehicle (UTV), as defined.

Utility Terrain Vehicles

A UTV is a motorized OHV having four or more low-pressure tires, designed with side-by-side seats, seat belts, a steering wheel and optional cab, brush cage or Rollover Protective Structure (ROPS).

All-Terrain Vehicles

An ATV is a motorized OHV traveling on four or more low-pressure tires, having a seat to be straddled by the operator and a handlebar for steering control.

Qualifications

- The supervisor shall ensure that a Job Hazard Analysis (JHA) is prepared for all projects or activities using OHVs and the operators possess the skills required for the work project or activity.
- Only qualified and authorized employees shall operate OHVs.
- Prior to use of an OHV, the supervisor shall conduct an evaluation to identify the proficiency level of the operator.
- Operators shall receive training in the use of and the loading/unloading of OHVs that includes classroom instruction and practical field exercise and demonstration of proficiency.

Personal Protective Equipment

At a minimum, the following personal protective equipment (PPE) and field equipment shall be used by all OHV operators and passengers:

1. Head Protection.

   - ATV operators shall wear a full or three-quarter face motorcycle helmet with the chin strap properly secured.
   - Motorcycle helmets shall meet requirements of the Department of Transportation (DOT), American National Standards Institute (ANSI) Z90.1 standard, or Snell Memorial Foundation (SMF) standards.
   - Helmets shall be replaced every five years or as recommended by their manufacturer, or sooner if involved in an impact-related accident or if showing damage or significant wear.

2. Gloves based on the work environment (e.g., brushy environment may warrant padded riding gloves as opposed to canvas gloves used for trash pickup).
3. Long pants and long-sleeved shirt, jersey or jacket.
4. Footwear will comply with NPS field footwear guidelines, and shall have heels when operating ATVs with foot pegs.
5. Eye protection includes helmet face shield, safety glasses, goggles or sunglasses that meet the ANSI 87.1 standard, based on the work environment (e.g., a brushy environment would warrant full goggles or a face shield instead of safety glasses).
6. Additional rider protection gear, such as rider pants or knee/shin/elbow guards, based on the work environment.

Off-Highway Vehicles (Cont'd)

Loading and Hauling

- Use a hauling vehicle of adequately rated capacity and capability. A tilt/bed trailer designed especially for OHVs is generally best for hauling OHVs.
- Use loading ramps that are sufficiently wide and that secure firmly to the truck bed/trailer.
- While transporting an OHV, put it in gear, set the parking brake, securely tie it to the hauling vehicle and close the tailgate.

Operation

1. Become familiar with local hazards.
2. Before riding always perform a pre-ride inspection as recommended in the owner's manual. Otherwise, check the following (a.k.a. TCLOCS):
   - Tires, wheels
   - Controls, clutch, brake, throttle
   - Lights
   - Oil, fuel
   - Chassis
   - Suspension, nuts, bolts

3. Do not carry passengers unless you are operating an ATV designed to ride up to two, or a UTV, which is designed to carry up to six passengers.
4. Always turn off the engine when the OHV is parked. Remove the ignition key and set the brake.
5. When carrying equipment, equalize the load to maintain balance, stability and center of gravity. Never exceed the recommended gross vehicle weight.
6. Avoid driving on pavement.
7. Do not drive recklessly or engage in horseplay.
8. Do not use in deep or swift moving water.
9. Modify an OHV only with the manufacturer's written approval.

Snowmobiles

Qualifications

- The supervisor shall ensure that a JHA, emergency evacuation procedures and communications plan are prepared and approved by the supervisor for all projects or activities using snowmobiles, and that operators possess the skills required for the work project or activity. An itinerary shall be filed with the supervisor and at the final destination when appropriate.
- Only qualified and authorized employees shall operate snowmobiles. Qualifications include being trained by the supervisor for the terrain and the job to be completed, and a thorough review of the snowmobile manufacturer's operating manual.
- Operators shall receive training in the use of and the loading/unloading of snowmobiles that includes classroom instruction and practical field exercise or demonstration of proficiency. Employees shall be trained in emergency survival, avalanche hazard recognition and control, where needed.

Personal Protective Equipment

PPE required for snowmobile use is as follows:

- Snowmobile helmet (DOT-, ANSI- or Snell-approved).
- Clothing adequate for winter travel, including goggles, gloves and boots.
- Emergency equipment/ clothing identified in the JHA.

Other Recommended Equipment

- Map and compass (a GPS receiver is optional)
- Manufacturer's operating manual
- First aid kit
- Flashlight with extra batteries and bulb
- Shovel
- Manufacturer's tool kit
- Collapsible probes and avalanche rescue transceivers (if a possibility of avalanches exists)
- Personal communication device
- Skis or snowshoes
- Sunscreen
- Spare parts (nuts and bolts), rope, hand winch (e.g., come-along), wire, wire ties, flares, duct tape, electrical tape
- Fire starter
- Food and water, emergency food

Operation

1. Always inspect the machine thoroughly before use, following procedures outlined in the manufacturer's operating manual.
2. Plan travel according to the weather and snow conditions.
3. No more than two people should be riding a snowmobile at once.
4. Do not drive recklessly or engage in horseplay.
5. Do not leave the engine running when parked. Turn it off, remove the ignition key and set the parking brake. If the machine does not have a parking brake, secure it against movement.
6. Avoid traveling at night and do not travel alone. If travel at night cannot be avoided, travel over familiar ground. Do not blaze a new trail. Reduce speed so you don't over drive the machine's headlights.

Industrial Golf Carts, Service Carts, Electric Trucks and Related Vehicles

These vehicles are used for a wide variety of tasks in park operations. They are also used in a variety of small-scale industrial operations because they are very easy to operate. These vehicles should not be operated on public highways, as they are typically not designed to comply with any DOT requirements. (See exceptions below.)

Qualifications

- The supervisor shall ensure that a JHA is prepared for all projects or activities using small industrial carts, and the operators possess the skills required for the work project or activity.
- Only qualified and authorized employees shall operate a small industrial cart. Qualifications include being trained by the supervisor in the use and operation of the vehicles. Operators must be 18 years or older to operate these vehicles. An experienced driver should accompany each first-time driver on a test drive before allowing him/her to operate the vehicle alone.

Operation

1. Operators are responsible for following the manufacturer's instructions.
2. The vehicle should be operated only from the driver's side. Refer to the operator's manual for maximum seating capacity. Be sure passengers are fully seated before moving the vehicle.
3. Do not allow passengers in the cargo bed. The vehicle is not equipped for people with functional needs. Be sure all passengers are capable of securing themselves in the vehicle before allowing them to ride in one.

4. Bring the vehicle to a complete stop before exiting.
5. **Do not** drive the vehicle on steep slopes. To prevent overturning of the vehicle, drive slowly up and down slopes.
6. Use caution when backing up or on grades or slippery surfaces.
7. Drivers should keep both hands on the steering wheel when operating the vehicle and wear a seat belt with vehicles that are so equipped.
8. Remove the key when the cart is not in use. Apply the parking brake.
9. During inclement weather, seek appropriate shelter especially during lightning or storms, as carts do not provide appropriate protection.
10. Avoid driving downhill as a sudden stop or change of direction could result in loss of control. Likewise, reduce speed for adverse driving conditions such as wet grass or rough terrain.
11. Vehicles should not be used on public roads other than when in a park setting and, if necessary, cross the streets in the curb cuts at the crosswalks using pedestrian cross signals.
12. If the vehicle is unable to climb a hill, **do not** attempt to turn it around. Turning the vehicle sideways on a hill could result in the vehicle rolling over. Slowly back downhill using the service brake to control speed.
13. Stop the vehicle before shifting into reverse. Failure to do so could result in injury to passengers or damage to the vehicle.

Loading and Unloading

1. Firmly engage the park brake before loading the vehicle.
2. Do not allow people to ride in the cargo bed.
3. Do not exceed the rated capacity of the vehicle. Overloading can affect vehicle handling or cause component failure, resulting in loss of control of the vehicle.
4. Reduce vehicle load and speed when driving up or down slopes or uneven terrain. Rated load capacity is for level surfaces only.
5. Make sure that cargo is well secured. Avoid top-heavy loads.
6. Do not load the tailgate. The tailgate should be in the upright position and securely latched when the vehicle is in motion.

Maintenance

1. Carts must be maintained in good operating condition.
2. A checklist must be maintained on each cart and completed every day to verify that maintenance was provided. Operating instructions should be prominently displayed on each vehicle.
3. Do not allow smoking near the battery charging area. Post "No Smoking" signs.
4. Make sure there is good ventilation in charging area.
5. Remove jewelry (e.g., rings, wristwatches, chains) when inspecting or cleaning the battery, wear a face shield and safety goggles to avoid getting acid in eyes. Do not let acid contact the skin. Wear acid-resistant gloves.
6. For lead-acid battery charging, ensure emergency eye wash capabilities are readily available.
7. Wash hands immediately after the job.
8. Make sure the battery vent tops are clean. Keep the top of the battery clean using a baking soda mixture.

Operational Leadership

Operational leadership (OL) is the process of coordinating actions among employees to enable them to safely interact effectively while performing work assignments. OL provides the NPS with a standardized approach that will assist all employees in assessing and managing risk throughout the organization. Human error has contributed to a majority of NPS accidents.

OL introduces employees to the critical skills necessary to recognize and reduce the likelihood of human error occurrences. Seven critical team skills have been identified that when employed should reduce the probability of human error throughout NPS work activities.

These critical skills are:

- Effective Leadership
- Error and Accident Causation
- Mission Analysis
- Stress and Performance
- Situational Awareness
- Decision-Making
- Communications and Assertiveness

Operational Leadership Principles and Practices

Application of OL principles and practices will enable employees to:

- Predict and identify human error potential so as to develop strategies for reducing that error to influence a positive outcome.
- Conduct risk assessments of operational assignments.
- Recognize the signs that indicate the impending or actual loss of situational awareness and deploy alternative options to affect a positive outcome.
- Understand the effects of stress on performance, memory functions and the decision-making process.
- Understand the common and uncommon causes of fatigue and identify the physical and mental symptoms that affect decision-making.
- Apply key leadership principles to strategic and operational decision-making.
- Enhance the professional standards of NPS operations.

Mission Analysis Process

1. **Define Mission/Tasks:** Review current and planned operations, describing the mission. Define what tasks need to be accomplished and set objectives.
2. **Identify Hazards:** Consider known sources of hazards by reviewing past incidents, brainstorm additional hazards with your team. Hazards can be associated with equipment, environment and personnel.
3. **Assess Risks:** Conduct SPE for each individual hazard (flip the page). Conduct GAR analysis for overall mission (flip the page).
4. **Identify Options:** Starting with the highest ranked hazards, identify risk mitigations for all hazards exceeding an unacceptable level of risk.
5. **Evaluate Risk vs. Gain:** Determine the benefits of the operation and weigh those against the risk level. Very high risk versus gain decisions require the concurrence of the appropriate level of supervision.
6. **Implement the Plan:** Take action. Increase, replace or reassign resources and ensure risk controls are in place.
7. **Monitor the Situation:** Are risk controls in balance? Are changes to the operation effective? React to changes by starting the process again.

Severity, Probability, Exposure Assessment

Use the Severity, Probability, Exposure (SPE) model to assess individual hazards (flip the page for the chart). Assign a numerical value of 1-5 for both severity and probability, and a numerical value of 1-4 for exposure. Multiply the values to come up with the total risk score.

Example: Severity 4 x Probability 5 x Exposure 4 = 4 x 5 x 4
Overall Risk score = 80 **Very High**

Manage identified risk accordingly to assure a safe operation.

Green, Amber, Red Assessment

Use the Green, Amber, Red (GAR) model to assess the overall operation (flip the page for the chart). Assign a numerical risk value of 1 for minimal risk through 10 for maximum risk to each element:

- Supervision
- Planning
- Team Selection
- Team Fitness
- Communication
- Contingency Resources
- Environment
- Incident Complexity

Add the values to come up with the total risk score.

Example:

- Supervision = 5
- Planning = 4
- Team Selection = 3
- Team Fitness = 3
- Communication = 6
- Contingency Resources = 8
- Environment = 6
- Incident Complexity = 9

Overall Risk Assessment = 44 **Amber**

Manage identified risk accordingly to assure a safe operation.

SPE Assessment (Risk of Injury Assessment)

Severity	Probability	Exposure
1. Insignificant	**1.** Rare	**1.** Below average
2. Minor	**2.** Unlikely	**2.** Average
3. Moderate	**3.** Possible	**3.** Above average
4. Major	**4.** Likely to occur	**4.** Great
5. Catastrophic	**5.** Frequent, very likely to happen	

Values	Risk Level	Action
80-100	Very High	Discontinue/Stop
60-79	High	Immediate correction
40-59	Substantial	Correction required
20-39	Possible	Attention needed/ Proceed with caution
1-19	Slight	Proceed/Possibly acceptable

GAR Operational Risk Management

Rate 1-10 ➤ Any category rated > 5 should receive specific mitigation

1. Supervision	Qualified, effective, accessible? Clear chain of command? Appropriate span of control ratio?
2. Planning	Information available & clear? Adequate time to plan? SOPs & JHAs? Team briefed & input solicited?
3. Team Selection	Level of training & experience? Cohesiveness & attitude? Prone to skill error or complacency error?
4. Team Fitness	Physical & mental state of the team? Consider rest, fatigue, morale, outside distractions.
5. Communication	Communications equipment, infrastructure & dispatch? Interpersonal communications of team?
6. Contingency Resources	Memoranda of understanding (MOUs) and pre-plans in place? Shared communications plan? Response time?
7. Environment	Time of day, weather, topography, approach & access, fuel load, urban challenges, chemicals?
8. Incident Complexity	Exposure time, environment stable? Potential for taxing staff? Multiple tasks? Sense of urgency?

Green (8-35)	Amber (36-60)	Red (61-80)

Personal Protective Clothing & Equipment

Procedures

Field offices shall assess the workplace to determine if hazards are present, or are likely to be present, that necessitate the use of personal protective equipment (PPE). Refer to 29 CFR 1910.132 General Requirements for guidance.

Using the Job Hazard Analysis (JHA) to Determine Appropriate PPE. The JHA process is used to identify hazards in a job task. Refer to RM50B for more detailed JHA guidance.

Mandatory Use of PPE. When specific PPE is found necessary and purchased, it is mandatory for employee use. Should an employee fail to do so, it's the supervisor's responsibility to take appropriate action to ensure compliance.

Eye and Face Protection

Eye protection and face shields shall be required when there is a reasonable probability of injury that can be prevented by use of such equipment. Eye protection shall meet ANSI Z87.1.

Goggles and Glasses

Use goggles, safety glasses, face shields or welder helmets when subjected to the following:

- Small flying particles when cutting, drilling, scaling and grinding metals; cutting, chipping or dressing stone and brick; woodworking; overhead pruning; brushing; and machine plating.

- Flying objects when hand drilling, chipping, caulking, riveting, quarrying, rock cutting and crushing, or when using a cyclone seeder or brush cutter.
- Concentrations of cement or other dust, or dust and sand when sandblasting.
- When handling hot metal pouring lead joints or shaping metal on an anvil.
- When handling acids and caustics such as sulfuric or muriatic acids, ammonia or creosote.
- Injurious radiant energy and flying hot particles.
- When grinding or using a buffer wheel, wear eye protection (i.e., goggles or glasses) and face protection (i.e., face shield) at all times.
- While welding, appropriate eye protection shall be worn. Refer to 29 CFR 1910.252(e)(2) when purchasing eye protection.
- In field situations where eye injury hazards such as brush, twigs, and limbs exist.

Care of Goggles and Glasses

- Wipe the lenses frequently with a clean cloth or soft tissue.
- Keep goggle frames, including side screens, free from dust and grit.

- Change headband frequently, keeping the webbing flat.
- Treat lenses to prevent fogging when necessary, or use goggles ventilated around the lenses.
- Replace goggles when they become scratched, pitted or otherwise damaged in a way that inhibits visibility.

Head Protection

Protective headgear shall be required where there is a reasonable probability of injury, which could be prevented by use of such equipment. Refer to 29 CFR 1910.135. Head protection shall meet ANSI 289.1 standards.

Hard Hats. Hard hats must be worn if there is danger from falling or flying objects or in timber areas due to danger of falling loose bark, limbs or weak tops. Hard hats must be worn when working in all construction activities, working in confined spaces, or engaged in active fire suppression work. In the event a hard hat sustains a large blow it must be removed from service permanently. Hard hats should be routinely inspected for compliance. Do not store them in vehicles or in direct sunlight.

Nonconductive Hard Hats. Wear electrically insulated hard hats if working near electrical conductors.

Proper Fit and Care. Adjust headband and hammock to fit snugly, with an air space of one-half inch or more between the head and top of the crown of the hat. Wear the hard hat evenly centered to protect the head properly. Clean and sterilize the headband and hammock regularly. Integrity of head protection is essential; therefore, head protection shall be replaced when it becomes dented or damaged.

Respirators

Use of respirators shall be required when there is a reasonable probability of injury that could be prevented by use of such equipment. Respirators must provide adequate protection against the particular hazard for which they were designed and must be approved by the National Institute for Occupational Safety and Health (NIOSH) and Mine Safety and Health Administration (MSHA).

Note: *The use of a respirator is intended to be a "last resort." Engineering controls and work practices should be addressed first.*

Hand Protection

Use of hand protection shall be required when there is a reasonable probability of injury that could be prevented by use of such equipment. Appropriate hand protection (Section 3.7 in RM50B) will be provided for the task. Do not use gloves with cuffs in the vicinity of equipment with rotating or moving parts, chain saws, chippers, etc.

Out-of-the-Ordinary PPE

The selection of appropriate out-of-the-ordinary PPE, such as fire safety boots, prescription eyewear, etc., must be made in consultation with the local safety manager/coordinator or with assistance from the regional Risk Management office.

The supervisor and the employee(s) work together to develop a JHA that identifies job hazards and proper abatement procedures that may include PPE. The JHA will be reviewed by the safety officer/manager to ensure compliance with the Occupational Safety and Hazard Administration's (OSHA) standards and NPS policy.

Motorized Watercraft Procedures

Training and Certification

All training and certification will be in accordance with 485 DM, Chapter 22 and RM 50B, Section 9.

Only NPS-authorized employees who have successfully completed the DOI Motorboat Operators Certification Course (MOCC) or other approved course [e.g., Corps of Engineers Safe Boat Operators Training Course and Federal Law Enforcement Training Center (FLETC) Marine Law Enforcement Program] may operate. NPS watercraft 65 feet or less in length do not require a USCG license or certification to operate.

Motorboat operator certification will be for a period of 5 years. To be recertified, operators will successfully complete the refresher training outlined in the MOCC Instructor Manual.

Annually, the operator will complete an inspection of the NPS vessel he/she operates and these inspections will be documented in writing (e.g., required equipment is on board, vessel is operational, emergency supplies are in place).

Powered Watercraft Under 26 Feet in Length

- Carry appropriate fire extinguishers for the types of fires that may be encountered on all powered watercraft.
- Assure that adequate fuel is available for the mission. Carry spare gasoline in an approved safety can. Always shut off engine when refueling. All vessels should be kept topped off and in a response-ready state.

Powered Watercraft Over 26 Feet in Length

- Post safety regulations as required by the U.S. Coast Guard.
- Assign only employees with a valid license for the class of craft and type of water being navigated as powered-watercraft operators.
- Prepare and conspicuously post instructions for starting and operating main and auxiliary engines, anchor gear, radio and other equipment so that in emergencies, someone other than the marine engineer can move the craft.
- Personnel who regularly travel on boats must know how to start and operate the main and auxiliary engines, other gear, radio, etc., in case of emergency.
- Standard safety equipment must include:
  - Sufficient lifeboat capacity for all passengers. Lifeboats are equipped with outboard motors, oars and survival equipment.
  - Readily accessible life preservers for all persons aboard in clearly marked locations. Sufficient life preservers or vests for rowboat or lifeboat use.
  - One approved life ring on each side of pilothouse with at least 60 feet of buoyant line attached.
  - Sufficient chain and proper anchor.
  - Emergency flares.
- Fire extinguishers for craft under 40 feet in length are required as follows:
  - Gas powered – one 10 lb BC rated.
  - Diesel powered – one 4 lb BC rated.

Watercraft (Manually Operated)

All employees who utilize watercraft on a regular basis must be able to safely operate that particular craft alone.

- Cargo should not exceed the rated capacity of the watercraft. Cargo should be secured to the craft to prevent shifting while underway. If cargo is required to be carried, balance the load evenly between port and starboard.
- When possible, enter/leave the watercraft from the side, rather than the ends, and always step in the center of the craft. While moving about in a canoe or kayak, steady yourself by placing one hand on each gunwale.
- Do not stand up, change places or make sudden moves in the watercraft. Put in on shore if necessary to change places, repair motor or reposition cargo.
- Ensure the anchor is attached to the bow. Exercise care in releasing and raising the anchor.
- Metal and plastic craft should have skid-proof paint applied to the bottom.
- Personnel at the bow are principal lookouts for submerged obstructions that can damage or capsize the craft. Direct the operator accordingly.
- Keep oars and oarlocks in good condition. Spare oars and oarlocks should be carried on long trips.
- All transportation at night should be kept to a minimum. Appropriate lighting is mandatory.
- Check with local residents when operating in unfamiliar rivers and lakes for water conditions that may be unique to that area.

Personal Protection in Watercraft

- Only trained and experienced employees may operate watercraft. Operators must be qualified to handle various sized craft as applicable.
- Never overload a watercraft. Maintain a safe margin below the danger point. Post the maximum safe load limits on each vessel less than 26 feet in length.
- Operators must be able to swim. Those who routinely travel by watercraft, or work on or near water, should be able to swim.
- Have a Coast Guard-approved life jacket readily accessible at all times for each person in a craft. Unless modified by means of a Job Hazard Analysis (JHA), and approved by the line supervisor, life jackets must be worn while operating all types of craft less than 26 feet in length. Personal flotation devices (PFDs) must meet the RM 50B Section Appendix 3. **Note:** Not all Coast Guard-approved PFDs are orange, nor do they have retro reflective material in the appropriate positions.
- Avoid traveling in small craft in heavy tidal currents.
- Inspect rubberized craft or lifeboat seams, surfaces, fabric condition, valves and ability to hold air under operating pressure before each use.

Watercraft Emergencies

When involved in an overturned or sinking craft, surviving the incident is often dependent upon what you carry on your person.

- Avoid traveling in high winds and rough water, or if a storm threatens. If caught in a storm, wear a life jacket, keep the bow to the sea or open water, and reduce speed. Beware of broaching. Kneeling on the bottom can lower a canoe's center of gravity.
- If the craft capsizes and you cannot get a life preserver, discard your heavy outer clothing and shoes (not applicable to colder climates/conditions). Hang onto the oars, boat or anything that will float until help arrives.
- Do not attempt to swim to shore from an overturned or disabled craft. Stay with the craft until it drifts, can be paddled or help arrives.
- Do not travel in a metal craft during lightning storms. If you sight an approaching storm, proceed to the closest shore and beach the craft.
- If you must continue (i.e., medical emergency), insulate yourself from the metal surfaces (i.e., sit on nonconductive materials).
- Use flares in the event of an emergency.
- When traveling in hazardous waters, use the radio (or alternative means available) to notify others of your location and situation. Provide frequent updates and be sure to call when you return to safer waters.

First aid equipment should be waterproof, and survival gear (for the environment) should always be aboard.

Reports of Unsafe/ Unhealthful Working Conditions

Procedures

Employees are responsible for identifying potentially hazardous conditions and correcting them when they have the ability and knowledge to do so.

Supervisor Responsibilities. Supervisors to whom reports are made are responsible for investigating employee reports and implementing controls to protect employees from the hazard. This responsibility cannot be delegated to the safety manager/ coordinator or to the employee. Examples of safety controls are the following:

1. Discontinue the operation or process until corrective action is completed.
2. Remove all employees from the hazardous condition.
3. Place barriers and signs in the hazardous area to prevent employee entry until corrective actions are completed.
4. Provide employees with appropriate clothing or personal protective equipment (PPE) or tools to allow them to continue the task safely.
5. Advise employees of corrective actions completed or planned.
6. Forward the report to a higher authority if the supervisor does not have the expertise, authority or resources to accomplish corrective action.
7. Follow up to ensure corrective actions have been taken.

Safety Manager Responsibilities. The safety manager provides technical assistance to supervisors and managers for proper identification of hazards and appropriate corrective actions.

NATIONAL PARK SERVICE

OCCUPATIONAL SAFETY AND HEALTH FIELD MANUAL

Every National Park Service (NPS) supervisor, employee and volunteer is responsible for following safe work practices and procedures, and identifying and reporting unsafe conditions. This guide is intended to provide assistance in carrying out those responsibilities and includes:

- Field injury prevention and first aid information
- Procedures for:
  - Working in confined spaces
  - Operating heavy equipment, machines and tools, motor and off-highway vehicles
  - Grounds maintenance
- Industrial hygiene and occupational health hazards

Based on National Park Service Occupational Safety and Health Program, Reference Manual 50B

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