

# Landscaper's Safety Guide



Farm and Ranch Safety and Health Association

**The Landscaper's Safety Guide is intended as a reference guide only. It is up to you to look after yourself on the job.**

**Many of the accidents that occur in the landscaping industry could be avoided through proper planning and extra care.**

**By studying the safe work practices and precautions in this guide you can reduce your chances of injury. By insisting that those working with you follow them as well, you will ensure a safer work environment.**

# Landscaper's Safety Series

## Table of Content

### GENERAL

- Personal Protective Devices ..... 3
- Preventing Back Injuries ..... 6
- Sun Safety in the Field..... 7
- Working Hot Environments ..... 9

### TOOLS AND SUBSTANCES

- Backhoe / Loader Safety..... 14
- Blower Safety ..... 16
- Chain Saw Safety ..... 18
- Cut-Off Saw Safety ..... 26
- Earth Compactor Safety ..... 28
- Edger Safety ..... 30
- Hand Tool Safety ..... 31
- Hedge Trimmer Safety ..... 32
- Jackhammer Safety ..... 33
- Pesticide Safety..... 34
- Portable Ladder Safety ..... 36
- Power Tiller Safety ..... 39
- Push Mower Safety ..... 40
- Riding Mower Safety ..... 41
- Skid-Steer Loader Safety..... 42
- String Trimmer Safety..... 43
- Tractor Safety ..... 44
- Tractor Mower Safety..... 46
- Trencher Safety ..... 47

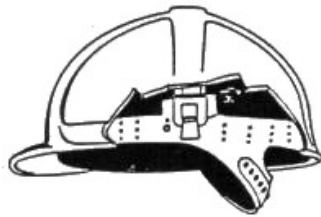
## Personal Protective Devices

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When hazardous situations on the farm cannot be engineered out or controlled by other methods, the worker exposed to these hazards must still be protected. Using personal protective equipment can either prevent or reduce the severity of an injury should an accident occur. For this reason, personal protective equipment should always be worn when exposure or injury is possible.

### Head Protection

The use of hard hats could prevent many head injuries common in farm operations. Jobs requiring protection include construction



work, operating and repairing machinery, felling or trimming trees, entering buildings with low doors, repair, demolition, blasting, and electrical work. Hard hats are rigid head gear designed to protect the head from impact and falling or flying objects. Nonconducting hats also protect the wearer from electrical shock.

### Respiratory Protection

Dust and chaff are well-known respiratory hazards to the farmer. Other hazards are toxic chemicals, oxygen depleted atmospheres connected with silos, and large concentrations of animal wastes.



### Mechanical Filter Respirator (dust mask)

Dust masks filter out or trap minute airborne particles such as dust, chaff, and most molds. They are useful when haying, harvesting, tilling dusty fields, applying granular fertilizers, grinding feed, and sweeping. Dust masks should never be used when working with volatile chemicals or when entering a toxic or oxygen-depleted atmosphere.



### Chemical Cartridge Respirator

This apparatus is a mask that covers the nose and mouth. It has filters to remove dust and absorbent materials such as charcoal to absorb chemicals. This device offers protection for a limited amount of time from toxic gases, vapours, fumes, and extremely heavy dust. This type of respirator should be used during most pesticide applications.



### **Gas Masks**

Gas masks are similar to chemical cartridge respirators but have far more capacity.

Absorbent filtering materials are carried in a canister connected to the face mask by a flexible hose. With a gas mask, workers can stay on jobs longer and handle more toxic chemicals than with cartridge respirators



### **Supplied Air Respirators**

In atmospheres where oxygen is less than 21%, a self-contained breathing apparatus (SCBA) is required. Manure pits, some silos, and grain bins that have been fumigated are structures where such a device might be required. The air tanks worn by fire fighters and scuba divers are common examples of supplied-air respirators.



### **Eye Protection**

Eye protection is needed when handling and applying pesticides; on jobs involving dust, chaff or flying particles; when grinding, drilling, sawing, or other shop work; or when operating equipment in low-hanging tree branches.

### **Safety Glasses**

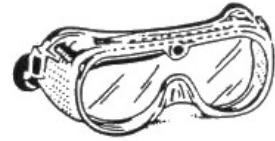
Safety glasses provide only frontal eye protection. Adding side shields will increase the protection.



Industrial safety glasses can be fitted with prescription lenses, including bifocals. Street-wear glasses have impact resistant lenses, but these pop out of their frames.

### **Goggles**

Goggles provide both front and side protection. Most models are flexible, inexpensive, and will fit over street glasses. Goggles are most useful in environments with much flying dust, or with chemicals.



### **Face Shields**

Face shields safeguard against chemical splashes and small flying particles (as from grinding). Protective glasses or goggles should be worn under the face shield for heavy impact resistance.



### **Hearing Protection**

Tests show that most "open" tractors and those with ordinary weather cabs produce sound levels exceeding 90 decibels (dBA). Long exposure to 90 dBA or more will damage hearing. Noise in this range can be generated by tractors, harvesters, grinders, choppers, blowers, conveyors, chain saws, and power mowers.

### **Ear Plugs**

Ear plugs are rubber or plastic and are inserted into the ear canal. Ear plugs should fit well. They should initially be fitted to your ear by an audiologist. Cotton plugs may change the tone of noise but are not effective in reducing damaging sound levels.

### **Earmuffs**

Ear muffs are cup-type devices that cover the external ear. Muff protectors can be taken off quickly and put on as needed. They are ideal where loud noise is intermittent. Muffs provide more dependable protection than ear plugs.



### **Body Protection**

Proper clothing for the job is necessary to ensure safety during many operations. Leather clothing or aprons offer protection from sparks and hot metal splashes, which may be encountered during welding or cutting with a torch. Pads are available and should be worn to protect shoulders and back when heavy loads or rough-edged objects are carried. Knee pads should be worn for work when kneeling continuously. Aprons, coats, and garments that are made of impervious materials should be worn for protection against toxic chemicals.

### **Hand Protection**

Farm work is hard on hands. In addition to protecting the hands from cold temperatures, gloves also offer protection against coarse or sharp-edged objects, chemicals, dirt, solvents, fuels, greases and paint.



Leather gloves provide good gripping power and protect hands when handling rough, abrasive, or sharp objects. Gloves should be worn for welding or torch operations. Cotton or canvas gloves provide sufficient protection for most light-duty work.

Gloves coated with synthetic rubber or plastic offer protection from petroleum products, solvents, and agricultural chemicals. Gloves should be cleaned thoroughly after contact with chemicals and before removal. Gloves should fit well. Tight gloves interfere with dexterity and are uncomfortable; Loose gloves are dangerous around moving machinery parts.

### **Foot protection**

Proper foot protection will guard against injuries caused by a lawn mower, an animal stepping on feet, dropping heavy objects, or stepping on sharp objects.



Safety shoes have steel-toe caps and puncture-and-slip-resistant soles. Built-

in metatarsal or in-step protection is also available. Proper fitting safety shoes are as comfortable as regular shoes.

### **Where to Buy Personal Protective Equipment**

Farm supply stores and local hardware stores may stock some types of personal protective equipment. Protective eyewear is available from safety supply firms or optical houses. Purchase of appropriate hearing protection should be discussed with technically qualified personnel. Agricultural chemical dealers may sell or suggest sources where respirators and impervious clothing may be purchased. The yellow pages of the phone book will list (under "Safety" or "Safety Equipment") companies that sell personal protective equipment.

# Preventing Back Injuries

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Lance Fluegel and Bradley Rein

## THINGS YOU CAN DO ON THE JOB

- Never attempt any lifting until your body is warm and loose. Perform some simple stretching and warm-up exercises if necessary.
- Do not attempt to lift heavy or bulky items alone. Ask co-workers to help you if available.
- Use mechanical lifting devices to lift and/or move heavy items such as trees, shrubs, sod, rocks, statuary, etc. Tractor loaders, skid-steer loaders, fork lifts, wagons, wheelbarrows, etc. often are found on job sites p use them if available.
- Slide heavy plants or materials if possible rather than attempting to lift them with your body. Pushing an object is safer than pulling it to the desired location. Planks and rollers can make this job easier still.
- Storing materials at least 12 inches off the ground, where possible, minimizes the danger of one of the most hazardous movements, lifting directly from the ground.
- Avoid lifting in a situation where the body will be twisted. Avoid jerking or erratic motions.
- Never try to catch heavy falling objects.

## USE THESE TECHNIQUES WHEN LIFTING

- Keep the feet parted for greater stability and lifting power
- Keep the back straight to keep the spine, back muscles, and inner organs in correct alignment. This will minimize the chance of hernia.
- Tuck the chin to keep the neck, head, and spine straight.
- Grip the object with the whole hand for more lifting power.

- Keep arms and elbows tucked in for more gripping power.
- Center your body over your feet for balance and lifting power.
- Bend your legs and then lift the object by straightening the legs. Your leg muscles will now take the load instead of your back.
- Reverse the procedure to lower an object.

## HELPFUL THINGS YOU CAN DO OFF THE JOB

- Follow a regular exercise program but see a doctor first for a checkup and advice.
- Some sports are excellent conditioning for the back. Swimming, cycling, jogging, walking and rowing are considered to be good for the back. Golf, bowling, racquet sports, football, baseball and weight lifting are more of a risk since they involve more rapid start and stop movements, twists, and turns.

## IF YOU DO SUFFER A BACK INJURY

- Assume a comfortable position immediately. Lying down is usually best.
- Apply ice packs to the pain area
- Get medical treatment
- Notify your employer.

# Sun Safety in the Field

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Charles V. Schwab and Laura Miller

Skin cancer is one of the most common forms of cancer in Canada. A great many Canadians die each year from melanoma, the most serious skin cancer.

Ultraviolet rays also can damage the eye's sensitive retina and cornea. Long-term exposure can cause cataracts, which can lead to permanent blindness or other visual impairments.

These trends have serious Implications for landscapers and others who spend a majority of their working hours outdoors.

## SUN EXPOSURE

Research has shown that cumulative sun exposure is a major factor in development of skin cancer. Small changes occur in the skin each time it is exposed to sunlight. People who burn easily, rarely tan, freckle or have a fair complexion, have blonde or red hair, or have blue or gray eyes, experience greater skin changes.

Skin cancer is not associated with a single event, such as a painful sunburn, but rather with progressive changes in the skin's makeup over years of sun exposure. The sun's rays, however, are more damaging during summer months and at midday hours than other times. You can get a sunburn during other seasons and at other times of the day, however, cumulative sun exposure is the major concern.

If you notice a new growth, mole or discoloration, or a sudden change in an existing mole, see a physician. Early detection of skin cancer is the first step for successful treatment.

The back of the neck, ears, face, and eyes are sensitive to sun exposure. Luckily, these and other body parts easily can be protected by wearing proper clothing, sunglasses, or sunscreen. By taking precautions and avoiding the sun's most damaging rays, you may be able to reduce your risk.

## HATS

Protection for the face and other parts of the head can be as simple as wearing a hat. When selecting a hat, consider the following questions, and balance your needs in each of these areas.

**Coverage:** How much of your face, ears, and neck are shaded by the sun?

Although the baseball cap has been the most popular style of hat, it does not protect vulnerable areas on the ears, temples, face, and neck. Other hats provide better protection, such as wide-brimmed hats, pith helmets, hats with double brims or removable flaps, and an Australian-style cap with a full brim.

**Coolness:** Is It cool enough to be worn on hot days? .The hat also must be practical for other conditions, such as high humidity, strong winds, blowing dust, and sporadic rain showers.

**Comfort:** How does the hat feel? Will it stay on during various tasks? Can you wear it around animals or in close quarters? Does it limit your vision or hearing?

**Commitment:** Will you wear it? The most well-designed hat is ineffective if it's seldom worn. Landscapers want a hat that is attractive, inexpensive, and easily washed.

## CLOTHING

The thought of wearing long-sleeved shirts and long pants in the summer might sound uncomfortable, but proper clothing can protect against the sun and minimize heat stress. Lightweight clothing, preferably 100 percent cotton, provides both comfort and protection.

## SUNSCREEN

Parts of the body that cannot be covered can be protected with sunscreen lotions. sunscreens are not a substitute for wearing proper clothing. They also can give users a false security

## **SUNSCREEN cont.**

Sunscreens recommended for outdoor workers should have a sun protection factor (SPF) rating of at least 15. This means that you are protected from a reaction to the sun's effects 15 times longer than you are without the sunscreen. Read the label to know when to re-apply sunscreen and whether it is water-proof.

## **SUN AVOIDANCE**

The easiest way to reduce exposure to ultraviolet radiation is to avoid the sun. Critical times are midday hours between 10 a.m. and 3 p.m. This may be impossible for some active individuals, but scheduling tasks around this period could reduce exposure when the sun is most dangerous.

## **SUNGLASSES**

Even the most effective hats can block only 50 percent of the ultraviolet rays that reach the eyes. A good shade hat combined with the use of sunglasses is a better way to protect eyes from sun exposure.

Use caution when selecting sunglasses because they vary widely in the amount of protection from ultraviolet radiation. A peel-off label on the lens indicates its UV rating, or percentage of ultraviolet rays blocked by the sunglasses (the best rating is 100). If no information is provided by the manufacturer, the sunglasses may not offer any added protection.

Remember that people who spend a lot of time outdoors in work or leisure activities can suffer from more than just exhaustion or heat stress. They are at risk for skin cancer and other diseases that result from years of exposure to the sun. Be aware of the risks and make it a habit to protect yourself from sun exposure.

# Working in Hot Environments

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National Institute for Occupational Safety and Health

## INTRODUCTION

Canadians work in a wide variety of hot and humid environments:

- Outdoor operations in hot weather, including surface mining, roofing, road repair and construction, dam building, and other construction.
- Farming operations, landscaping
- Iron, steel and nonferrous foundries.
- Brick-firing and ceramics operations.
- Glass products manufacturing plants
- Rubber products manufacturing plants
- Electrical utilities (particularly boiler rooms)
- Bakeries
- Confectioneries
- Restaurant kitchens
- Laundries
- Food canneries
- Chemical manufacturing facilities
- Mines
- Smelters, and
- Steam tunnels.

Being uncomfortable is not the major problem with working in high temperatures and humidities. Workers who are suddenly exposed to working in a hot environment face additional and generally avoidable hazards to their safety and health. The employer should provide detailed instructions on preventive measures and adequate protection necessary to prevent heat stress.

## HOW THE BODY HANDLES HEAT

The human body, being warm blooded, maintains a fairly constant internal temperature, even though it is being exposed to varying environmental temperatures. To keep internal body temperatures within safe limits, the body must get rid of its excess heat, primarily through varying the rate and amount of blood circulation through the skin and the release of fluid onto the skin by the sweat

glands. These automatic responses usually occur when the temperature of the blood exceeds 98.6 degrees F and are kept in balance and controlled by the brain. In this process of lowering internal body temperature, the heart begins to pump more blood, blood vessels expand to accommodate the increased flow, and the microscopic blood vessels (capillaries) which thread through the upper layers of the skin begin to fill with blood. The blood circulates closer to the surface of the skin, and the excess heat is lost to the cooler environment.

If heat loss from increased blood circulation through the skin is not adequate, the brain continues to sense overheating and signals the sweat glands in the skin to shed large quantities of sweat onto the skin surface. Evaporation of sweat cools the skin, eliminating large quantities of heat from the body.

As environmental temperatures approach normal skin temperature, cooling of the body becomes more difficult. If air temperature is as warm as or warmer than the skin, blood brought to the body surface cannot lose its heat. Under these conditions, the heart continues to pump blood to the body surface, the sweat glands pour liquids containing electrolytes onto the surface of the skin and the evaporation of the sweat becomes the principal effective means of maintaining a constant body temperature. Sweating does not cool the body unless the moisture is removed from the skin by evaporation. Under conditions of high humidity, the evaporation of sweat from the skin is decreased and the body's efforts to maintain an acceptable body temperature may be significantly impaired. These conditions adversely affect an individual's ability to work in the hot environment. With so much blood going to the external surface of the body, relatively less goes to the active muscles, the brain, and other internal organs; strength declines; and fatigue occurs sooner than it would otherwise. Alertness and mental capacity also may be affected. Workers who must perform delicate or detailed work may find their accuracy suffering, and others may find their comprehension and retention of information lowered.

## **SAFETY PROBLEMS**

Certain safety problems are common to hot environments. Heat tends to promote accidents due to the slipperiness of sweaty palms, dizziness, or the fogging of safety glasses. Wherever there exists molten metal hot surfaces, steam, etc., the possibility of burns from accidental contact also exists.

Aside from these obvious dangers, the frequency of accidents, in general, appears to be higher in hot environments than in, more moderate environmental conditions. One reason is that working in a hot environment lowers the mental alertness and physical performance of an individual.

Increased body temperature and physical discomfort promote irritability, anger, and other emotional states which sometimes cause workers to overlook safety procedures or to divert attention from hazardous tasks.

## **HEALTH PROBLEMS**

Excessive exposure to a hot work environment can bring about a variety of heat-induced disorders.

### ***Heat Stroke***

Heat stroke is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105 degrees F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes removing the victim to a cool area, thoroughly soaking the clothing

with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should be directed to the continuation of the cooling process and the monitoring of complications which often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

### ***Heat Exhaustion***

Heat exhaustion includes several clinical disorders having symptoms which may resemble the symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

**CAUTION:** Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.

### ***Heat Cramps***

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat. Drink large quantities of water, but do not adequately replace the body's salt loss. The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs, or abdomen, but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth.

### ***Heat Cramps cont.***

**CAUTION:** Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions

### ***Fainting***

A worker who is not accustomed to hot environments and who stands erect and immobile in the heat may faint. With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempts to control internal temperature, blood may pool there rather than return to the heart to be pumped to the brain. Upon lying down, the worker should soon recover. By moving around, and thereby preventing blood from pooling, the patient can prevent further fainting.

### ***Heat Rash***

Heat rash, also known as prickly heat, is likely to occur in hot, humid environments where sweat is not easily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

### ***Transient Heat Fatigue***

Transient heat fatigue refers to the temporary state of discomfort and mental or psychologic strain arising from prolonged heat exposure. Workers unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance. The severity of transient heat fatigue will be lessened by a period of gradual adjustment to the hot environment (heat acclimatization).

## **PREPARING FOR THE HEAT**

One of the best ways to reduce heat stress on workers is to minimize heat in the workplace. However, there are some work environments

where heat production is difficult to control, such as when furnaces or sources of steam or water are present in the work area or when the workplace itself is outdoors and exposed to varying warm weather conditions.

Humans are, to a large extent, capable of adjusting to the heat. This adjustment to heat. Under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

On the first day of work in a hot environment, the body temperature, pulse rate, and general discomfort will be higher. With each succeeding daily exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body becomes acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

Gradual exposure to heat gives the body time to become accustomed to higher environmental temperatures. Heat disorders in general are more likely to occur among workers who have not been given time to adjust to working in the heat or among workers who have been away from hot environments and who have got accustomed to lower temperatures. Hot weather conditions of the summer are likely to affect the worker who is not acclimatized to heat. Likewise, workers who return to work after a leisurely vacation or extended illness may be affected by the heat in the work environment. Whenever such circumstances occur, the worker should be gradually reacclimatized to the hot environment

## **LESSENING STRESSFUL CONDITIONS**

Many industries have attempted to reduce the hazards of heat stress by introducing engineering controls, training workers in the recognition and prevention of heat stress, and implementing work-rest cycles. Heat stress depends, in part, on the amount of heat the worker's body produces while a job is being performed. The amount of heat produced during hard, steady work is much higher than that produced during intermittent or light work. Therefore, one way of reducing the potential for heat stress is to make the job easier or lessen its duration by providing adequate rest time.

Mechanization of work procedures can often make it possible to isolate workers from the heat sources (perhaps in an air-conditioned booth) and increase overall productivity by decreasing the time needed for rest. Another approach to reducing the level of heat stress is the use of engineering controls which include ventilation and heat shielding.

### ***Number and Duration of Exposures***

Rather than be exposed to heat for extended periods of time during the course of a job, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work-rest cycles. Work-rest cycles give the body an opportunity to get rid of excess heat, slow down the production of internal body heat, and provide greater blood flow to the skin.

Workers employed outdoors are especially subject to weather changes. A hot spell or a rise in humidity can create overly stressful conditions. The following practices can help to reduce heat stress:

- Postponement of nonessential tasks.
- Permit only those workers acclimatized to heat to perform the more strenuous tasks, or
- Provide additional workers to perform the tasks keeping in mind that all workers should have the physical capacity to perform the task and that they should be accustomed to the heat.

### ***Thermal Conditions in the Workplace***

A variety of engineering controls can be introduced to minimize exposure to heat. For instance, improving the insulation on a furnace wall can reduce its surface temperature and the temperature of the area around it. In a laundry room, exhaust hoods installed over those sources releasing moisture will lower the humidity in the work area. In general, the simplest and least expensive methods of reducing heat and humidity can be accomplished by:

- Opening windows in hot work areas.
- Using fans. Or
- Using other methods of creating airflow such as exhaust ventilation or air blowers.

### ***Rest Areas***

Providing cool rest areas in hot work environments considerably reduces the stress of working in those environments. There is no conclusive information available on the ideal temperature for a rest area. However, a rest area with a temperature near 76 degrees F appears to be adequate and may even feel chilly to a hot, sweating worker, until acclimated to the cooler environment. The rest area should be as close to the workplace as possible. Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter but frequent work-rest cycles are the greatest benefit to the worker.

### ***Drinking Water***

In the course of a day's work in the heat a worker may produce as much as 2 to 3 gallons of sweat. Because so many heat disorders involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced. Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst drive. A worker, therefore, should not depend on thirst to signal when and how much to drink. Instead, the worker should drink 5 to 7 ounces of fluids every 15 to 20 minutes to replenish the necessary fluids in the body. There is no optimum temperature of drinking water, but most people tend not to drink warm or very cold fluids as readily as they will cool ones. Whatever the temperature of the water, it must be palatable and readily available to the worker. Individual drinking cups should be provided - never use a common drinking cup.

Heat acclimatized workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average American diet contains sufficient salt for acclimatized workers even when sweat production is high. If, for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. Salt tablets should not be used.

**CAUTION:** Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.

### **Protective Clothing**

Clothing inhibits the transfer of heat between the body and the surrounding environment. Therefore, in hot jobs where the air temperature is lower than skin temperature, wearing clothing reduces the body's ability to lose heat into the air.

When air temperature is higher than skin temperature, clothing helps to prevent the transfer of heat from the air to the body. However, this advantage may be nullified if the clothes interfere with the evaporation of sweat. In dry climates, adequate evaporation of sweat is seldom a problem. In a dry work environment with very high air temperatures, protective clothing could be an advantage to the worker. The proper type of clothing depends on the specific circumstance. Certain work in hot environments may require insulated gloves, insulated suits, reflective clothing, or infrared reflecting face shields. For extremely hot conditions, thermally conditioned clothing is available. One such garment carries a self-contained air conditioner in a backpack, while another is connected to a compressed air source which feeds cool air into the jacket or coveralls through a vortex tube. Another type of garment is a plastic jacket which has pockets that can be filled with dry ice or containers of ice.

### **AWARENESS IS IMPORTANT**

The key to preventing excessive heat stress is educating the employer and worker on the hazards of working in heat and the benefits of implementing proper controls and work practices. The employer should establish a program designed to acclimatize workers who must be exposed to hot environments and provide necessary work-rest cycles and water to minimize heat stress.

### **SPECIAL CONSIDERATIONS DURING PROLONGED HEAT SPELLS**

During unusually hot weather conditions lasting longer than 2 days, the number of heat illnesses usually increases. This is due to several factors, such as progressive body fluid deficit, loss of appetite (and possible salt deficit), buildup of heat in living and work areas, and breakdown of air conditioning

equipment. Therefore, it is advisable to make a special effort to adhere rigorously to the above preventive measures during these extended hot spells and to avoid any unnecessary or unusual stressful activity. Sufficient sleep and good nutrition are important for maintaining a high level of heat tolerance. Workers who may be at a greater risk of heat illnesses are the obese, the chronically ill and older individuals.

When feasible, the most stressful tasks should be performed during the cooler parts of the day (early morning or at night). Double shifts and overtime should be avoided whenever possible. Rest periods should be extended to alleviate the increase in the body heat load.

*The consumption of alcoholic beverages during prolonged periods of heat can cause additional dehydration.* Persons taking certain medications (e.g., medications for blood pressure control diuretics, or water pills) should consult their physicians in order to determine if any side effects could occur during excessive heat exposure. Daily fluid intake must be sufficient to prevent significant weight loss during the workday and over the work week.

# Backhoe / Loader Safety

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Lance Fluegel and Bradley Rein

## BEFORE USING THE MACHINE

- Read the owner's manual to learn the characteristics of your machine.
- For your personal protection you will need to wear some or all of the following: sturdy pants and shin, safety shoes, hard hat, safety goggles or glasses, gloves, hearing protection, and respirator for dusty conditions. Sunscreen protection is vital in Arizona if not under a roof.
- Check the loader/backhoe for the presence of the following safety devices in good working order: rollover protective structure (ROPS), seat belt (if ROPS equipped), guards, shields, backup warning system, lights, and mirrors.
- Fill the fuel tank while engine is off and cool. Never fill inside a building. Do not smoke. Wipe up any spills immediately.
- Check the machine daily for broken /missing, or damaged parts. Make the necessary repairs or replacements.
- Keep the machine clean - especially steps, hand rails, pedals, grab-ions, and floor of the cab. Slippery surfaces are very hazardous.
- Remove or secure loose items in the cab that could interfere with operating the controls.
- Check the work area for hidden holes/obstacles, drop-offs, etc. Clear children, pets, and bystanders from the area.
- Check overhead for utility lines, roofs, and other obstacles.
- Request the utilities company to locate underground cables, gas lines, water, and sewer lines before digging. You need to request this service in advance.
- Always use the hand rails, ladders, and steps provided when mounting the machine; never grab controls or the steering wheel.

- The cab was designed for one person - allow no riders, especially children.

## OPERATING THE LOADER

- Adjust the seat, fasten the seat belt, set the brake, and place transmission in park or neutral before starting the engine.
- If machine is in a garage be sure ventilation is adequate. CARBON MONOXIDE KILLS!
- Start the engine and check all controls for proper function. Check horn and backup alarm. Do not use if anything is faulty.
- If the backhoe is still attached be sure to use chains and locks to prevent it from swinging.
- If the backhoe is removed you may have to use counterweights. Check your owner's manual.
- Keep the working area as level and clean as possible. Use the bucket to grade the area frequently.
- Always carry the bucket low for good visibility and maximum stability.
- Use extreme caution when backfilling to avoid collapsing the wall of the trench.
- When undercutting high banks or material piles be alert for falling rocks and/or cave-ins.

## OPERATING THE BACKHOE

- Keep the loader bucket on the ground.
- Level the machine for maximum stability.
- Operate the backhoe only from the seat.
- Never swing the bucket over a truck cab. Do not load the truck while the driver is still inside.
- Dump the bucket uphill if possible when operating on a slope. If you must dump downhill swing slowly to avoid tipping the machine.

- If using the backhoe as a hoist, do so with the weight over the back of the machine – NEVER THE SIDE - to avoid tipping. Be sure the load you are lifting is balanced, and move the boom slowly to avoid swaying the load.

#### **SAFE STOPPING PROCEDURE**

- Park the machine on level ground if possible and set the parking brake. Place transmission in park if so equipped.
- Lower the loader and backhoe buckets to the ground.
- Stop the engine and remove the key.
- Work the hydraulic controls to relieve pressure.
- Wait until all motion has stopped and then dismount carefully using steps and safety holds. Do not jump from the machine.

# Blower Safety

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Lance Fluegel and Bradley Rein

## BEFORE OPERATING THE BLOWER

- Read the owner's manual to familiarize yourself with the machine.
- Check over the machine carefully for loose, broken, or damaged parts. Repair or replace before using.
- Wear tight-fitting, sturdy clothing to avoid having it sucked into the machine. Avoid ties and clothing with chains or straps. Always wear proper personal protective equipment (see Figure 1). Protect your eyes from dust and flying objects with a face mask, screen or safety goggles. Wear a respirator or mask in extremely dusty conditions. Assistants and/or bystanders should wear similar protection.



**Figure 1. Always wear eye and ear protection when operating a blower.**

- Do not operate the unit when tired, ill, upset, or under the influence of drugs, alcohol, or medication.
- Fill the fuel tank out of doors over bare ground with the engine cool. Do not smoke while handling fuel. Move at least 10 feet from the fueling spot before cranking the engine.

- Make certain there are no children or pets in the working area (at least 30 feet from the unit).

## PRECAUTIONS DURING BLOWER OPERATION

- Always start and run the unit in an upright position.
- Do not start or run the engine inside a closed building. Carbon monoxide kills!
- Never operate the blower without the tubing.
- Always direct the discharge of debris away from people, animals, glass, and solid objects that could cause material to ricochet (see figure 2).



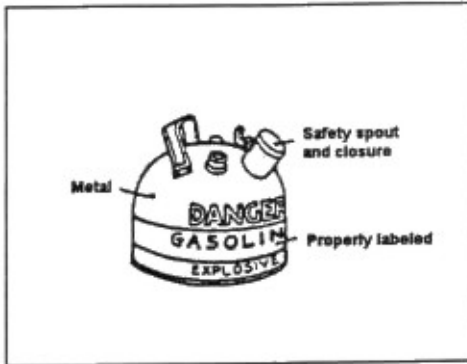
**Figure 2. NEVER point the blower at someone**

- Do not use the unit for spreading or misting chemicals, fertilizers or other toxic substances that could result in serious personal injury.
- Do not use the blower from ladders, trees, rooftops, or other unstable surfaces.

## OTHER SAFETY PRECAUTIONS

- Do not work on the unit without stopping the engine and disconnecting the spark plug wire.

- Store gasoline only in approved containers, never plastic jugs or glass bottles.



**Figure 3. Keep gasoline in an approved container**

# Chain Saw Safety

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David E. Baker and Don Day

Although once used only by professional lumberjacks, chain saws are now popular among many other professions. Landscapers use them to cut to do general tree trimming, clearing land, and cutting border material.

However, In the hands of a careless or inexperienced operator, chain saws can be very hazardous. Most accidents are caused by the operator coming into contact with a moving chain saw blade. Injuries from a chain saw are usually serious because they leave a jagged cut.

## SHOPPING FOR A SAW

The first step to safely operating a chain saw is selecting a saw that fits your needs and is quiet, balanced and equipped with safety features.

First, you must decide whether a gasoline or electric chain saw is best for you. Consider the following points when selecting a saw.

**Electric-powered saws** (Should be listed by the Underwriters' Laboratories (UL)):

- Require a nearby, convenient source of electricity.
- Need no fuel.
- Run quietly.
- Start easily and instantly.
- Are limited in guide bar length (usually under 14 inches).
- Can be used indoors.
- Have potential for shock hazard.
- Usually cost less.
- Vibrate less.
- Have no exhaust fumes.

**Gasoline-powered saws:**

- Can be used anywhere; not limited by electric cord.
- Use gasoline-oil mixture as fuel.
- Are relatively noisy and smoky.
- Require some effort to start.

- Available in many engine and guide-bar sizes.
- Intended for outdoor use.
- Have potential for fire or bum hazard.

Second, consider the length of the guide bar. Match the bar size to the type of job you expect to do most often.

Mini or lightweight saws have 8- to 12-inch guide bars; they are for light and occasional use for limbing, cutting small logs and felling very small trees.

Midweight saws have 14- to 20-inch guide bars; they can be used for frequent log cutting and felling of small trees.

Heavyweight saws have guide bars that are more than 20 Inches long. These saws are not generally recommended for non-professional saw owners.

If the guide bar is substantially longer than the thickness of the wood to be cut, accidental contact between the guide bar tip and a branch, the ground or other object could result in a serious kickback injury.

If the guide bar is too short, you will have to bury the tip of the guide bar in the cut. Although most manufacturers indicate that a saw can cut a log twice as thick as the guide bar, burying the tip of the guide bar in the wood could also result in a serious kickback injury.

## YOU AND YOUR SAW

First, in preparing to operate the saw safely, read and study the operator's manual. Even if you are an experienced operator, you should periodically review safe operational procedures. If you buy a used saw, ask the previous owner for the operator's manual or write the saw manufacturer for a copy.

Before you cut trees or timber, outfit yourself with the proper donning and personal protective equipment that will help reduce the possibility of a serious injury. Use the following list as a

guide:

- Clothing should be well-fitted and free of dangling or ragged edges that could become tangled in the saw. For additional protection, use nylon mesh protective leg chaps and/or knee pads to provide increased protection to your legs.
- A hard hat protects your head from falling limbs or branches. A properly fitted hat is cool, comfortable and provides important protection from serious head injury.
- Safety goggles or safety eye glasses with side shields prevent injury from flying wood chips, twigs and sawdust
- A good pair of comfortable ear muffs or ear plugs protect your ears from continual exposure to the 95 plus decibel noise level from the saw.
- A good pair of light-weight leather gloves protect your hands from abrasions, splinters and cuts.
- A pair of safety boots or shoes with high tops will help protect your ankles in the event of accidental contact with the moving saw blade. Steel toes will help protect your feet from injury from falling limbs or logs.

## PREPARE THE SAW

A saw in good condition is safer and easier to operate. Preventive maintenance will allow you to cut more wood quickly and safely. Maintenance includes sharp teeth, correct chain tension, proper lubrication and a properly tuned engine. Check your operator's manual for this maintenance information.

A properly sharpened chain. If you notice that the chain tends to walk sideways while cutting or the cut shows fine powder instead of chips, or if you find yourself pressing down hard to keep cutting or smell burnt wood, your saw needs sharpening.

Follow the instructions outlined in your owner's manual when sharpening the chain. If you do your own sharpening, use the proper tools. Wear gloves or use a rag over the chain to protect your hands from the sharpened cutters.

Correct chain tension. To assure good cutting action and a long chain life, check chain tension. If too loose, a chain will derail; if too tight, a chain will bind.

All chains stretch with use. Most of the stretch occurs during the first half hour of operation. Follow the manufacturer's recommendation on chain tension. Most manufacturers recommend that a cold chain be tightened to where the chain tie straps hang away from the bar rail about 1/32 of an inch at the center of the bar. A warm chain should be adjusted to a 1/8-inch PP.

Proper lubrication. Lubrication will prolong a chain's useful life. On saws with automatic oilers, be sure the oiler is properly adjusted so it doesn't over-oil and run dry during operation. Remember that automatic oilers need an extra squirt of oil occasionally.

Occasionally the bar-oiling mechanism plugs up; serious damage to the saw can result if this is not corrected. If the chain smokes while operating, there is not enough lubrication. To check for bar oiling, hold the saw tip above a light colored, dry surface and accelerate the engine. Oil should spatter on the surface if the oiler is operating properly. If not, remove the guide bar and check the chain oil discharge slot.

### Tool kit.

Every owner should have a good tool kit to help ensure continued operation of the saw. The kit should contain the following:

- A few extra labeled cans or a plastic bottle (with attached pouring nozzle) of chain oil.
- Wrenches to fit all nuts and lugs on the saw.
- Screwdriver.
- Round file and guide for touching up the chain.
- Flat file and depth gauge to file the depth guides.
- Small brush (1/2 inch) to clean away sawdust and wood chips from around gas cap and cooling fins.
- Extra spark plug.
- Owner's manual (wrapped in a plastic bag).
- Cleaning rags.

- Sharp ax.
- Sledge hammer and wedges.
- Multi-purpose fire extinguisher.
- Shovel.
- Supply of fuel in a UL-listed and/or FM-approved safety can.
- First aid kit.

## OPERATING TECHNIQUES

Refueling and starting the engine. Since the chain saw engine is a two-cycle engine, use the manufacturer's recommended fuel mixture. When refueling the engine, use a funnel or flexible nozzle to avoid spillage on the engine.

Only refuel the engine when it is cool.

If fuel is spilled, thoroughly clean the engine with the saw on the ground and in an area cleared of combustible materials.

Do not smoke during refueling.

Each time you refuel, check the refill oiler, air filter, chain tension and the tightness of all nuts, bolts and screws.

### Starting the engine.

With one foot placed in the bracket to the rear of the unit, start the saw engine on level ground. Set the starting controls. Grip the top handle of the saw firmly with one hand; use your other hand to pull the starting rope. Smaller saws may not have a foot bracket so make certain the saw is held firmly on the ground. Never drop start the saw.

### Felling procedures.

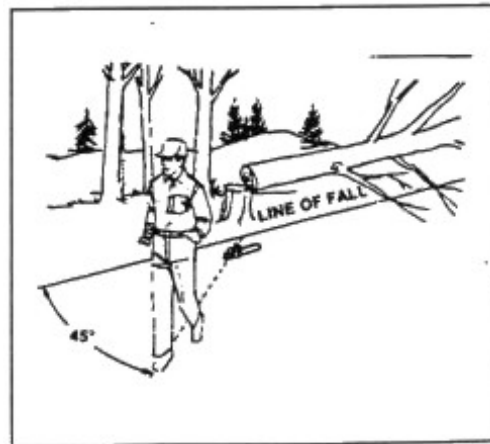
Before you attempt to fell any tree, consider its characteristics. One tree may lean, and another tree might be unbalanced because of uneven top growth or breakage even though the trunk doesn't lean. Large diameter branches are also a good indicator of imbalance. Also consider wind conditions, which can have a dramatic effect on the direction of fall.

### Clear the ground.

Before you start to cut, clear the ground around the base of the tree of low or dead limbs, underbrush and other obstructions. This precaution should provide clear vision,

unrestricted movement and an unhampered escape route when the tree begins to fall (Figure 1).

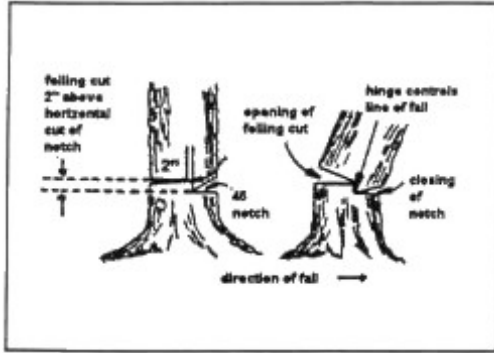
A felling and safety plan. In advance, plan your escape route to either the rear or side, depending on the likely direction of the fall. When the tree starts to go, shut the saw off and drop it in a place that will allow an unhampered escape.



**Figure 1. Plan a safe, unobstructed path of retreat before making felling cut.**

When you have determined a felling and safety plan, proceed as follows:

1. Hold saw firmly with both hands.
2. Make a cut close to base of the tree but high enough to conveniently avoid running saw into the ground.
3. Cut through trees up to 8 inches thick with one cut.
4. On larger trees, notch (undercut) at least one-third of trunk diameter on fall side of trunk. Make lower cut of the 45-degree notch first to prevent pinching or binding of the chain by wedge.
5. Make felling or back cut on the opposite side of the trunk 2 inches above and parallel to the horizontal notch. Leave wood fibers to act as a hinge to keep tree from twisting and falling in the wrong direction or kicking back on the stump. (See Figure 2).



**Figure 2. Tree fall direction can be closely controlled with properly made notching and felling cuts.**

6. Keep the guide bar in the middle of the cut (horizontal) so cutters returning in the top groove do not re-cut. Guide saw into tree. Do not force it. Rate of feed will depend on the size and type of timber being cut.
7. Remove saw from cut and shut off before the tree falls.
8. Cutting completely through hinge fibers may allow tree to fall in any direction, possibly on the retreating operator. Move away from the tree at a 45-degree angle through the cleared retreat lane.

**Wedges.**

A well-balanced tree may have to be wedged, pulled or pushed to fall in a desired direction. Wedges are the most dependable means of controlling the direction a tree will fall.

Use two wedges rather than one to insure that the tree falls forward. Use a sledge or mallet with a face at least 1/3 larger than the breadth of the wedge. Strike squarely with firm, but not excessive, blows. Careless blows may pop the wedge out, swinging the tree backward. Using an ax head as a wedge or driver is dangerous. The steel is likely to splinter, and flying particles might strike the user.

**LIMBING**

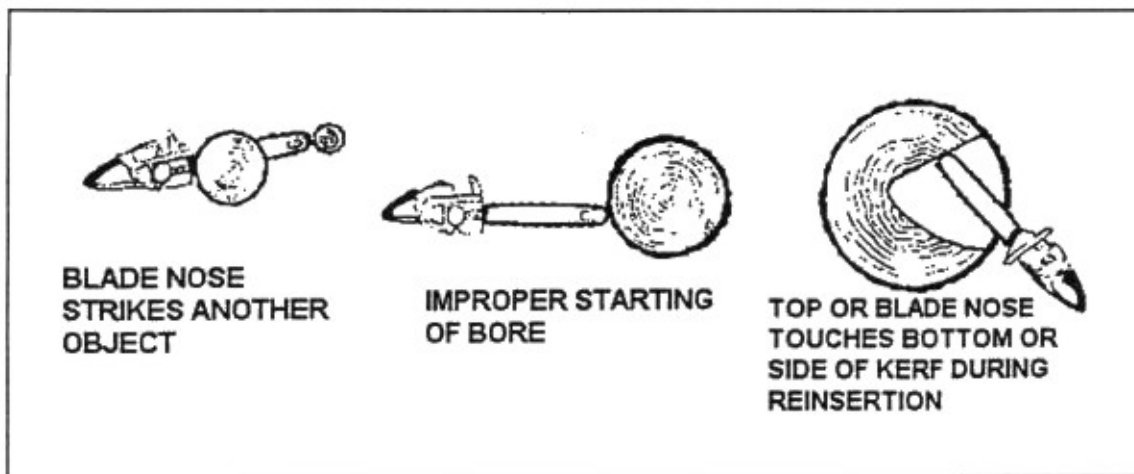
After the tree is on the ground, take a look at each limb before making the cut to be sure that cutting the limb off will not bind the guide bar or cause the trunk to roll toward the operator. Do not face the limb squarely. Stand at a 45-degree angle so that if the saw slips or completes the cut sooner than expected, the chain will not strike your leg.

Sawing with the point of the guide bar (nose sawing) greatly increases the chances of chain saw kickback (Figure 3). If the chain suddenly hits a solid object or takes too large of a cut, then the saw may be forced backward. This could result in a serious accident.

**Preventing kickback.**

Follow these steps to prevent kickback:

1. Hold the saw firmly with both hands.
2. Grip the top handle by putting your thumb around it.



**Figure 3: Avoid situations which can cause kickback**

3. Use a saw equipped with a chain-brake or kickback guard.
4. Watch for twigs that can snag the chain.
5. Don't pinch the bar while cutting the log.
6. Saw with the lower part of the bar close to the bumper, not on the top near the nose.
7. Maintain high saw speed when entering or leaving a cut in the wood.
8. Keep the chain sharp.
9. Don't reach above shoulder height to cut. The chain is too close to your face in this position.

Never make cuts with the saw between your legs. Never so-addle the limb you are cutting. Always be aware of the direction the chain will go if it breaks, and keep people clear of this area. Stand on the side of the trunk opposite the limb you are cutting.

While limbing or cutting the trunk (bucking), make sure the chain does not hit the ground. An operator can cut 40 trees and not damage the chain the way striking the ground one time can.

### BUCKING (CUTTING THE TRUNK)

If the trunk is supported along its entire length, overbuck. To overbuck, make cuts into 1/3 of the diameter of the log from the top down the length of the log from the top down the length of the trunk. Then roll the log over and make the final cuts. This procedure prevents pinching the guide bar and chain (Figure 4).

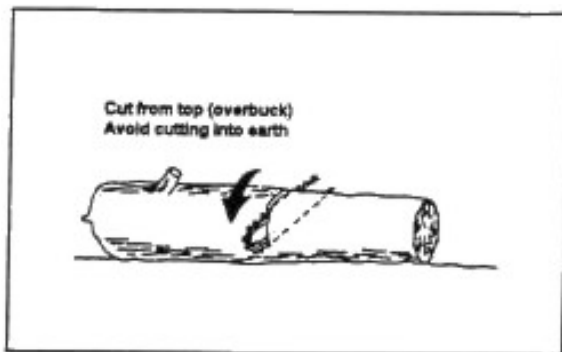


Figure 4

If the log is supported on one end, make the first cut from the underside 1/3 the diameter of the log (underbuck). Then complete the cut from the topside (overbuck) (Figure 5).

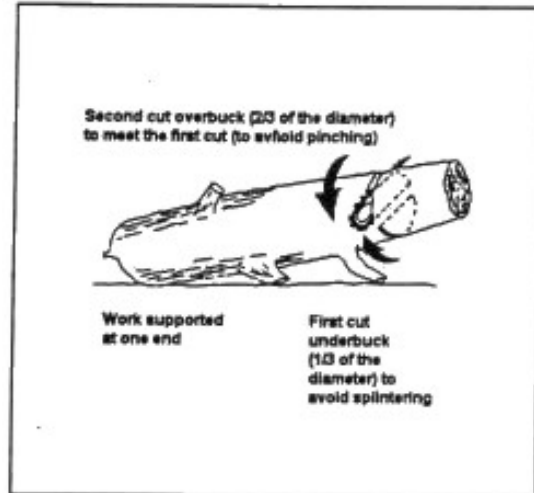


Figure 5

When the log is supported from both ends, cut 1/3 the diameter from the top (overbuck) then complete the cut by cutting upward from the underside (underbuck) to meet the first cut (Figure 6).

Whenever the saw is being operated, keep people well out of the cutting area. If a person is assisting by removing limbs, be aware of your assistant's position and activity at all times.

When cutting logs with a large diameter, operate the saw with the throttle about three-quarters open. Overpowering the saw will waste fuel and create unnecessary wear. Underpowering will not push enough air through the cooling fins and may cause engine overheating. A saw buck is a handy device for safely cutting wood to the proper length. You can find plans in your owner's manual or at your local library.

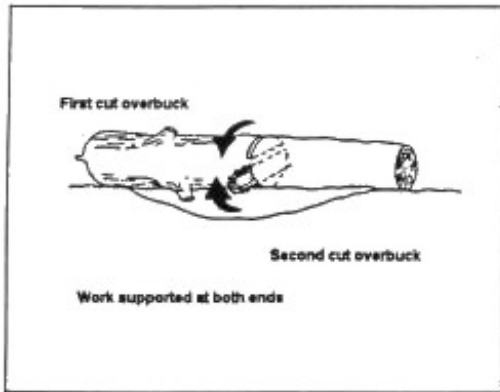


Figure 6

## ELECTRICALLY POWERED CHAIN SAW SAFETY

Electrically powered chain saws require some special safety precautions. Use only a three-wire cord of the proper size with three-pronged plugs and a grounded three-wire outlet. A ground fault interrupter in the power supply line will help prevent fatal shocks.

The soil in the work area should be relatively dry. Avoid working in areas where foliage or the ground is wet.

Lay out the cord so it will not interfere with your work. Take care to place it so that you don't inadvertently cut it with the saw or trip on it.

Make sure the saw switch is in the "off" position before completing the electrical connection. Always unplug the power before making adjustments and when the saw is not in use.

## TRANSPORT AND STORAGE

For transport, set the saw level with the gas cap up. Be sure the saw cannot tip over and spill gasoline. Avoid carrying the saw in the passenger area of a vehicle. Protect yourself and the chain. Use a chain guard or a carrying

case to protect yourself as well as the chain.

For storage, drain the fuel tank in a safe area. Run the engine at idle until it stops to remove the remaining gas from the engine. Remove the chain and store it in a container of oil. Disconnect the spark plug wire to reduce the possibility of accidental starting. Store the saw out of reach of children.

## FEATURES FOR CONVENIENCE AND SAFE USE

### Balance.

Saws should not tip to either side or rock back with the guide bar tilting toward the operator. The saw should feel balanced and comfortable. Hand guard. This is a bar in front of the forward handle that keeps the left hand from slipping onto the chain.

### Chain brake (Gasoline only).

This feature is designed to stop the chain in a fraction of a second if a kickback occurs, thus reducing the chances of serious injury. A chain brake can also serve as hand guard.

**Spark arrester (Gasoline only).** A spark arrester keeps sparks from being ejected by the exhaust. It is required in some areas of the country.

### Safety tip.

A safety tip covers the chain as it passes around the nose of the guide bar. It reduces the chance of kickback by keeping the chain from contacting anything at the guide bar tip.

### Trigger or throttle lockout.

This feature guards against inadvertent saw chain motion.

### Chain catcher.

A chain catcher helps with electrical safety. If you choose an electric chain saw, select one that has been UL listed.

### Vibration reduction system.

Rubber bushings between the handle and saw body or on the engine mountings help reduce the vibration you feel when sawing. This reduces fatigue.

**Bumper spikes.**

Most saws have large spikes on the front of the engine or motor housing that grip the wood and help hold the saw in place during cutting.

**Automatic chain oiling.**

This feature automatically oils the chain. Automatic chain sharpening. This helps keep the chain sharp while on the job. Manual sharpening should still be performed every three to four hours of use. Excessive use causes chain wear.

**Compression release (Gasoline only).**

This makes starting large engines much easier.

**Case and/or chain sheath.**

This protects the saw from dirt during storage and transfer.

**Adjustment tool.**

This is a tool with the proper wrench sizes for adjusting the chain and removing spark plugs

**Table 1. Chain Saw Troubleshooting Guide**

Symptom	Problem	Correction
<b>Difficult or poor cutting</b>	Chain dull Improperly sharpened chain Chain installed backward Improper chain tension Bar and chain aren't being lubed Damaged guide bar Exhaust ports dirty Fuel filter dirty Improperly adjusted carburetor	Sharpen chain Check chain Turn chain around Correct chain tension Fill oil tank, adjust oiler Inspect guide bar Clean muffler and exhaust ports Clean fuel filter Adjust carburetor
<b>Oiler not working</b>	Out of oil Oil hole plugged Oil strainer dirty Oiler adjusted incorrectly Plugged vent on oil tank cap	Fill oil tank Clean oil supply hole Clean oil strainer Adjust oiler Clean vent on oil tank cap
<b>Engine won't start</b>	Improper starting procedure Fuel tank empty Engine flooded Carburetor adjustment incorrect Spark plug fouled	Follow correct procedure Full fuel tank Clean spark plug Adjust carburetor Clean or replace plug
<b>Engine dies, or accelerates poorly</b>	Fuel tank empty Air cleaner dirty Spark plug fouled Carburetor adjustment incorrect Plugged vent on fuel tank cap	Fill fuel tank Clean air cleaner Clean or replace plug Adjust carburetor Clean vent on fuel tank cap

**Table 2. Selecting a Chain Saw**

<b>Type</b>	<b>Guide bar length</b>	<b>Use</b>
Mini or lightweight saws	8 – 12 inches	Light occasional use for limbing, cutting small logs and felling very small trees
Midweight saws	14 – 20 inches	Frequent log cutting and felling of small trees.
Heavyweight saws	Over 20 inches	Professionals use, not generally recommended for consumers.

## Cut Off Saw Safety

Lance Fluegel and Bradley Rein

that purpose.

### BEFORE OPERATING THE SAW

- Cut-off saws are high-speed cutting tools and very dangerous to operate; therefore, it is very important that you read and fully understand the contents of the owner's manual before using.
- Never lend or allow anyone to use your saw until you are certain they can operate it safely. Lend them the operator's manual too.
- Never allow children to operate the saw. Be sure they are mature physically and mentally before allowing them to do so.
- Allow no bystanders, especially children and pets, in the working area.
- Cut-off saws are heavy. You must be certain that your physical and mental condition is satisfactory to operate the machine. Never attempt to operate the saw under the influence of drugs or alcohol, or when fatigued. Read the accompanying unit **Preventing Back Injuries** prior to using the saw.
- Operating cut-off saws and other similar power tools over a long period of time exposes the operator to Whitefinger disease. This condition produces numerous burning sensations and interferes with the ability to feel and regulate temperature. Get medical advice at once if you experience these symptoms.
- Personal protective equipment is essential (see Figure 1). Protect your legs and lower body with sturdy long pants, your arms and upper body with a sturdy long-sleeved shirt, your feet with steel-toed safety shoes, your hands with non-slip gloves, your head with a hard hat or bump cap (depending upon conditions), your eyes with non-fogging vented goggles or face screen, protect your ears with ear plugs or muffs and a respirator for breathing protection in dusty conditions. **WARNING:** Never cut any material containing asbestos without using a respirator specifically approved for



**Figure 1. Sturdy clothing, gloves, safety hat, eye and ear protection, and safety shoes are necessary for safe operation of the cut-off saw**

- Some materials throw off dangerous sparks when cut. You should wear non-flammable clothing free of fuel, oil, or grease under these conditions.
- Check the saw for broken, loose, or damaged parts. Repair or replace before using.
- Use only cutting wheels approved by the manufacturer. Unapproved, cracked, or warped wheels may shatter or break, exposing the operator to serious injury or death.
- Adjust the wheel guard to deflect sparks, dust and material away from the operator and flammable materials.
- Be sure the wheel does not turn while the engine is idling. Adjust the carburetor if

necessary

- Fuel the engine in a well-ventilated outdoor area. Engine must be shut off and cool. Do not smoke while fueling and wipe off spilled fuel immediately.

### **OPERATING THE SAW**

- Start the saw on firm ground or other solid surface in an open area. Never attempt to drop-start the engine.
- Clear the working area. Avoid operating the saw if the terrain is wet and/or frozen.
- Hold the saw firmly with both hands when the engine is running.
- Begin cutting at full throttle and continue at full throttle until the cut is finished.
- Avoid standing in a direct line with the cutting wheel.
- Use only downward pressure on the saw. As lateral pressure may cause the blade to break and shatter.
- Do not change the direction of the cut once started, as this can also cause the blade to break and shatter.
- Do not use abrasive-type wheels for rough grinding.
- Do not cut above shoulder height.
- Shut off the engine and remove the spark plug wire before adjusting or working on the saw.

Carry the saw with engine stopped, muffler away from your body, while protecting the cutting wheel from striking the ground or other objects.

### **AFTER USING THE SAW**

- Remove the cutting wheel when transporting the saw.
- Secure the saw to prevent fuel spillage and damage to the unit
- Store the saw, with cutting wheel removed, safely away from children.

# Earth Compactor Safety

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## BEFORE USING COMPACTORS

- Study the owner's manual to familiarize yourself with the machine. See Figures 1, 2 and 3 for examples of compactors.
- Instruct all operators on how to use the machine safely. Do not allow anyone to operate the machine until you are sure they can do so safely.
- Check for loose bolts and damaged parts. Tighten, repair, or replace as needed, before using the machine. Make sure all guards are in place.
- Save your back! Never attempt to lift compactors by yourself. Use a mechanical lifting device or ask another person(s) to assist. Attach safety straps if mechanically lifting the unit more than 2 feet off the ground. Lighter backfill tampers (less than 35 pounds) may be handled by one person if proper lifting techniques are used (see unit on **preventing back injuries**).
- Fill the fuel tank out of doors with the engine stopped and cool. Do not fill the tank over three-fourths full to prevent vibration from expelling fuel from the tank. Never smoke while fueling, and wipe up spills immediately. Store fuel in a properly marked safety can.
- Wear proper personal protective equipment consisting of sturdy pants and shirt, eye and ear protection, safety shoes, and non-slip gloves.

## SAFETY DURING OPERATION

- Always start the engine out of doors. Never start it in a closed building due to possible deadly carbon monoxide buildup.
- Clear the working area of bystanders, children, and pets.
- Keep your feet clear of the machine at all



Figure 1

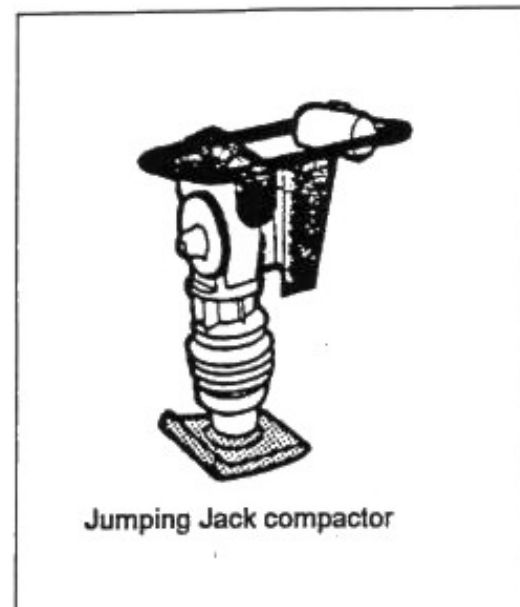


Figure 2

times to avoid the tremendous impact delivered by the machine. Grasping the machine lightly, but securely, lets the machine do the work while saving your back.

- Do not leave the machine running unattended.
- Position your body to prevent contact with the hot parts of the engine.
- Do not operate a compactor on concrete and avoid unstable surfaces that might be subject to cave-ins.
- Shut off the engine and disconnect the spark plug wire before making repairs or adjustments. Carburetor adjustments are the only exception to this rule.
- Store jumping jack types in an upright position.

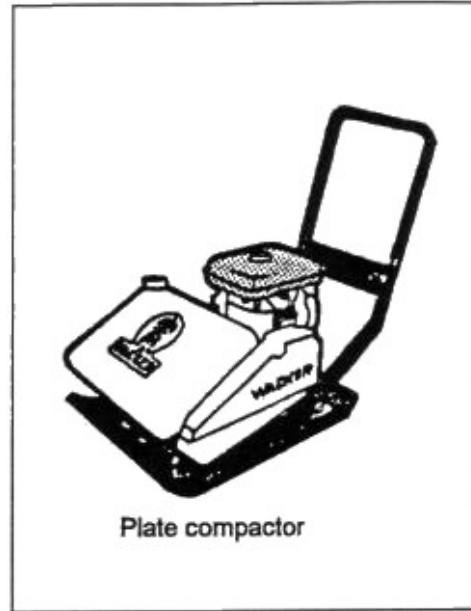


Figure 3

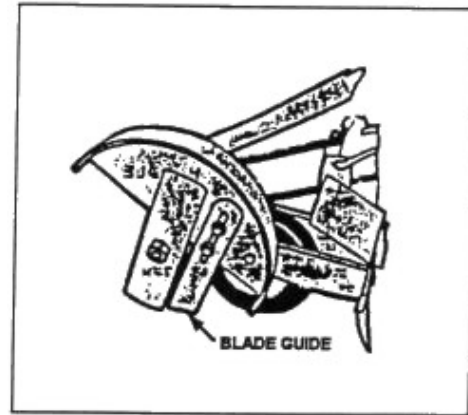
# Edger Safety

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Lance Fluegel and Bradley Rein

## BEFORE USING

- Read the owner's manual to familiarize yourself with the controls and how to use the machine safely. Be sure you know how to disengage and stop it quickly.
- Never allow children or inexperienced adults to operate the edger without proper instruction. Be certain operators are physically and mentally capable of using the machine.
- Carefully survey the working area. Have children, pets, and bystanders move a safe distance away. Remove sticks, stones, bottles, and other debris that could be thrown by the machine.
- Wear proper personal protection: safety goggles or eye shield, ear protection, long pants, safety shoes, and gloves.
- Check the condition of the edger. Make repairs, replace necessary parts, and tighten loose bolts before using.
- Fill the engine with fuel out of doors. Never fuel when the engine is running or has not had a few minutes to cool down.
- If using an electrically-operated unit, be certain that it is properly grounded or is double-insulated.



**Figure 1. WARNING: Excessive blade depth increases quantity of thrown debris and may cause equipment damage.**

- Watch the discharge direction carefully. Direct it away from people, pets, children, windows, etc. Be alert for situations that could ricochet material.
- Disengage and stop the engine before adjusting or repairing. Unplug electric models. Wait for all parts to stop moving.
- Store the edger safely out of reach of children.

## OPERATING THE EDGER

- Never operate the engine inside a building in order to prevent deadly carbon monoxide buildup.
- Be sure the blade is disengaged before attempting to start the engine, (see Figure 1)
- Hold the edger with both hands in a comfortable, well-balanced stance.
- Keep your hands and feet well clear of the cutter blade.

# Hand Tool Safety

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Lance Fluegel and Bradley Rein

## BEFORE USING HAND TOOLS

- Always buy quality tools to minimize breakage.
- Select the right tool for the job.
- Purchase tools that are comfortable in size and weight for the person(s) using them.
- Inspect all tools carefully for dull blades, damaged handles, loose heads, etc. Replace or repair as needed.
- Sharpen all cutting tools before using and frequently thereafter. A sharp tool is a safer tool.
- Always wear safety glasses when sharpening tools with a power grinder. Never wear gloves for this operation, to avoid having a hand caught and pulled into the wheel.
- Wear safety glasses and safety shoes when performing striking, shearing, or other forceful-type actions.
- Wear sturdy gloves, long-sleeved shirts, and long pants when working with dense plant materials. This is particularly important for thorny or spiny type plants such as cacti, mesquite, etc.

## WHEN USING HAND TOOLS

- Stretch or warm up before performing heavy duties such as digging, chopping, etc., to avoid muscle pulls and strains.
- Keep sharp points of tools away from the body.
- Take periodic rest breaks, especially when performing strenuous jobs such as digging, spading, or sawing.
- Keep children, bystanders, and pets a safe distance from the work area.
- When stopping or interrupting work you should place sharp, pointed or long-handled tools so they cannot be stepped on or tripped over.
- When not using pointed or sharp edged tools, always place them with the points or edges down to prevent people stepping on them.

# Hedge Trimmer Safety

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Lance Fluegel and Bradley Rein

## **PRECAUTIONS BEFORE USING A TRIMMER**

- When buying a trimmer, select one with the cutting teeth and guards close enough together so that fingers can't fit between them.
- Select a trimmer that has two handles, including a wide forward handle high above the cutting blades.
- Select a trimmer that is lightweight and easy to handle.
- Read the owner's manual to familiarize yourself with the machine and its use.
- Check the trimmer carefully for loose screws, bolts, and damaged or broken parts. Replace parts or make necessary repairs before you use the trimmer.
- Sharpen the blades if necessary.
- If not double insulated be sure that you use a three-wire extension cord equipped with a three-prong plug. Be sure the outlet you use is the grounded type. Use an outlet with ground fault protection for maximum safety.
- Be sure that young adults are properly instructed on use of the trimmer and they are physically and mentally mature enough to operate it. Never allow children to use the trimmer.
- Gear the working area of children, pets, and other bystanders.
- Inspect the shrubbery carefully for hidden wires, posts, or other trash.

## **OPERATING THE TRIMMER**

- Always wear long pants, long-sleeved shirt, gloves, eye protection, and ear protection.
- Do not operate the trimmer above chest height.
- If trimming taller shrubbery, stand on a stepladder or other firm support. Avoid the use of unstable support such as chairs or ladders.
- Keep your hands and body away from the blades.
- Keep the cord of electric models away from the trimmer to avoid damaging or cutting it.
- Work slowly and deliberately. Plan your cuts before you make them.
- Take an occasional rest break to avoid fatigue.
- Stop the engine or unplug electric models before cleaning or adjusting.
- Never leave the trimmer unattended, to prevent children playing with it.
- Store the trimmer safely out of the reach of children.

# Jackhammer Safety

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Lance Fluegel and Bradley Rein

## BEFORE USING THE HAMMER

- Read the operator's Instruction manual before using the tool.
- Be sure electric models with a three-wire system are properly grounded, to reduce the risk of fire and electric shock. This is not necessary for double insulated models. Use a ground fault interrupter (GFI) for maximum safety protection.
- Be sure the extension cord for electric models is a size large enough for the distance from the receptacle to tool.
- On engine-driven, air models-always fill the gas tank out of doors with engine shut off and cool. Never handle fuel while smoking or in the presence of sparks or open flame. Allow the engine to cool briefly if you need to refuel during operation.
- Always wear proper protective equipment. Safety glasses or shield, safety helmet, hearing protection, safety shoes, breathing protection, sturdy long pants, and long-sleeved shin are essential.
- Check all bits to see that they are sharp. If not, sharpen according to the manufacturer's recommendations. Always use eye protection when operating a grinder.

## OPERATING THE JACKHAMMER

- Always disconnect the electric power or air supply before Inserting or removing tools.
- Be sure all tools are properly locked into the unit before operating.
- Keep all bystanders, children, and pets out of the work area.
- Prevent back injuries by using your leg muscles to lift the machine into operating position.
- Allow the tool to do the work by using a grip light enough to maintain control.
- Take rest breaks as needed.
- If stopping work for a short period of time or for the day, unplug the electricity or stop the compressor.

# Pesticide Safety

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Lance Fluegel and Bradley Rein

- Wear a suitable respirator for breathing protection.

## PRECAUTIONS WHEN PURCHASING PESTICIDES

- Be sure you are properly licensed for the pesticide you will be using. Do not buy or accept any pesticide in a damaged or leaking container or without a label.

## HANDLING AND STORING PESTICIDES

- You must comply with the WHMIS law. The law requires hazardous material containers to be labelled, workers to be trained and informed and material safety data sheets for all hazardous substances.
- Keep pesticides away from human and animal foodstuffs at all times.
- Always store pesticides in a locked building or cabinet in their original containers.
- Store pesticides out of reach of children.

## PERSONAL PROTECTIVE EQUIPMENT

- AT LEAST wear long-sleeved, one-piece coveralls over your regular clothing. A full body suit is preferred.
- Use chemically resistant gloves with your sleeves over the gloves for normal mixing and application operations.
- If working vertically with your hands place sleeves inside the gloves and tape in place.
- Wear a chemically-resistant hat and apron to protect your head and body.
- Protect your feet with chemically resistant boots or footwear. Make sure boots are under pant legs.
- Protect the eyes with goggles or a full a face shield.

## MIXING PESTICIDES

- Read the label carefully and mix exactly according to the directions.
- Mix only enough to do the job.
- If mixing inside a building be sure that you have adequate ventilation.
- When mixing outside stand upwind.
- If mixing with water keep the hose at least six inches above the container to prevent back siphoning pesticide into the water system.
- Do not mix pesticides without another adult in the area in case of an accident. Have soap, towels, and water hose available for clean-up.
- Do not eat, drink, or smoke while mixing or applying pesticides.

## APPLYING PESTICIDES

- Always wear personal protective equipment as recommended by the manufacturer.
- Check the sprayer, duster, or spreader to see that it is in good operating condition. If not, clean and/or repair before using.
- Avoid using backpack-type equipment that might leak and contaminate the operator.
- Carefully calibrate the equipment to ensure that it delivers the correct amount.
- Use large, low-pressure nozzles and apply the pesticide when the air is calm, to prevent drift.
- Keep children and pets away from the spray area.

## **AFTER APPLYING PESTICIDE**

- Spray any leftover pesticide onto another crop or dilute with water and spray onto the ground around the crop
- Wash application and mixing equipment with water and detergent. Rinse at least three times.
- Dispose of empty pesticide containers by triple-rinsing first and then taking to a sanitary landfill.
- All rinsate should be sprayed on a safe crop or disposed of in an otherwise suitable manner - never into a drain or septic system.
- Wash all clothing and equipment with water and detergent.
- Personal clothing must be washed separately from other laundry. The washer should be run through an empty cycle completely to remove any pesticide from the machine.
- The operator should shower and shampoo completely after applying pesticides.
- Warning signs should be posted around the treated area. Children and pets should be kept away until the area is safe for reentry.
- Save the container label and record the date and time of application for future reference.

# Portable Ladder Safety

David E. Baker and Rusty Lee

Portable ladders are one of the handiest, simplest tools we use. Because of their effectiveness, ladders are used by many different people to perform many different tasks. Although ladders are very uncomplicated, planning and care are still required to use them safely.

## LADDER HAZARDS

Ladder accidents usually are caused by improper selection, care or use, not by manufacturing defects. Some of the more common hazards involving ladders, such as instability, electrical shock, and falls, can be predicted and prevented. Prevention requires proper planning, correct ladder selection, good work procedures and adequate ladder maintenance.

### Prevention tips:

- Do not hand-carry loads on a ladder.
- Do not try reaching so far that you lose your balance; move the ladder.
- Non-skid feet or spurs may prevent a ladder from slipping on a hard, smooth surface.
- Do not stand on the ladder's top three rungs.
- A damaged side rail may cause one side of a ladder to give way;
- The base should be spaced 1 foot away for every 4 feet it reaches up (see Figure 1).
- Ladders used to reach a walking surface or roof must extend at least 3 feet beyond.
- Extension ladders need both locks holding to prevent overloading a rail.
- Step ladders should be securely spread open. Never use a folding step ladder in an unfolded position.

- Electrical shock can occur with metal or wet wooden ladders. Not only is the shock itself dangerous, but it can cause falls resulting in injury.

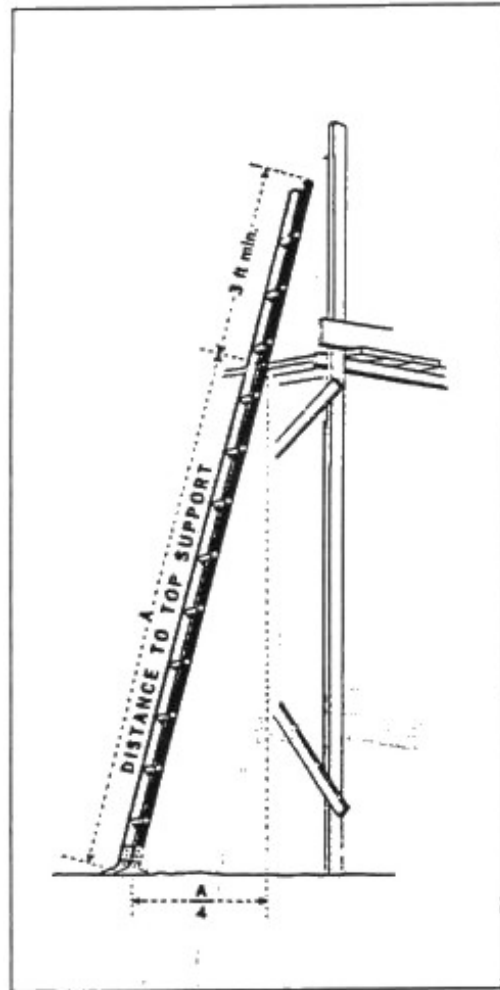


Figure 1

## LADDER SELECTION

Portable ladders are designed as "one-man" equipment with the proper strength to support the worker as well as his tools and materials. Ladders are constructed under three general classes:

- Type I Industrial - Heavy-duty with a load capacity not more than 250 pounds.
- Type II Commercial - Medium-duty with a load capacity not more than 225 pounds (suited for painting and similar tasks).
- Type III Household - Light-duty with a load capacity of 200 pounds.

## LADDER MAINTENANCE

**Wood ladders** should be protected with a clear sealer varnish, shellac, linseed oil or wood preservative. Wood ladders should not be painted, because the paint could hide defects. Check carefully for cracks, rot, splinters, broken rungs, loose joints and bolts and hardware in poor condition.

**Aluminum or steel ladders** should be inspected for rough burrs and sharp edges before use. Inspect closely for loose joints and bolts, faulty welds and cracks. Make sure the hooks and locks on extension ladders are in good condition. Replace worn or frayed ropes on extension ladders at once.

**Fiberglass ladders** should have a surface coat of lacquer maintained. If it is scratched beyond normal wear, it should be lightly sanded before applying a coat of lacquer.

## HELPFUL HINTS

- When working on cylindrical objects like poles and columns, the top rung of portable ladders can be replaced with chain or rope to reduce rocking.
- Aluminum ladders are very corrosion-resistant, but exposing them to fertilizer can cause damage.
- Use the ladder inspection checklist to remind yourself of what you should look out for in order to prevent accidents.

## Ladder Inspection Checklist

General	Needs repair	O.K.	Date repaired
<b>Loose steps or rungs?</b> (considered loose if they can be moved at all with the hand)	_____	_____	_____
<b>Loose nails, screws, bolts, or metal parts?</b>	_____	_____	_____
<b>Cracked, split, or broken uprights, braces, or rungs?</b>	_____	_____	_____
<b>Slivers on uprights, rungs or steps?</b>	_____	_____	_____
<b>Damaged or worn non-slip bases?</b>	_____	_____	_____
<b>STEP LADDERS</b>			
<b>Wobbly?</b> (from side strain)	_____	_____	_____
<b>Loose or bent hinge spreaders?</b>	_____	_____	_____
<b>Stop on hinge spreaders broken?</b>	_____	_____	_____
<b>Loose hinges?</b>	_____	_____	_____
<b>Broken, split or worn steps?</b>	_____	_____	_____
<b>EXTENSION LADDERS</b>			
<b>Loose, broken or missing extension locks?</b>	_____	_____	_____
<b>Defective locks that do not seat properly while extended?</b>	_____	_____	_____
<b>Worn or rotted rope?</b>	_____	_____	_____

# Power Tiller Safety

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Lance Fluegel and Bradley Rein

## BEFORE USING THE TILLER

- Read the owner's manual completely. Learn the purpose of all levers and controls. Be sure you can stop the machine quickly.
- If purchasing a new machine or renting ask the salesperson to demonstrate safe operation of the machine.
- Never allow anyone who is not physically or mentally mature or who has not been properly trained to operate the machine.
- Always inspect the machine for loose, broken, or damaged parts. Make needed repairs or replacements before using.
- Be sure all shields and guards are in place.
- Fuel the engine out of doors while stopped and cool. If refueling wait several minutes for engine to cool. Do not smoke while handling fuel. Wipe up any spills.
- If using an electric tiller that is not double insulated, you should plug it into a 3-socket, grounded outlet using a properly sized 3-wire extension cord. Using a Ground Fault Interrupter circuit gives maximum safety protection.
- Dress properly for the job: Wear snug-fitting clothing in good condition, safety glasses or goggles, hearing protection, safety shoes, and filter mask if conditions are dusty.
- Clear the work area of potential safety hazards such as wire, stones, bottles, cans, sticks, etc.
- Be sure there are no children, pets, or bystanders in the working area.
- Do not use the tiller near underground utilities, irrigation pipes, trees, etc.

## OPERATING THE TILLER

- Never start the engine in a closed building. Deadly fumes can build up.
- Keep hands and feet clear of all moving parts.
- Do not operate in wet or slippery conditions. This is especially important for electric models.
- Be sure the depth regulator is engaged before starting the tiller. Falling to do this could cause the machine to lurch quickly away from you.
- Disengage the tiller and stop the engine to inspect for damage if you hit an obstruction. Repair any damage before resuming.
- Never leave the machine running and unattended.
- Always disengage the tines when turning or transporting the tiller.
- Never attempt to lift the tiller by yourself. If transporting to a distant location. Drive the machine up secure ramps or ask for assistance if it must be lifted. Tie machine securely to prevent rolling.

# Push Mower Safety

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Lance Fluegel and Bradley Rein

## BEFORE MOWING

- Review the instruction manual if you haven't used the mower for awhile.
- Be sure that all safety devices are in position and working - rear shield, grass chute deflector, handle upstops (not on electric models), and "dead man control."
- Wear close-fitting clothes, sturdy non-slip shoes, eye protection, and hearing protection.
- Fill the fuel tank out of doors when engine is cold. Wipe up any spills.
- Do not smoke while fueling the engine.
- Adjust cutting height and blade condition; sharpen if necessary (engine must be shut off).
- If your electric mower isn't labeled "double insulated" - never plug into anything but a rounded 3-prong outlet. Use a ground fault Interrupter (GFI) for maximum safety.
- Pick up all debris in the lawn - anything the mower could pick up and throw.
- Be sure grass is dry before cutting, to prevent the operator from slipping
- Do not allow children or; pets near the mowing area
- Never allow children to operate power mowers. Wait until they are physically; and mentally mature enough to handle the job.

## USING THE MOWER

- Start the mower outdoors near the area to be mowed.
- Do not push a running mower over gravel, stones, or hard objects such as pipes, rocks, or sidewalks.
- Push the mower forward - do not pull it.
- Mow across the slope so if you slip you are less likely to get your feet in the blade.
- Keep electric cord out of the mowing path.
- Keep hands and feet clear of the blade housing and the discharge chute.
- Do not run with push powered mowers.
- If using a push powered mower be careful to not overdo your work capacity especially on hot days.
- Take frequent rest breaks especially if the operator is out of condition.
- Point the discharge chute away from people, pets, buildings, windows, and glass doors.
- Turn the mower off if you leave it for even a moment.
- Disconnect the spark plug wire before working on the mower.

# Riding Mower Safety

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Lance Fluegel and Bradley Rein

## BEFORE MOWING

- Read or review the operator's manual to familiarize yourself with the mower and controls.
- Make certain all safety devices are in place and operating. Be sure the mower is equipped with a working engine interlock and a "deadman" control.
- Wear close-fitting clothes, sturdy non-slip safety shoes, eye protection and ear protection, (no bare feet, sandals, or sneakers)
- Fill the fuel tank out of doors with the engine stopped and cool. Wipe off any spills. Do not smoke while filling.
- Adjust the cutting height and check the condition of the blade. Be sure the engine is shut off. Sharpen the blade if necessary.
- Disconnect the spark plug wire and wear heavy leather gloves to remove and/or replace the blades.
- Never wear gloves while sharpening me blade on a power grinder as the gloves could be caught and pulled into the grinding wheel.
- Pick up all debris in the lawn.
- Keep children and "pets out of the area. Never allow children-to-ride on the mower with you;
- Do not allow children to operate the mower until you are sure they have the physical size and mental maturity to do so. Properly instruct them on safe operation at that time.

## OPERATING THE MOWER

- Be sure the mower and transmission are disengaged before starting the engine.
- Start the engine out of doors to avoid buildup of dangerous fumes.
- Drive the mower up and down gentle slopes for best stability. Back up moderate slopes. Avoid steep slopes completely.
- Turn off the engine and wait for moving parts to stop before dismounting. Remove the key!
- Slow down when turning sharply and on slopes to avoid tipping.
- Always look behind you for small children, pets, or obstructions, before backing the mower.
- Disconnect the spark plug wire before attempting to service, adjust, or repair the mower.
- Keep the discharge chute pointed away from buildings, people, and animals.
- Keep hands and feet away from all moving parts.

# Skid Steer Loader Safety

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Lance Fluegel and Bradley Rein

## BEFORE YOU BEGIN OPERATIONS

- Read the operator's manual carefully to learn the characteristics of the machine.
- Depending upon the job, you should wear some or all of the following safety equipment: sturdy pants and shirt, hard hat, safety glasses or goggles, hearing protection, safety shoes, gloves, and respirator.
- The loader should be equipped with seatbelts, rollover protective structure (ROPS), side screens, starter interlock switches, backup alarm system, and warning lights for maximum safety.
- Fill the engine with fuel when engine is shut off and still cool. Do not smoke. Wipe up any spills immediately.
- Check the machine daily for broken, loose, or damaged parts.
- Check to see that counterweights as recommended by the manufacturer are in place. NOTE: This is very important as improperly balanced skid-steer loaders are easily upset.
- Clean steps, pedals, and floor of any slippery substances.
- Clear the driving compartment of loose items that might interfere with the controls.
- Check the work area for hazards such as holes, soft spots, and obstructions. Check overhead for utility lines, doorway clearances, or other obstructions.
- Mount the machine wearing clean, dry shoes using the grab bars or handrails provided.

## OPERATING THE SKID STEER LOADER

- Adjust the seat, fasten the seat belt, set the brake, and place transmission in park or neutral before cranking the engine.
- Visually check for the presence of others in the area and warn them away. Be especially alert for children.
- If the machine is garaged leave the door or some windows open for ventilating the exhaust. CARBON MONOXIDE KILLS!
- Start the engine and check all controls to see that they are functioning properly.
- Check horn and backup alarm to see that they are working.
- Operate with caution on uneven surfaces. Avoid steep slopes completely.
- Carry the load as low as possible. Avoid sharp turns and slopes with a raised load.
- Keep the back of the machine pointed uphill. BACK UP AND DRIVE DOWN!
- Operate with extreme caution near areas with sharp dropoffs.
- Do not undercut banks or materials that are piled high, to avoid falling rocks or cave-ins.
- Be alert, when backfilling, for unstable soils that could collapse under the weight of the machine.
- Never leave the machine without first lowering the bucket, stopping the engine, setting the parking brake, and placing the shift in park or neutral.
- If stopping for any length of time lock the ignition and remove the key.

# String Trimmer Safety

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Lance Fluegel and Bradley Rein

## **BEFORE USING THE TRIMMER**

- Read the owner's manual carefully.
- Wear proper protective clothing: eye protection, trim-fitting pants and shirt, sturdy shoes, and ear protection if using a gas-powered trimmer.
- Check the machine for loose, broken, or damaged parts - repair or replace as needed.
- Be sure electric units are either double insulated or connected to a 3-prong grounded outlet
- Use a property sized outdoor type extension cord for electric units. A 2-wire cord for double insulated units and a 3-wire cord for units that need to be grounded. Use of a ground fault interrupter (GFI) circuit provides added safety.
- Do not use electrical powered units in damp or wet conditions.
- Be sure the working area is free of hazards which could hamper the use of the trimmer
- Trimmers can throw objects with force so keep children, bystanders, and pets from the working area.

## **WHILE OPERATING THE TRIMMER**

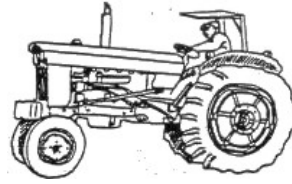
- Do not operate the trimmer near windows.
- Keep the trimmer close but not touching the ground. Angle the unit slightly to the left to discharge trimmings away from your body.
- Hold the trimmer firmly with both hands in a properly balanced stance.
- Keep the hot engine and exhaust away from your body

- Use only monofilament string recommended by the manufacturer. Never use wire or metal reinforced string as broken pieces can become lethal missiles.
- Do not use the trimmer for any purpose other than manufacturer's recommendations.
- Never touch the string while in operation.
- Do not operate gas powered units indoors to prevent carbon monoxide poisoning.
- Stop the engine and disconnect spark plug wire before servicing. Disconnect the power cord on electric units.
- Refuel only with engine stopped and cool.

## **WHEN FINISHED**

- Store the unit in an area where children or untrained personnel will not have access.

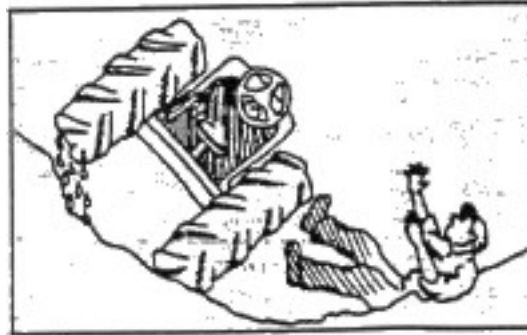
## Tractor Safety



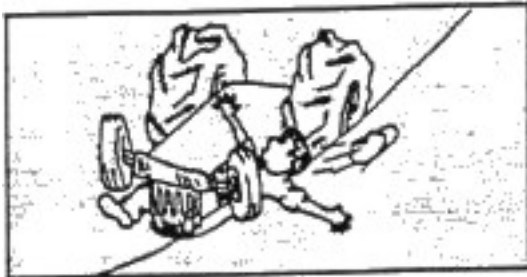
Permit no riders on tractor and field equipment

Securely fasten your seat belt if your tractor has a R.O.P.S. (roll-over-protective structure)

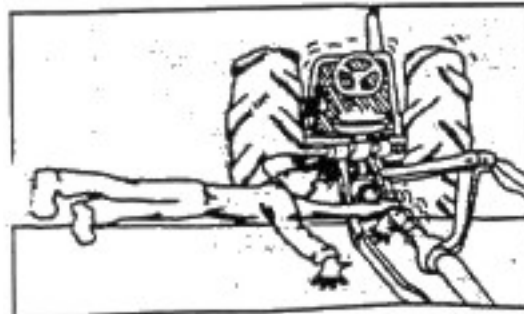
Operate the tractor smoothly – no jerky turns, starts, or stops.



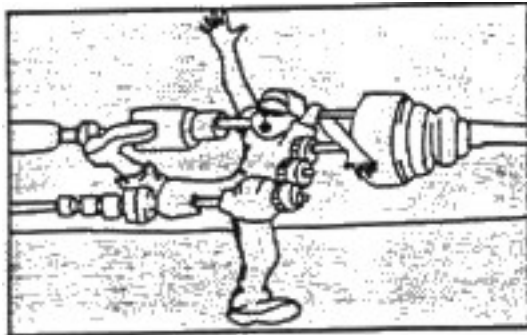
Reduce speed when turning, crossing slopes, and on rough, slick or muddy surfaces.



Stay off slopes too steep for safe operation



Keep all guards in place when the machine is in operation

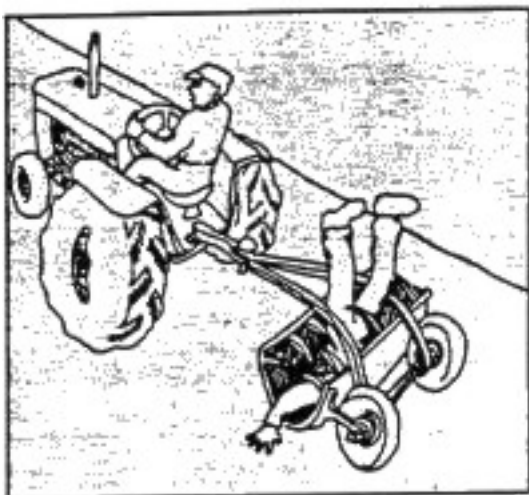


Check out electrical power before performing maintenance or service on farmstead equipment.

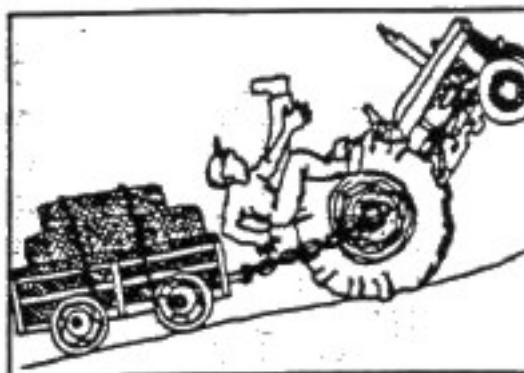
Stop engine, disconnect the power source and wait for all machine movement to stop before servicing, adjusting, cleaning, or unclogging the equipment.



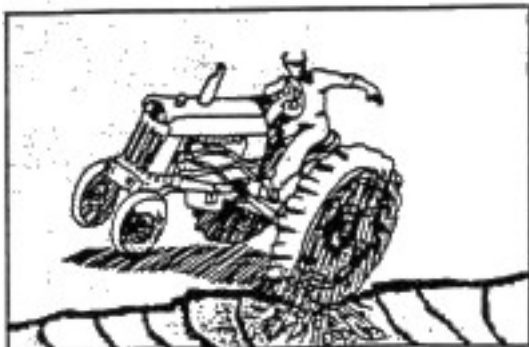
Watch where you are going, especially at row ends, on roads, and around trees.



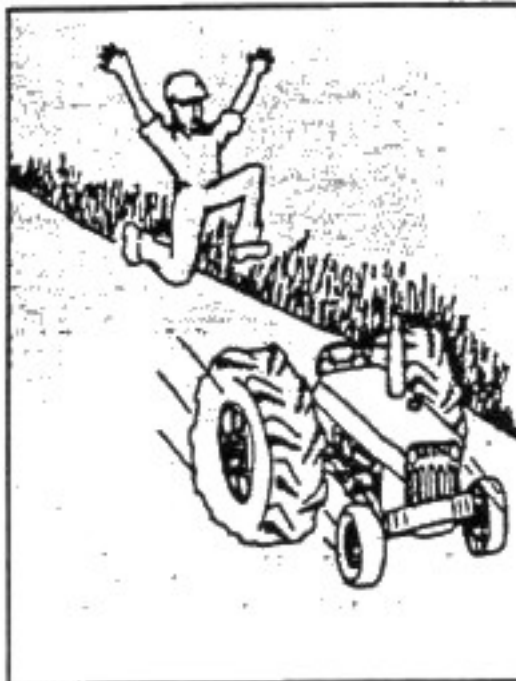
Make sure everyone is clear of machinery before starting the engine, engaging powers, or operating the machine



Hitch only to a drawbar and hitch points recommended by the manufacturer.



Where possible, avoid operating the tractor near ditches, embankments, or holes.



When tractor is stopped, set brakes securely.

# Tractor - Mower Safety

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Lance Fluegel and Bradley Rein

## BEFORE USING THE MOWER

- Read or review the operator's manual to familiarize yourself with the machine.
  - Learn the location and use of controls, gauges, and dials for the tractor.
  - Familiarize yourself with speeds, slope capabilities, braking and steering characteristics, and tractor-mower clearances.
  - Be sure the tractor is equipped with a roll-over protective structure (POPS) and a seat belt. If not, have it retrofitted for one.
  - Check that the power take off, mower input driveline, drive belts, chains, and gears are all properly guarded. Repair or replace if necessary.
  - Check the discharge chute to see that it is present and pointed downward.
  - Fill the fuel tank out of doors with the engine stopped and cool. Do not smoke while filling.
  - If you will be driving on public roads be sure the slow moving vehicle (SMV) emblem is in place. Check that the warning lights are present and operating.
  - Check overhead clearance of electrical wires and other obstructions, especially if you are using a wing-type, boom-type, or flail mower.
  - Inspect the work area for debris, ditches, potholes, stumps, irrigation valves, etc. Clear removable items and mark the others.
- Do not allow any riders - especially children.
  - Adjust the seat, fasten the seat belt, set the parking brake, place shift lever in neutral or park, and disengage the p.t.o. before cranking the engine.
  - Raise the mower high and use low rpm before engaging power to the unit.
  - Use a ground speed based on length and density of material being cut - normally between 2-5 mph.
  - Mow very tall grass twice at 90-degree angles if possible.
  - Mow up and down slopes with rear-mount, pull-type, and wing-type mowers.
  - Mow across slopes with side-mount, onset, and sicklebar mowers.
  - Look behind you before backing.

## OTHER DOS AND DON'TS

- When finished or stopping, disengage the p.t.o., place shift in neutral or park, set parking brake, turn engine off, and wait for all movement to stop before dismounting.
- Remove the key if leaving the tractor for any length of time.
- Always block the mower if working under it for any reason.

## OPERATING THE TRACTOR MOWER

- Be sure your hands and shoes are clean and dry before mounting the tractor to prevent slipping. Use the steps and hand bars.

# Trencher Safety

---

Lance Fluegel and Bradley Rein

## BEFORE USING THE TRENCHER

- Read the operator's manual before attempting to operate the machine. Be sure you understand it completely.
- Dress properly for the job. Wear snug-fitting, sturdy pants and shirt, safety shoes, safety helmet, safety goggles or screen, and hearing protection.
- Check the machine for loose, missing, or broken parts. Tighten, repair, or replace as needed before using.
- Check all safety devices such as seat belts, roll-over protective structures (POPS), shields, warning lights, etc., to see that they are in place and working.
- Read and heed the safety warning decals on the machine.
- Check for hydraulic leaks with a piece of wood or cardboard. Never use your hand as pinpoint leaks can penetrate the skin.
- When checking radiator coolant, cover the cap with a cloth to protect yourself from escaping steam. Open the cap slightly to release pressure, and then open the rest of the way. Allow engine to cool before adding any needed coolant.
- Fill the fuel tank with engine stopped and cool. Do not smoke. Be sure there are no sparks or open flames nearby. If you must refuel during operation, allow the engine to cool a few minutes before doing so.
- Check for underground utilities in the digging area. You should request the utility company to locate services at least two days in advance of digging. Don't take chances. You could lose your life if you strike a gas or electric line.
- Check for the presence of overhead utility lines as they can be equally as dangerous.

## OPERATING THE TRENCHER

- Use care when mounting riding trenchers. Be sure your hands and shoes are clean and dry. Use the handrails, not control levers, to guide yourself.
- Fasten the seat belt and adjust the seat to a comfortable position.
- Warn others away from the machine and work area especially children and pets.
- Be sure the transmission and other controls are in the neutral position. Set the brakes on all models.
- Start the engine and test all controls.
- Lower the trencher boom within a few inches of the soil.
- Engage the chain at slow speed. Be sure you can control the trencher as the chain can jerk the machine quickly.
- Operate riding trenchers only from the seat. Keep hands and feet clear of chain and augers on walk-behind models.
- Use caution when operating on slopes as the machine will want to work down the slope.
- Never make sharp turns while digging.
- Never adjust or attempt to free a jammed chain while it is running. Always stop the machine and engine first.
- Trenchers are one person machines - never allow any riders.
- When raising the boom you should disengage the chain just as it clears the trench.

- Follow these steps when shutting the machine down for any length of time:
  1. Lower the trenching boom and attachments to the ground.
  2. Set the parking brake or block the wheels.
  3. Put the transmission in park or neutral.
  4. Stop the engine.
  5. Cycle the hydraulic controls to relieve any pressure.
  6. Remove the ignition key.
  7. Dismount carefully using steps and handholds.

### **TRANSPORTING TRENCHERS**

- Follow the manufacturer's manual for specific loading and unloading procedures.
- Be sure all required tie downs, safety chains, etc., are properly secured.
- If driving the trencher on public roads make certain that all warning signs, lights, and flags are in place and visible. The Slow Moving Vehicle (SMV) emblem must be visible to vehicles approaching from the rear.