

Chain Saw Safety Training

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Training Summary

Proper maintenance, personal protective equipment, and correct technique are critical components of safe chain saw operation. Council properties rely on chain saws to help clear trails, remove deadfalls, clear timber, and stockpile wood for campfires and heating buildings. This training outline provides local councils with the resources to train chain saw operators on council property.

National camp standards require that chain saw operators be at least 18 years old and meet one of the following requirements:

1. Be a professional forester.
2. Be a certified arborist.
3. Have received training in chain saw techniques from a Ranger section of National Camping School.
4. Have written documentation of having other training in these techniques that is recognized by the state or federal government.
5. Have successfully completed BSA Chain Saw Safety Training course, No. 20-136. (Successful completion of this training program achieves this goal.)

Learning Objectives

At the end of this lesson, participants will be able to

- ∞ Identify daily, weekly, and monthly required chain saw maintenance items.
- ∞ Properly use personal protective safety equipment and clothing.
- ∞ Start and operate a chain saw.
- ∞ Understand felling procedures.

Required Materials

- ∞ Demonstration chain saw, tool kit, and manual
- ∞ Examples of approved safety equipment
- ∞ Training cards for participants
- ∞ State or local information regarding chain saw use
- ∞ [\[\[link\]\]](#) Chain Saw Safety PowerPoint presentation (courtesy Florida Agricultural Safety Program, <http://www.flagsafe.ufl.edu>)
- ∞ Manufacturer's literature (optional)

Chain Saw Safety Training

Equipment

Field Maintenance Tool Kit

- ∞ Srench—A combination screwdriver and wrench designed for chain saw maintenance
- ∞ Small screwdriver—For carburetor adjustments
- ∞ Plastic wedges
- ∞ Round file—Use the appropriate diameter
- ∞ Flat mill bastard file—For filing the rakers
- ∞ Grease—For lubricating the bearing and sprocket tip guide bars
- ∞ Star wrench—For various screws and bolts on your saw
- ∞ Extra spark plug—Replace if pitted or fouled
- ∞ Extra starter cord—Carry approximate length needed
- ∞ Extra chain—Use appropriate size, drivers, and gauge of chain
- ∞ Extra parts—Needle cage bearing, washer, E-clips, sprocket, bar nuts
- ∞ Air filter—Replace when badly soiled

Safety Equipment

- ∞ Hard hat
- ∞ Eye protection
- ∞ Hearing protection
- ∞ Gloves
- ∞ Chaps
- ∞ Leather boots
- ∞ Falling ax or pounder

Daily, Weekly, and Monthly Maintenance

Guide Bar and Chain Lubrication

- ∞ Be sure there is bar oil in the oil reservoir. The oil reservoir should be filled at every refueling. Bar oil and fuel should be burned at approximately the same rate.
- ∞ If there is a large amount of oil left in reservoir, oil slots may be plugged or adjusted too lean. Check and clean the engine oil slots and oiling grooves in the guide bar.

To check for proper bar and chain oiling, hold the bar tip a few feet away from a piece of wood or log and observe the amount of oil that is thrown off.

Daily Saw Maintenance

- ∞ Check the throttle trigger for smooth operation. Be sure the trigger cannot be pulled until the throttle trigger lockout is depressed.
- ∞ Clean the chain brake, and check that it engages and disengages properly.
- ∞ Clean or replace the air filter as necessary. Check for damage and holes.
- ∞ The guide bar should be turned daily. Check the chain oil hole in the bar to be sure it is not clogged. Clean the bar groove. Lubricate the sprocket tip on the bar.
- ∞ Check the chain oiler to be sure the bar and chain receive proper lubrication.

- ∞ Sharpen the saw chain, and check its tension and condition. Check the sprocket for wear; replace if necessary.
- ∞ Check the starter cord and assembly for damage and wear. Clean the air intake slots on the starter housing.
- ∞ If necessary, retighten loose nuts and screws, using proper tools and taking care not to damage threads or crack casings.
- ∞ Test the ignition switch to be sure it shuts off the engine.

Weekly Saw Maintenance

- ∞ Check antivibration shock-absorber systems for damage and wear.
- ∞ Check and lubricate the clutch drum bearing.
- ∞ File off any burrs on the side of the guide bar.
- ∞ Clean the spark plug and check the gap.
- ∞ Check the starter assembly, and rewind the spring for proper tension.
- ∞ Clean the flywheel fins.
- ∞ Clean the cooling fins on the cylinder.
- ∞ Remove carbon buildup on the muffler screen. Change the screen when mesh openings exceed 0.025 inches (0.06 cm).
- ∞ Clean the carburetor body and under the air filter cover.

Monthly Saw Maintenance

- ∞ Check the chain brake for wear. If tools and skill are available, check the clutch center, clutch drum, and clutch springs for wear.
- ∞ Check the fuel filter; change if necessary. Flush the chain oil tank with gasoline.
- ∞ Flush the inside of the fuel tank with gasoline.
- ∞ Check all wires and connections.

Operating and Fueling the Chain Saw

There are two recommended methods to start a chain saw.

Method 1

- ∞ Engage the chain brake and ensure that the chain is not contacting anything.
- ∞ Place the saw on firm, level ground so that the chain is not in contact with the ground.
- ∞ Kneel with your right knee next to the air filter cover or pistol grip. Place your left knee to the left side of the pistol grip.
- ∞ Turn on the ignition switch. If the saw has a compression release, open it.
- ∞ If the engine is cold, choke the carburetor. Some saws' throttles open along with the choking.
- ∞ Place one hand on handle bar and the other gripping starter handle. Either hand can be used as long as the saw is held firmly.
- ∞ Firmly grasp the starter cord handle. Pull sharply with a short pull. Guide the starter cord back into the starter assembly.
- ∞ Once the saw has started, close the compression release.

Method 2

- ∞ Engage the chain brake.
- ∞ Hold the chain saw with your right hand in pistol grip. Do not depress the throttle trigger during the starting procedure unless the saw is flooded.
- ∞ Rest the guide bar on a log or limb so that the bar tip extends beyond obstructions. Be careful not to stub the bar tip.
- ∞ Assure firm footing and steady balance.
- ∞ Turn the ignition switch on. Open the compression release if there is one on the saw. Once the saw has started, close the compression release.
- ∞ If the engine is cold, choke the carburetor. Some saws' throttles open along with the carburetor choking. Be sure the chain brake is applied and that the chain is not contacting anything.
- ∞ With your left hand, firmly grasp the starter cord handle. Pull sharply with a short pull while counteracting force with a push from your right hand. Be aware of the bar tip and do not depress the throttle trigger. Guide the starter cord back into the starter assembly.

Fueling

- ∞ Shut off the saw, and allow it to cool for a few minutes before fueling.
- ∞ Clear an area on the ground for the saw to be positioned accordingly.
- ∞ Wipe dirt and wood chips off of the fuel tank cap and surrounding areas.
- ∞ Slowly loosen the cap, allowing any built-up pressure to escape.
- ∞ Use an approved safety fuel container with a funnel or spout to help avoid spillage.
- ∞ After fueling, replace the fuel cap, making sure the threads are not crossed and the cap is placed on securely.

While the saw is cool and idle for fueling, remember these few maintenance points.

- ∞ Always fill the chain oil reservoir. Wipe off the reservoir cap to prevent contamination.
- ∞ Always check chain tension.
- ∞ Always clean the air filter.

Stance and Handling

Kickback is a strong thrust of the chain saw back toward the operator, generally resulting from improper use of the guide bar tip. Kickback also can occur when the top of the guide bar is pinched in a cut. Without proper control, the saw can severely injure the operator.

Accidentally stubbing the bar tip is the most common kickback mistake. It is important that the operator is aware of the tip location at all times. Stubbing the top of the tip will result in a thrust up and back; stubbing the bottom will result in a thrust down and back. Controlling the chain saw at all times is essential for safe and effective operation. Control is possible only with proper stance and handling.

Stance and Handling

- ∞ Secure firm footing. Be sure loose material (bark, limbs, rocks) is removed from underfoot before cutting. It may be necessary to form a flat foothold.
- ∞ Keep feet spread shoulder width apart in a balanced stance, and place feet and legs away from the guide bar and chain.

- ∞ Keep a firm grip on the saw with both hands, thumbs and fingers encircling the handle. The major responsibility rests with the left hand on the handle bar to prevent loss of control. Be sure that the thumb is wrapped around the handle bar.
- ∞ Do not cross the hands. Wrap-around handle bars allow operator to make various cuts without crossing the hands. Moving to the opposite side of the material being cut will allow proper handling if a wrap-around handle bar is not being used.
- ∞ Fatigue is a major hazard. Do not operate a chain saw when fatigue makes proper stance, handling, and clear thinking difficult.

Felling

Felling Procedures

- ∞ Observe the top (widowmakers, heavy branches, wind) .
- ∞ Establish the lay.
- ∞ Check for snags.
- ∞ Swamp-out the base.
- ∞ Size up (lean, sounding, conks).
- ∞ Determine an escape route.
- ∞ Walk out the lay.
- ∞ Re-examine the escape route.
- ∞ Face the tree.
- ∞ Check the gunning.
- ∞ Warning.
- ∞ Backcut.
- ∞ Escape the stump.
- ∞ Analyze the operation.

Problem Trees

- ∞ Small trees
- ∞ Heavy leaners
- ∞ Root pull
- ∞ Big trees
- ∞ Hangups
- ∞ Sit-backs
- ∞ Snags
- ∞ Domino falling
- ∞ Fire-weakened timber
- ∞ Candlestick or staub

Six Steps of Tree Felling

Step 1—Inspection

Every tree-felling event presents hazards that should be identified before work is started. The first thing you must do after the pre-job briefing to ensure the work will be completed without injury or property damage is to **inspect the tree and work area.**

- ∞ Check the **trunk, leaders, and branches** for decay, rot, cavities, splits, and tension wood that would require special handling.
- ∞ Check the **height of the tree, the lean, and the distribution of branches in the crown.** It might be necessary to top and/or remove some branches to make the tree fall in the desired direction without striking other trees or conductors in or near the felling area.
CAUTION: Felling tree into tree is very hazardous. Avoid!
- ∞ Check **conditions at the base of the tree.** Brush, limbs, and other debris that might hinder a quick escape from the tree should be removed. Extra caution must be taken if the work surface at the base of the tree is slippery because of ice, snow, or muddy conditions.
- ∞ **Visually check for nails and other foreign objects** that might be embedded in the trunk where felling cuts will be made.
- ∞ Check for **shallow or exposed roots** in high-wind conditions. Special or extra rigging might be required to prevent the tree from falling in the wrong direction.
- ∞ Check for **dead trees and overhead dead limbs** in the felling area that could break and fall if struck by the tree being felled.
- ∞ Check for **vines** that could interfere with normal tree felling.
- ∞ Check for **tree stumps, large rocks, and uneven terrain** that might cause the tree to roll or bounce unexpectedly when it strikes the ground.

This tree inspection process will help you establish a step-by-step plan to identify and eliminate hazards. Make sure that everyone on the crew is aware of all hazards that exist and how to safely work to eliminate them.

“Look Up, Look Down, and Look All Around.”

Step 2—Job Briefing

Now that you have completed a tree and work area inspection (step 1), you have had time to plan the job considering existing hazards, how the work will be performed, by whom, and with what tools and equipment.

Your next step is to thoroughly brief the entire crew on each person’s individual work assignment and the sequence in which the work will be done, from the start of the tree felling operation to its completion. In order to do this, you must complete an appropriate job briefing with all crew members before the start of each felling process.

All proper briefings contain the following items:

- ∞ Identify all hazards associated with the job.
- ∞ Communicate to crew members their individual work procedures.
- ∞ Inform the crew of any special precautions necessary to complete the job.
- ∞ Ensure that the proper personal protective equipment is used.
- ∞ Explain the lines of communication and review signaling/communication procedures.

Additional job briefings must be held if significant changes occur during the course of work that might affect the safety of crew members.

After your job briefing, verify that crew members understand what they are responsible for and how they will eliminate or avoid hazards while doing their assigned work. Do not risk an incident because someone did not understand what to do or how to do it. The job briefing will help enable the work to be done safely and efficiently.

Step 3—Supervise and Communicate

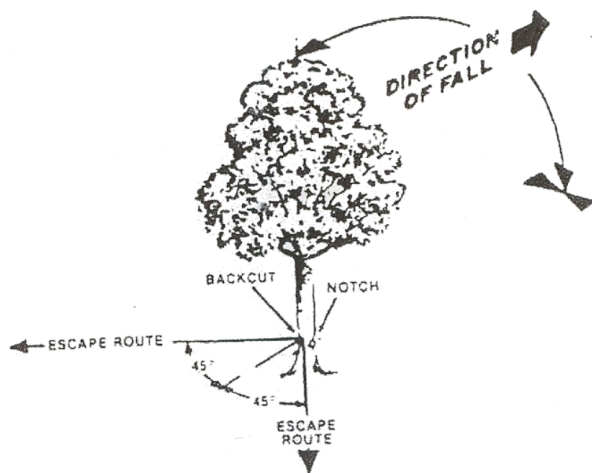
Now work can begin, but take nothing for granted; things do not always go as planned. It is very important that the crew leader watch closely what is happening, constantly checking on each crew member's activity and instructing them what to do when problems arise.

- ∞ The crew leader must designate someone else to supervise the crew, if for any reason the crew leader must leave the work site or assume another function in the felling process (e.g., crew leader becomes the sawyer).
- ∞ Everyone on the crew should identify hazards when they are spotted. This kind of teamwork will help keep everyone free from injury.
- ∞ Ensure that spotters are informed of look-out situations.
- ∞ If you see someone about to make a mistake or do something careless or risky, tell them about it immediately.
- ∞ Crew leaders should monitor crew members for signs of fatigue.

Remember, people get hurt when they break a safety rule or get distracted, fatigued, or careless.

Step 4—The Escape Route

After the tree is trimmed or topped as needed, but before any notch cuts are started by the sawyer (saw operator), the crew leader and sawyer must establish a clear, unobstructed escape route for the sawyer. The escape route should be at a 45-degree angle to the rear of the planned direction of fall (see illustration below). The sawyer shall continue to move directly away from the tree in the escape route until the tree has come to rest. Then the sawyer may return to the felling area.



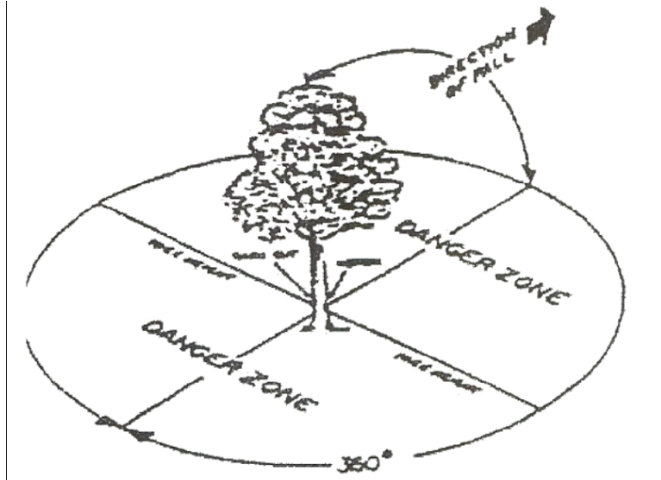
During the felling operation, the sawyer must:

- ∞ Make absolutely certain that no one is in the danger zone and give an audible warning to crew members before starting notch cuts and back cuts.
- ∞ Leave the stump area immediately when the tree begins to fall. The sawyer continues to quickly move directly away from the tree along the designated escape route or other safe route until the tree has come to rest.
- ∞ Leave the saw behind if it gets pinched in the back cut.
- ∞ Many serious injuries have resulted from crew members standing too close to the tree

as it falls. It is imperative that all spotters and crew members are located at safe distance from the tree.

Step 5—The Danger Zone

Once an escape route has been established, but before any notch cuts are started by the sawyer, the crew leader and sawyer must visually inspect the felling area to make certain that all crew members are well out of the danger zone—the area equal to 1.0 times the height of the tree, extending outward from the base of the tree in all directions, covering a complete 360-degree circle around the tree as shown below.



- ∞ **Danger zone:** 1.0 times the height of the tree
- ∞ **Rope-pulling zone:** 1.5 times the height of the tree
- ∞ **Watch zone:** 2 times the height of the tree

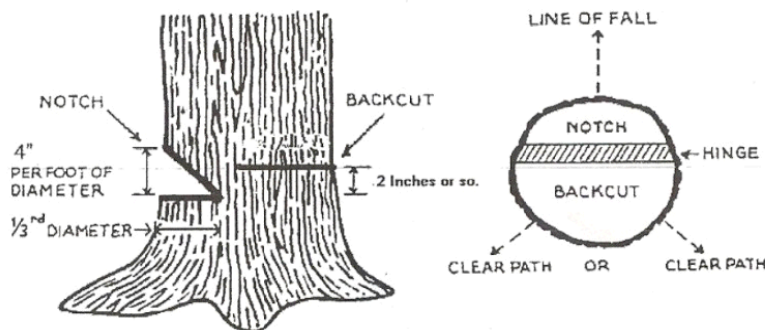
Rope used to pull the tree in the direction of fall must be pulled at a distance of 1.5 times the height of the tree. Guide ropes can be used to prevent the tree from falling in the wrong direction. Crew members handling ropes must fully extend the rope and position themselves at the end of the

rope well out of the danger zone until the felling is completed by the sawyer and the tree is on the ground. All other crew members and onlookers must be kept clear of the operation at a distance of at least 2 times the height of the tree.

Note: All trees with 5-inch diameter breast height or larger must have a rope used to start the direction of fall.

Step 6—Notch and Back Cut

Placement of the notch and back cut is critical as these cuts determine the direction of fall. The two cuts used in making the notch are a horizontal cut reaching about one-third of the way into the tree and another cut positioned at a 45-degree angle that meets cleanly with the inside edge of the horizontal cut. This means that the height of the face of the notch should be equal to the depth of the notch.



The back cut must also be a horizontal cut that will run parallel to the horizontal cut of the notch. The back cut is made 1 to 2 inches above the horizontal notch cut. Always determine the approximate width of the hinge wood when making the back cut. A rule of thumb: 10 percent of tree diameter = hinge wood. **DO NOT** cut all the way through the notch.

During tree felling operations, the sawyer must:

- ∞ **Give an audible warning** to crew members before starting notch cuts, starting back cuts, and felling the tree.
- ∞ **Leave the saw** if it hampers an escape from the tree or gets pinched in the back cut.
- ∞ **Leave the stump area immediately** when the tree begins to fall. The sawyer continues to quickly move directly away from the tree along the designated escape route or other safe route until the tree has come to rest.

Required Personal Protective Equipment

- ∞ Hard hat
- ∞ Safety glasses
- ∞ Close-fitting but comfortable work shoes
- ∞ Sawyer chaps (for saw operators)
- ∞ Leather work gloves
- ∞ Leather work boots (steel toe preferred)
- ∞ Hearing protection

Safety Watch-Outs

- ∞ NEVER work alone.
- ∞ Make sure that all crew members have the appropriate personal protective equipment for their assignment.
- ∞ Ensure that all gear and equipment is operationally safe and functional.
- ∞ Establish a safe work plan.
- ∞ Supervise and communicate to crew members.
- ∞ Utilize ropes, cables, and pulleys at every opportunity.
- ∞ Establish escape routes.
- ∞ Always use spotters.
- ∞ Be mindful of the danger zone.
- ∞ Monitor everyone (including yourself) for fatigue.
- ∞ Communicate, communicate, communicate!

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