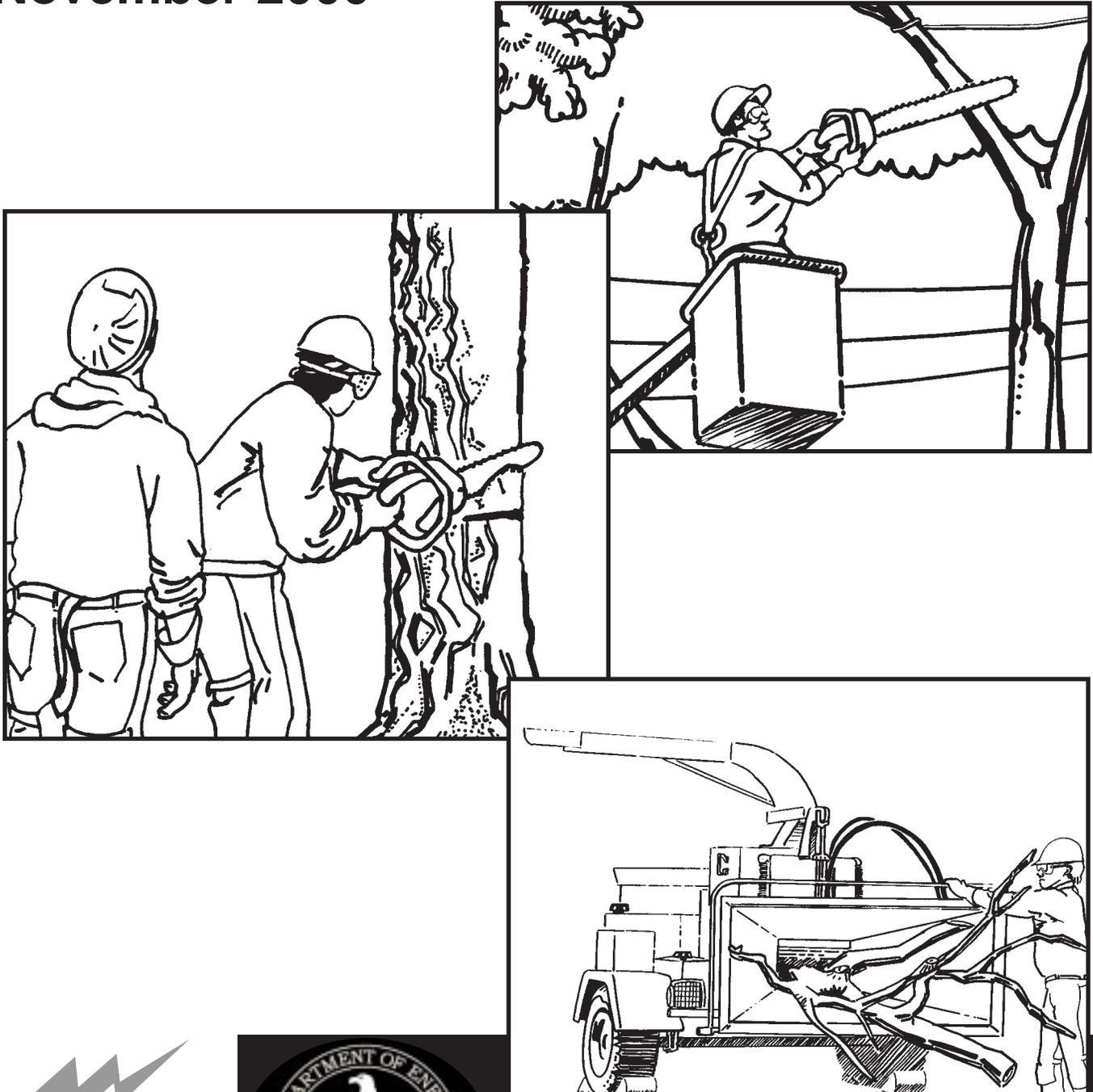


Chapter 11

Trimming & Felling of Trees & Brush Near Powerlines

November 2000



Power System Maintenance Manual

TRIMMING AND FELLING OF TREES AND BRUSH NEAR POWER LINES

NOVEMBER 2000

Western Area Power Administration

**Power System Maintenance Manual
Chapter 11**

Approved for Publication and Distribution

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November 2000

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Preface

This guide is issued by the Western Area Power Administration (Western) and is designed to provide specific guidelines, instructions, procedures, and criteria for performing trimming and felling of trees and brush near Western's power lines. Procedures and guidelines are in accordance with Western's Power System Safety Manual (PSSM). Corrections or comments concerning this guide may be addressed to:

Western Area Power Administration
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P.O. Box 281213
Lakewood, Colorado 80228-8213

PROPOSED REVISION TO PSMM, CHAPTER 11

Type of Suggested Revision: Addition, Deletion, Rewording, Other (Circle one)	PSMM, Chapter 11 Section Number: _____
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1. General

1.1 Purpose. The purpose of this chapter is to provide information on maintenance practices that are required when performing trimming and felling of trees and brush near power lines. Information on cutting practices, diagrams of recommended cutting procedures, and Western's policy on right-of-way management have also been included.

1.2 Definitions.

Back Cut - The last of the three cuts required to fell a tree. Located on the opposite side of the tree's intended falling path and minimally two inches above the face cuts. For an illustration, refer to cutting diagrams found in Appendix A.

Barber Chair - Vertical split of a tree during the felling procedure. Generally a result of improper undercutting or back cutting. Characterized by a portion of the fallen tree being left on the stump.

Danger Tree - A standing tree located within or adjacent to the easement or permit area that presents an immediate hazard to the facility or employees, due to conditions such as, but not limited to encroaching within the safe distance to the conductor (as a result of bending, growing, swinging, or falling toward the conductor), or deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree.

Dogs - Spikes located on the sides of the chain saw near the engine adjacent to the bar. Dogs are used to support the weight of the chain saw by digging them into the side of the tree stump while cutting into the tree.

Expert (tree feller) - A person with a high degree of skill and knowledge on trimming and felling of trees and brush, and is currently employed in the field of tree felling.

Face Cuts - The first two cuts required to fell a tree. Located on the same side of the tree's intended falling path and are roughly the depth of one third of the trunk's diameter. For an illustration, refer to cutting diagrams found in Appendix A.

Gunning Mark - A dark line located on the sides of the chain saw engine casing that runs perpendicular to the saw bar and is used as an aid in determining the falling path of the tree.

Hung Tree - A tree which is prevented from falling to the ground by leaning against, or becoming entangled with another tree or object.

Holding Wood - A section of wood that is located between the face cuts and the back cut which prevents the tree from prematurely slipping from the stump. The holding wood also helps direct where the tree will fall.

Kickback - A quick violent jerking motion of the chain saw resulting from the teeth of the saw catching (rather than cutting into) the tree or limb. Kickback may be caused by striking a limb with the tip of the moving chain, running the engine too slowly at the start or during the cut, a dull or loose chain, cutting above shoulder height, or a loose grip

1.3 Interpretations

May - permissive choice (“may” equals “is permitted”).

Shall or Must - Mandatory under normal conditions (“must” or “shall” equals “is required to”).

Will - Mandatory, but allowing the responsible employee or party some discretion as to when, where and how.

Should - Advisory. “Should” statements represent the best advise available at the time of printing (“should” equals “is recommended that”).

1.4 Job Planning.

Prior to performing the removal of trees or brush on rights-of-way, it is required that consideration be given to Safety and Environmental issues such as:

- Work planning will include reviews to ensure compliance with environmental laws, regulations and policies.
- A job hazard analysis (written or verbal depending on the size and complexity of the job) shall be performed at the work site before any tree cutting/trimming operation. The JHA is the responsibility of the foreman, supervisor, the acting or lineman in charge.
- A first-aid kit shall be located on each employee transport vehicle. The number of first-aid kits and the content of each kit shall reflect the degree of isolation, the number of employees, and the hazards reasonably anticipated at the work site.
- The proper equipment shall be available and shall be in top working condition.
- Personnel performing the work shall be trained and shall possess a certification.

2. Training Requirements

2.1 Instruction and Certification. Only certified personnel shall perform or supervise work involving tree trimming/felling activities. Certification shall ensure that an individual is not only knowledgeable in the contents of this chapter, but also competent in performing the work. Uncertified personnel may perform tree felling/trimming activities during certification training. Initial certification shall include hands-on competency testing under the direction of an expert in the field. Recertification is not a requirement.

Refresher training should be done at any time the employee or supervisor feels it is necessary, and as a minimum every four years.

An expert in the field shall be scheduled to perform tree felling and chain saw operations training for Western on an annual basis. The training should be rotated among regions. This would require that each region host the training on a four-year cycle. This will ensure that each region will have the opportunity to be trained at least once every four years. New employees that are not yet certified shall attend the training within their first year of employment by taking it at the region hosting it for that year.

3. Personal Protective Equipment

3.1 Required Safety Equipment - Ground. The following personal protective equipment is required for all tree felling operations (tree felling, limbing and bucking) while on the ground (i.e., not from inside a bucket truck, or flail mower):

- Full length chaps.
- Leather or ballistic gloves (nonslip grip preferred).
- Hard hat.
- Face shield or screen, or safety glasses.
- Hearing protection.
- Cut-resistant footwear meeting ASTM standard F1818.
- Protective-toed safety boots.

NOTE: Tripping hazards associated with all footwear shall be addresses in the JHA.

3.2 Required Safety Equipment - Aerial Devices. The following personal protective equipment is required for all tree trimming activities conducted from an aerial device:

- Leather or ballistic gloves (nonslip grip preferred).
- Hard hat.
- Face shield or screen, or safety glasses.
- Hearing protection.
- Proper fall protection equipment.
- Protective-toed safety boots.

4. Chain Saw Safety Features/Equipment

4.1 Required Features/Equipment. The following is a list of required chain saw features for all Western owned and maintained chain saws:

- Engine equipped with a spark arrester.
- Antivibration mounting.
- Gunning marks.
- Dogs (both sides if available).

4.2 Recommended Features/Equipment. The following is a list of recommended chain saw features and other equipment for all Western-owned and maintained chain saws:

- Wraparound handle bars when available.
- A semiskip chain on the saw, it has 30 percent fewer teeth. This makes cutting less fatiguing for the operator and lengthens the life of the saw.
- A saw with at least a 24" bar on hand for clearing branches. The longer bar permits clearing without squatting.
- Several small (5-6 inch) wedges on hand and one or two large (8-10 inch) wedges. Do not use wood or metallic wedges.
- Standardized bar nuts and bolts so that only one size wrench and one size replacement nut is needed.
- Standardized size of teeth on every chain so that only one size of file is needed for all chain saws.

5. Chain Saw Maintenance

5.1 Pre-Cutting Procedures. Prior to performing any chain saw operations the following should be taken into consideration:

- To assure that the gas and oil are mixed thoroughly, shake the fuel container.
- To reduce the chance of foreign material falling into the fuel tank during filling, brush wood chips and sawdust from clothing and wipe around the fuel cap, with a rag.
- Clean oil and fuel from the outer surfaces of the saw after refueling; make sure the handle is clean and dry before using the saw.
- Check chain tension and sharpness.
- It is recommended that only the amount of fuel to be used in one week be mixed.

5.2 Post-Cutting Procedures. Allow the saw to cool before returning it to the carrying case. If the saw is to be put away for more than one month, drain the fuel and oil. The fuel mixture will spoil after a few months of storage. After heavy use, thoroughly clean and service the chain saw prior to storage. Maintain correct chain tension and sharpen as necessary. A dull chain can heat up and break and is a safety hazard because it catches and jerks the saw.

6. Chain Saw Operations

6.1 Starting chain saws. The following are requirements prior to starting a chain saw at the work site:

- Wear required protective clothing.
- Study the owner's manual if necessary for details on saw settings for start-up. The manual will also have instructions for stabilizing the saw when pulling the starter cord.
- Move the saw at least 15 feet from the fueling location before starting the engine.
- Clear flammable materials away from the muffler before starting.
- Wrap your thumb under the handle, not over it, for proper grip to control kickback.
- Ensure you have control of the saw and that the bar tip cannot contact an object during starting.
- Start the saw as close to the work location as possible. Avoid walking with the saw when the engine is running. Carry the chain saw with the engine stopped, the guide bar to the rear, and muffler away from your body.
- Test the chain saw after starting by squeezing and releasing the throttle to ensure the chain stops when the throttle is released.

6.2 Tree Removal Criteria. Table 1 provides criteria for tree removal or trimming based on the distance from the nearest point on a tree to the conductor. If the distance is less than or equal to the distances specified for the voltage shown in Table 1, the tree must either be removed or trimmed. The Maintenance Managers have discretion in applying a more stringent criteria based upon tree problems, land ownership, terrain, and contract easement or permit rights to remove such trees. For the complete details of Western's policy, responsibilities and general guidance on right-of-way management for trees, encroachments and access routes, refer to WAPA Order 6460.1, found in appendix B.

6.3 Felling Trees. Perform a JHA prior to any cutting activities and have another person in a safe position at the worksite. Depending on the size and complexity of the job, the JHA may be verbal or written. Items listed below should be included in the JHA.

Pre-Felling Procedure

- Study the tree to be cut. Whenever possible, plan the face cuts (see Appendix A - Cutting Diagrams) so that the tree falls in the direction parallel to the transmission line.
- Determine the area that the tree will fall and walk the path if necessary to assure that the area is clear. Clean an area for the trees to fall into if necessary.

Transmission Line ROW Tree Removal Requirements	
Line Voltage	Minimum Distance Between Conductor and Trees
69-kV and below	15 feet
115-kV	15 feet 8 inches
138-kV	16 feet 4 inches
161-kV	16 feet 8 inches
230-kV	18 feet
345-kV	20 feet 4 inches
500-kV	24 feet

Table 1–Tree Removal Criteria

- Visualize the path that the tree will take as it falls and make sure that the tree will maintain proper clearance from energized equipment as it falls.
- Determine an escape route from the falling tree. Plan an escape route that is free of brush and other obstacles. Plan and if necessary, clear an escape path at a 45-degree angle from directly behind the tree’s direction of fall. If the tree slides off the stump during the fall, it may shoot backwards rapidly.

Felling Procedure/Precautions

- During sawing, focus your attention to the top of the tree for falling limbs and debris.
- Cut at high engine speeds.
- Be aware of the push and pull motions of the chain saw. Some woods are soft and the push and pull motions are not great, but hard woods, knots, metal objects, and hardened sap can catch the chain resulting in strong push and pull motions. Proceed with caution with a firm grip on the handle with thumb wrapped underneath.

Post-Felling Procedure

- Leave the saw at the site, do not run with the saw.
- Do not leave tree stumps over eight inches high that may cause damage to vehicles or other equipment.

Special Precautions

- The chain saw shall not be used to cut directly overhead. Good control of the saw cannot be maintained, and there is no protection of the upper torso in the event of a kickback. Cutting above head height is permissible if it is to remove a limb that is not located directly overhead and the procedure can be done safely.
- Dead and dying trees should be felled first. Treat these trees with caution since vibration from the saw or movement from the wind can cause the tree to come crashing down or loosen dead limbs above your head. Sound the tree with an ax to determine the extent of decay. It may take several seconds for the vibration to reach the top and return so watch aloft for falling limbs and debris.
- Cut only when you have a clear working area (small brush and saplings can get caught in the chain), secure footing, and a planned escape path from the falling tree.
- The face cut diagrams in Appendix A depict several cuts that can be used to fell trees. Training and hands-on experience are needed to perform these cuts safely. Do not attempt to fell a tree if you feel it cannot be accomplished safely.
- As an added precaution to prevent a tree from splitting apart while cutting (barber-chairing), a log chain wrapped around the tree and locked with a chain hook back into itself over a five foot section above the face cut may be used in conjunction with all other proper tree cutting procedures.

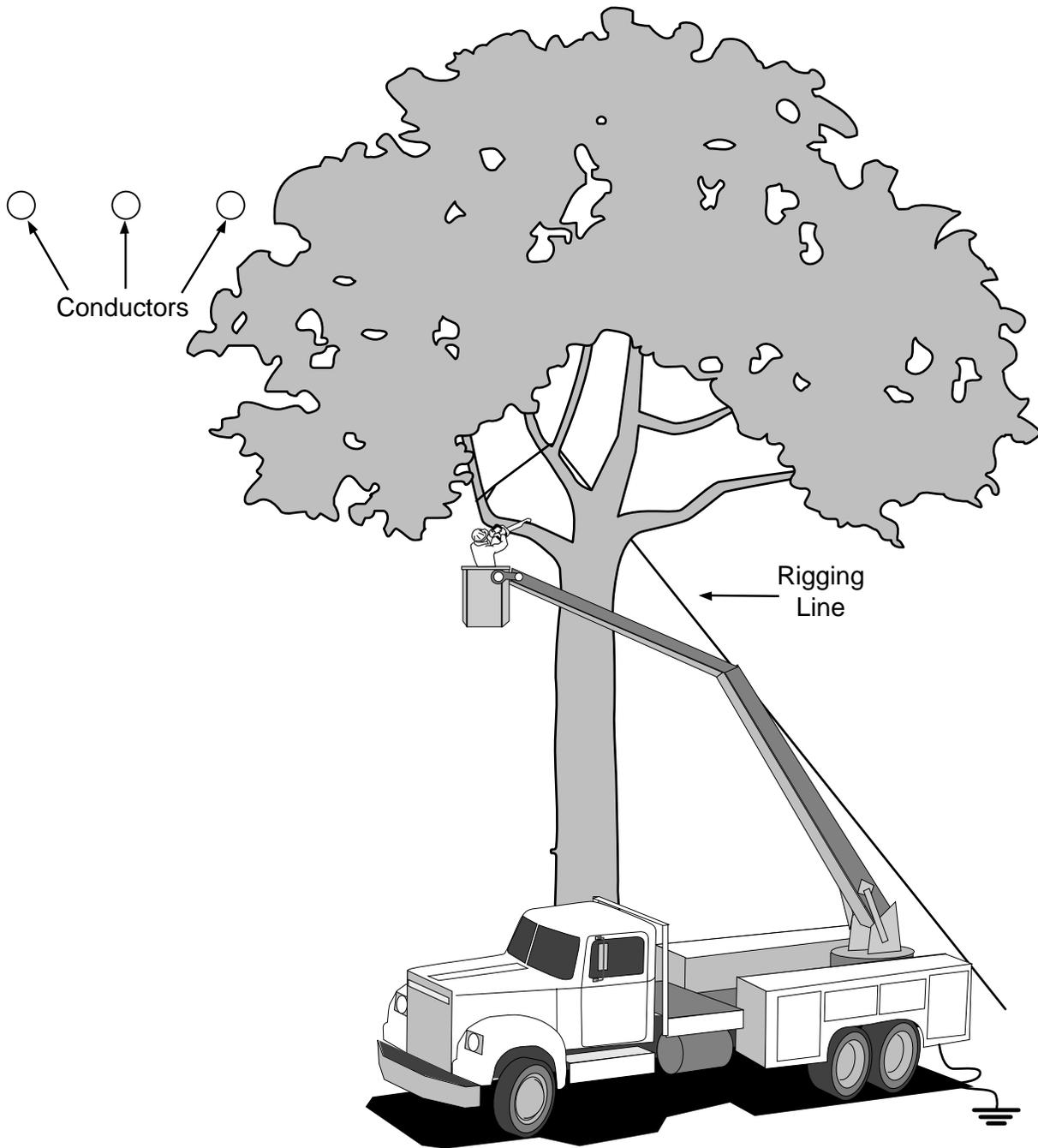


Figure 1. Example of Rigging a Tree Branch Prior to Removal

6.3.1 Wedges. Wedges are used to prevent pressure on a chain-saw blade or start the fall of a tree. In applicable situations, drive a wedge in the same direction as the intended fall as shown in figure A1, towards the center of the tree, into the back cut, behind the bar as soon as there is room. Multiple wedges can be used to guide the tree. If needed, this may be done in stages. Cut part way into the tree and then tap on the wedge using the back of an ax; then cut farther and drive the wedge a little farther. This will help keep pressure off the bar of the saw as the tree settles. If the bar is stuck, trying to pull the saw from the stump is bad for the saw and may be unsafe. Therefore, as soon as the tree sits back on the bar, the cutter must reevaluate the situation, anticipate what possible reaction to expect and if necessary, prepare an alternate escape path. If possible, drive a wedge into the cut, behind the bar, to release the pressure on the saw. Watch the tree closely and be prepared for it to fall. If the tree

begins to fall, leave the saw and leave the site by following the appropriate escape path.

6.3.2 Electrical Hazards. When removing branches or trees that are violating minimum approach distances specified in the PSSM and PSMM, a clearance is required and personal grounds attached. If trees have the potential to violate the minimum approach distances, a clearance with grounds attached shall be taken or a written JHA shall be done defining alternate methods to cut the tree.

6.3.3 Multiple Tree Felling In An Area. If several craftsmen are cutting at the same time, allow at least two tree lengths of clearance between cutting sites. Study the entire cutting area to assure that the paths of the falling trees do not intersect nor the escape paths do not intersect the path of the falling trees. Shouting as a tree is falling is a good way to alert others, but it is not sufficient warning for other workers since they will be wearing hearing protection and will not hear the warning call. Check the path of the tree before making the final back cut to assure that other craftsmen are out of the path of the falling tree. No one should enter the cutting area until they have been acknowledged and been given permission to enter by the cutter.

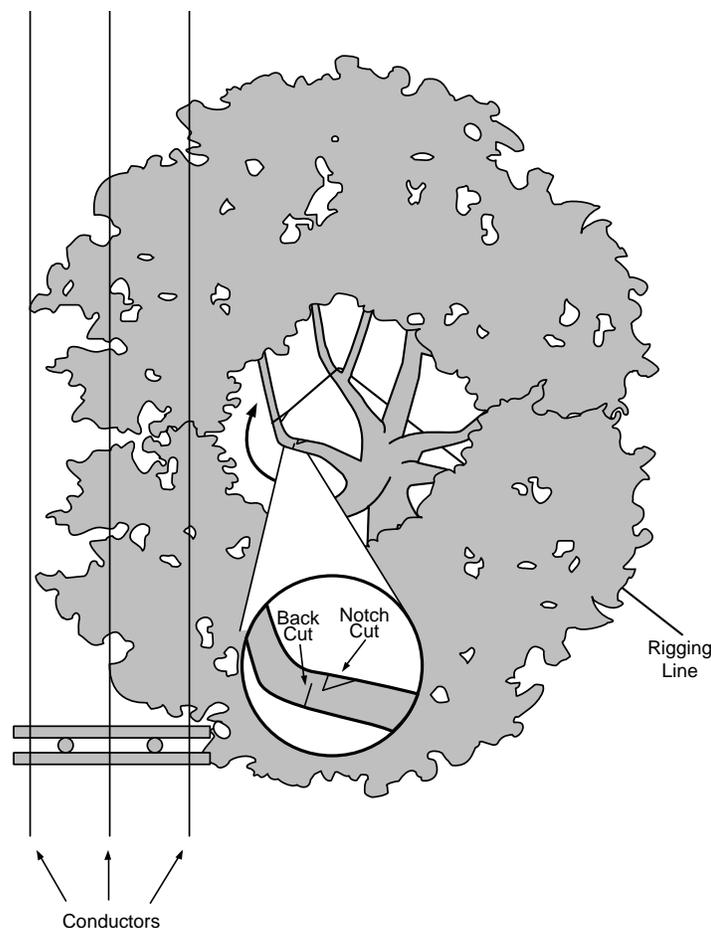


Figure 2. Basic Hinge Cut

6.3.4 Hung-Trees. If a tree hangs up on another, do not attempt to dislodge the tree until you have consulted with the other members of the cutting crew and determined the best method to free it. Leave the tree if a safe method to remove the tree cannot be determined. If a hung tree must be left, barricade the area so that workers and other people cannot get into the felling area. Wind can knock the hung tree loose after the crew has left the site. Attempting to cut down the tree that is holding up the leaning

tree is prohibited. Using a winch line or a long rope and a vehicle or other methods to pull the first tree off the second allows workers to be out of the path of the tree when it falls. Use the rope or winch method only if the rope can be attached to the tree safely.

6.3.5 Rigging Trees. Never use rigging as a substitute for wedging. Continuous communication must be maintained between the tree feller and the operator of the winch line. The following special precautions apply to rigging trees for felling:

- Keep slight tension on the rigging line while the back cut is being made. If the tree is still standing after the back cut is made, add tension on the line and tighten the wedges. This procedure is repeated until the tree falls.
- Rigging lines shall be of sufficient length to prevent the tree from falling on equipment.
- A ladder or aerial device should be used to attach rigging to the tree.

6.4 Tree Climbing. The practice of climbing trees shall only be performed by qualified climbers for the purpose of attaching the proper rigging for tree felling operations. The employee shall be attached at the work location. The attachment point shall be to the main trunk of the tree. Under no circumstances shall an employee be permitted to climb a tree for the purpose of topping or trimming. If a situation exists where a tree must be topped or trimmed, and accessing the cutting area of the tree cannot be accomplished through an aerial device, either a variance must be obtained, or the job must be contracted out. The following rules apply to climbing trees:

- Proper tree climbing equipment (tree climbing gaffs) must be used for tree climbing procedures.
- Attachment is optional when the employee is ascending/descending the tree.

6.5 Tree Trimming from an Aerial Device. Western's policy states that all tree trimming activities performed aloft, will be performed from aerial devices as opposed to climbing the tree or a transmission line structure to access branches to be removed. If a situation exists where a tree must be topped or trimmed, and accessing the cutting area of the tree cannot be accomplished through an aerial device, either a variance must be obtained, or the job must be contracted out.

Safety precautions that shall be adhered to when using chain saws from an aerial device include the following:

- Be aware of slipping hazards while operating chain saws inside a bucket.
- chain saws shall be started on the outside of fiberglass buckets.
- Where electrical hazards exist (determined by a JHA), only insulated aerial devices may be used to perform tree trimming activities.
- The chain saw shall not be used to cut directly overhead. Good control of the saw cannot be maintained, and there is no protection for the upper torso in the event of a kickback.

6.5.1 Electrical Hazards. When removing trees or tree limbs that are violating or have the potential to violate the minimum approach distances specified in the PSSM, if the limb were to fall directly toward the line, or sway within the MAD due to wind, a clearance on the line must be taken. In addition to receiving a clearance, personal protective grounds shall be installed if the limb has any potential of coming any closer to the line once it is cut.

6.5.2 Hydraulic Tree Trimming Tools. When performing work involving the use of hydraulic tree trimming tools, the following shall be adhered to:

- Insulated hydraulic tools shall not be used as a means to mitigate the electrical hazards associated with tree trimming near transmission lines.

- Hydraulic driven tools connected to dielectric oil systems shall be maintained as part of that system and are not to be used on non-dielectric oil systems. This is to prevent hydraulic oil cross-contamination.

6.5.3 Branch Control. JHA's for tree trimming (branch removal activities) from a bucket shall include consideration of the branch's size in light of the dangers involved in not being able to control the branch and the absence of an escape route. A method used to control the horizontal direction a branch falls is by performing a hinge cut. A hinge cut is very similar to performing a tree felling cut since three cuts are made and the direction the branch swings as it begins to fall is determined by the location of the three cuts. Although performing a hinge cut aids in directing the fall of a cut branch it should not be totally relied upon for critical cuts; proper rigging should also be used to "guarantee" the direction of fall for that branch. Figure 2 depicts a basic hinge cut along with the proper rigging necessary to direct the fall of the branch. The notch cuts, two total, are made first followed by the back cut which severs the limb.

Another method of branch control is the control cut method. The worker(s) will cut one to three foot sections at the end of a limb. The size of the section being cut will be whatever can safely fall freely or be handled safely by the second person aloft that is not operating the saw or pruner. The cut sections shall be tossed, lowered, or allowed to fall freely to the ground after assuring personnel are clear from the path of the falling limb.

6.6 Limbing and Bucking. Study how the trunk section will roll as the limbs are removed from it and position yourself to avoid the path of the trunk. Cut the tree into small enough pieces to prevent back injuries when carrying the pieces to the chipper or trailer.

7. Chipper Operations

7.1 Personal Protective Equipment. All workers feeding brush into chippers shall wear the following personal protective equipment:

- Hearing protection
- Eye protection
- Gloves
- Hard hat
- Foot protection

Operators shall not wear loose clothing or gauntlet-type gloves while feeding the chipper.

7.2 Operating Requirements. Brush chippers shall be fed from the side of the feed table centerline, and the operator shall immediately turn away from the feed table when the brush is taken into the rotor or feed rollers. Chippers should be fed from the curbside whenever practical. Foreign material such as stones, nails, sweepings, etc., shall not be fed into the chipper. The chipper chute shall not be raised or removed while any part of the machine is turning or moving. The chipper shall not be used unless a discharge chute is of sufficient length or design to prevent contact with the blade in place.

The ignition system on brush chippers shall be equipped with an appropriate locking device in accordance with OSHA CFR 29, 1910.269.

8. References

- Chain saw Savvy - A Complete Guide, Neil Soderstrom, Morgan and Morgan, 1982.
- Line Clearing Manual for Overhead Conductors, Nebraska Public Power District.
- Professional Timber Falling - A Procedural Approach, D. Douglas Dent, 1974.
- American National Standards Institute (ANSI) Z133.1, Tree Care Operations.
- Occupational Safety and Health Administration (OSHA) CFR 29, 1910.266, Logging Operations.
- Occupational Safety and Health Administration (OSHA) CFR 29, 1910.269, Electric Power Generation, Transmission & Distribution.

Appendix A Cutting Diagrams

A.1 Traditional Face Cut. Face cuts meet at about one-third of the trunk diameter and form at least a 45-degree angle. The backcut is horizontal and about 2 inches higher than the intersection of the face cuts. Do not cut through the tree. Allow the remaining holding wood to act as a hinge to help prevent the tree from twisting or jumping off the trunk as it falls. The procedure, shown in figure A1, is as follows:

- The lower face cut (1) is made first, gunning your saw in the direction that you want the tree to fall.
- The upper face cut (2) is made second, making sure that the corners meet (are matched up), and that your opening is clear of any debris.
- The backcut (3) is made last, installing wedges as soon as there is room (with the saw in the tree)

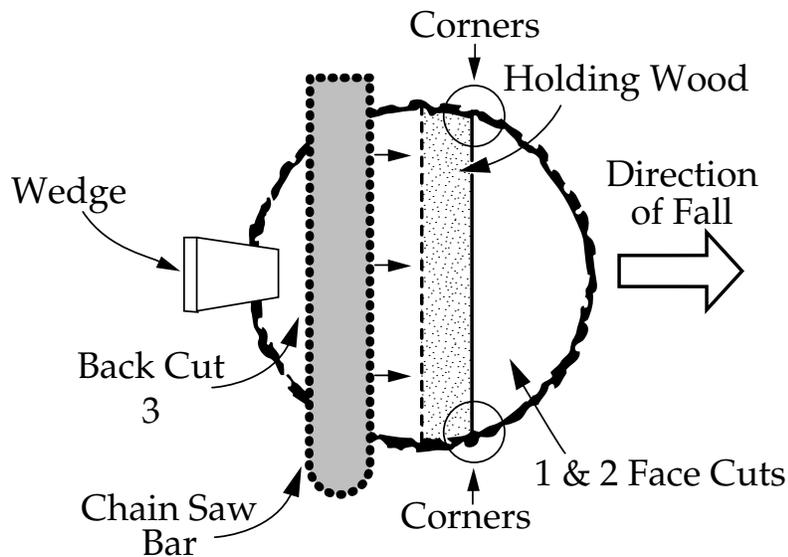
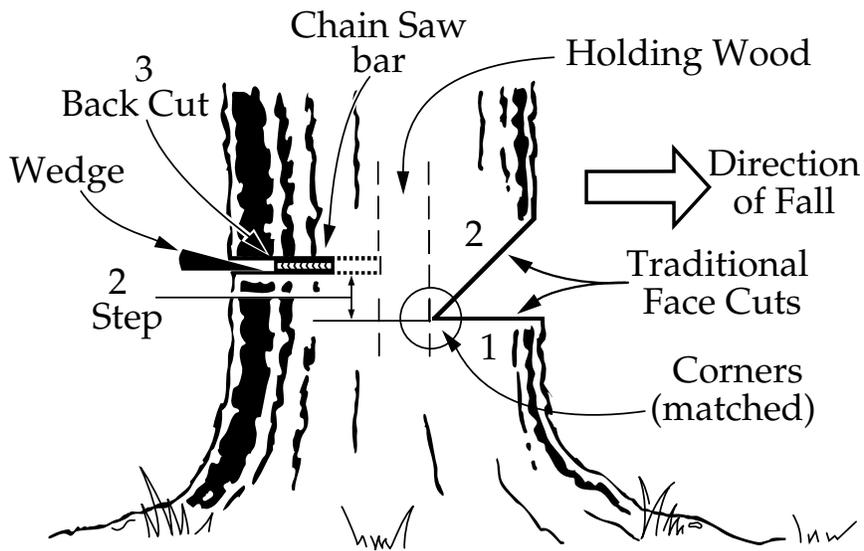


FIGURE A1. Traditional Face Cut Diagrams

A.2 Corner-Wedging Technique. The only difference in procedure between the corner wedging technique and the traditional face cut technique is when making the back corner cut and inserting the corner wedge. When applying the corner wedging technique, the “corner wedge” is used for stabilizing the tree and keeping the tree from setting on the tip of the saw bar. All other cutting procedures are the same as shown in figure A2:

- The lower face cut (1) is made first, gunning your saw in the direction that you want the tree to fall.
- The upper face cut (2) is made second, making sure that the corners meet (are matched up), and that your opening is clear of any debris.
- Bore in to make your corner cut (3) third, and install the corner wedge (4) such that it points parallel with the undercut.
- The backcut (5) is made last, installing wedges as soon as there is room (with the saw in the tree).

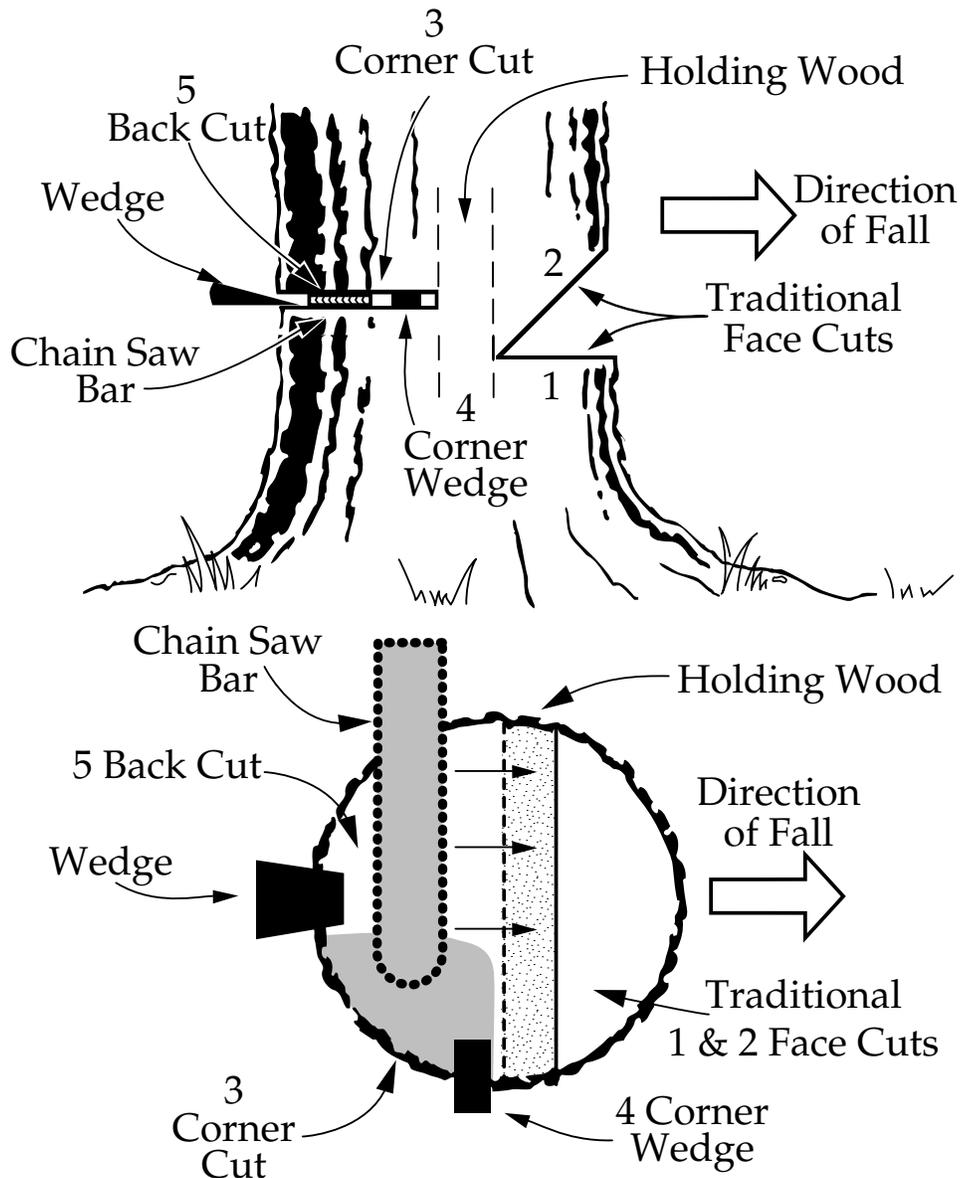


FIGURE A2. Corner-Wedging Technique Diagrams

A.3 Humboldt Face Cut. This cut is especially useful when felling a tree uphill. This cut helps prevent the butt from jumping backward off the stump. The upper face cut (1) is made first, the lower face cut (2) second, and the backcut (3) last, as shown in figure A3. The Humboldt face cut was developed to save usable wood by making the angled cut underneath.

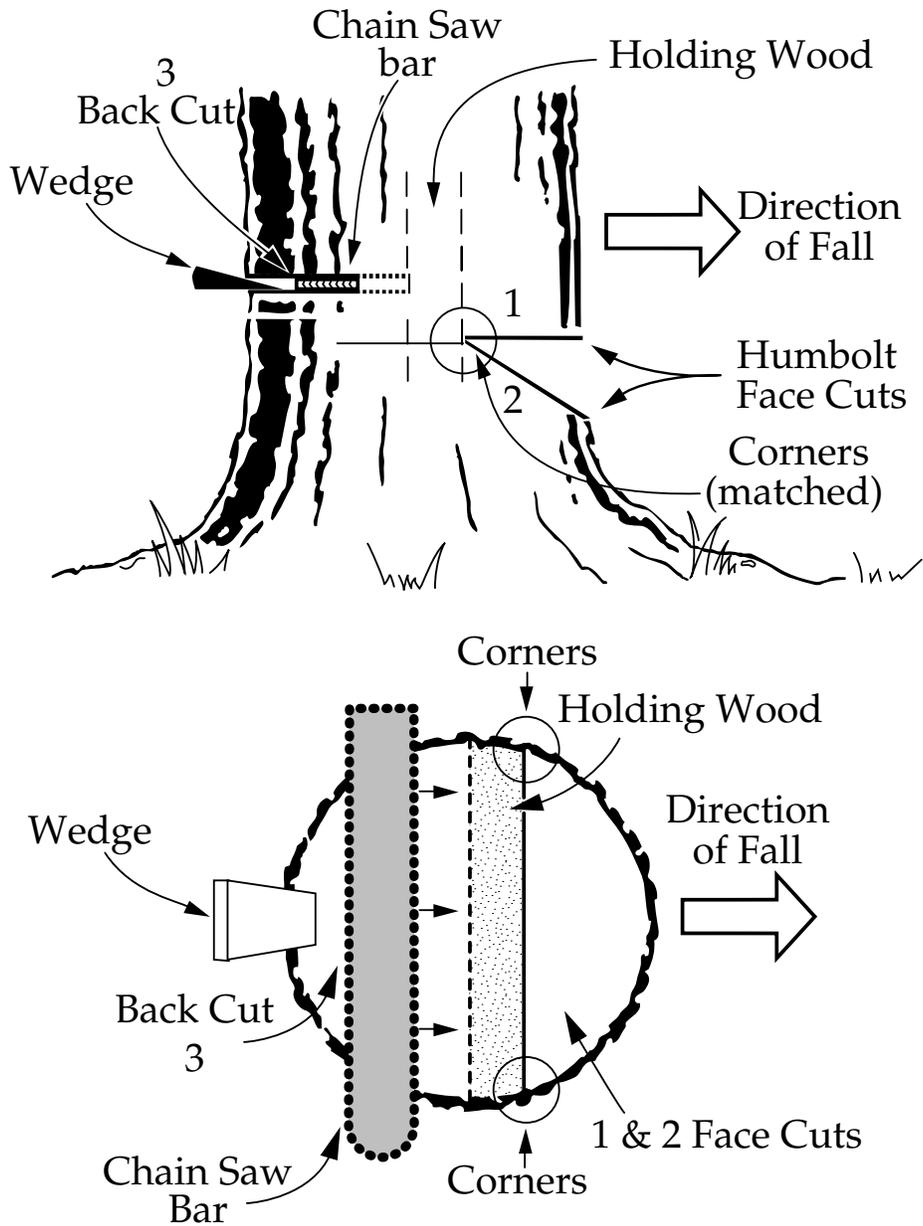


FIGURE A3. Humboldt Face Cut Diagrams

A.4 Side Boring Back-Cut. Trees that lean over two feet in the direction of intended fall present barber chairing, root pulling, or slabbing dangers, if cut by traditional or Humboldt methods. One method of dealing with this problem is to perform the side boring back cut.

- The proper face cuts are made first as in A.1.
- Bore in at 3 and cut through the tree leaving a section of holding wood two inches above and behind the face cut as shown in figure A.4.
- Cut in the direction shown through to the back of the tree.

When boring into the tree, be alert for kickbacks until the saw tip is safely embedded in the trunk. Insure the boring cut has reached across the stump. If it doesn't, make a second boring cut from the opposite side.

NOTE: The presence of rotten wood in the trunk requires rethinking, particularly if it is in the holding and back holding wood. Be prepared to leave the site along the escape path should the bar of the saw get stuck and/or the tree start to fall.

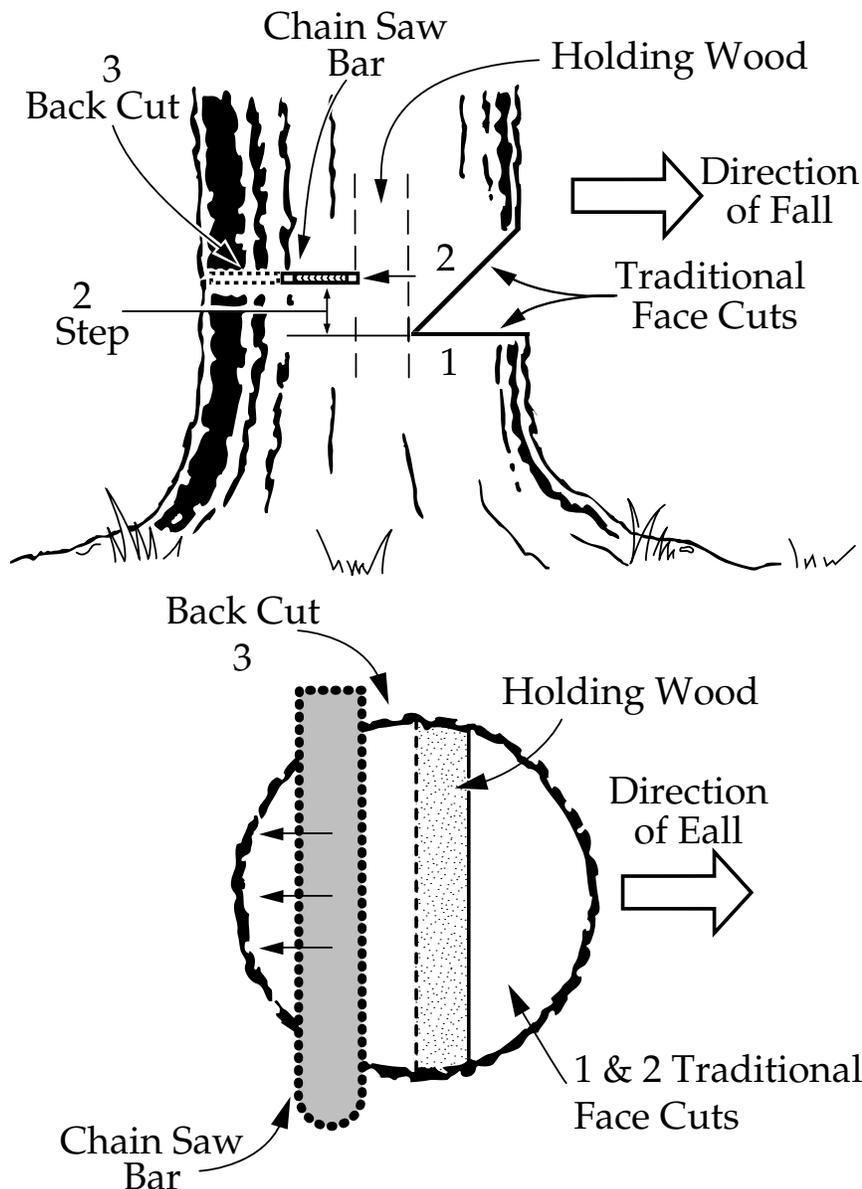


FIGURE A4. Side Boring Back-Cut Diagrams

A.5 Scandinavian Face Cut. The Scandinavian face cuts are made at 90-degree angles (as shown in figure A.5), so that the faces do not close until the tree hits the ground. The butt remains attached throughout the fall. The face cuts are shallower than in the Traditional cut. This allows the sapwood to be the holding wood instead of the heartwood as in the other cuts, providing better control as the tree falls. The disadvantage of this cut is that the holding wood may remain intact after the tree has fallen. At this point, the holding wood may be under severe pressure posing a hazard when it is cut. The tree may fly away from the stump unpredictably when the holding wood is released. Use extreme caution. This cut is not suitable for large trees.

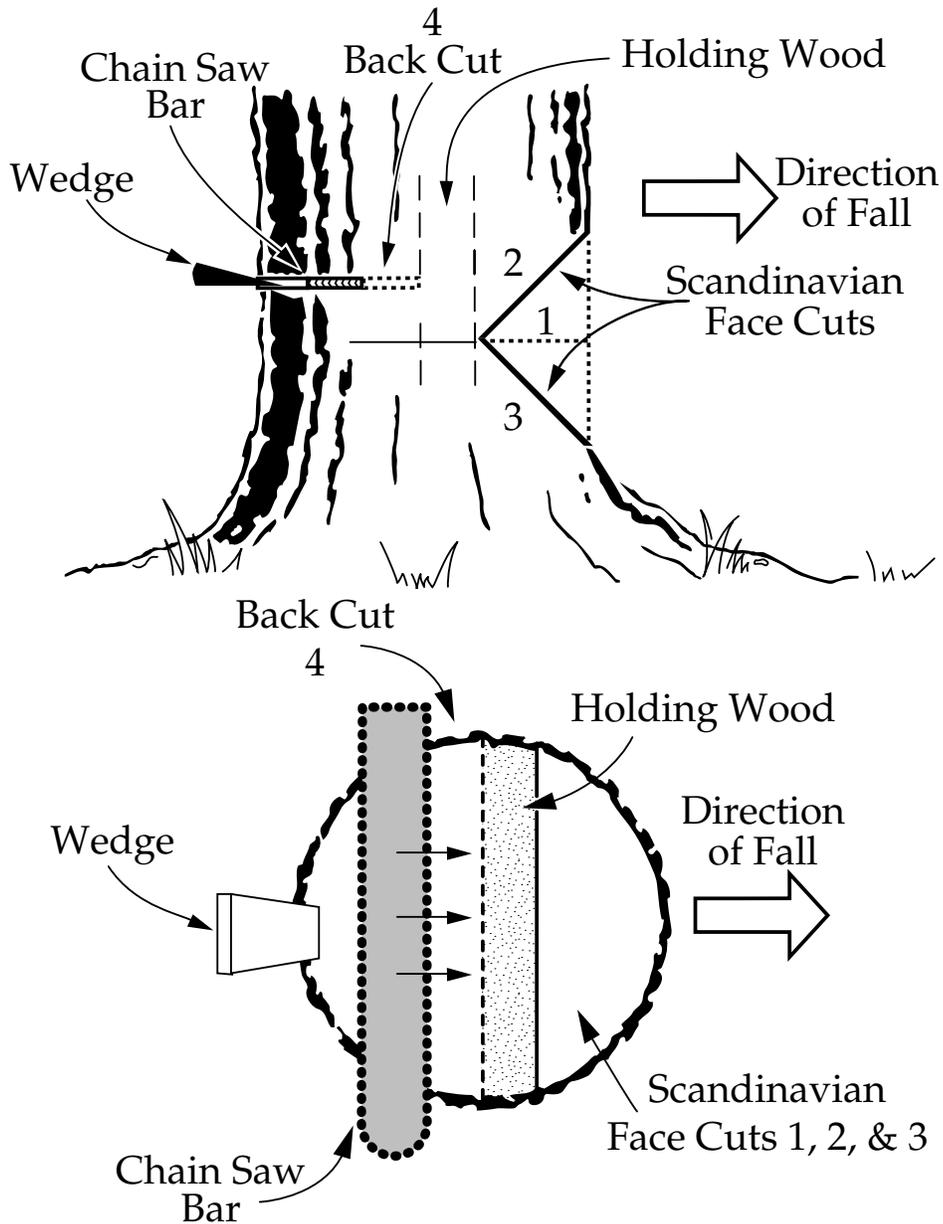


FIGURE A5. Scandinavian Face Cut Diagrams

U.S. Department of Energy

ORDER



WAPA 6460.1

03-01-95

SUBJECT: RIGHT-OF-WAY MANAGEMENT GUIDANCE FOR DANGER TREES,
ENCROACHMENTS, AND ACCESS ROUTES

1. PURPOSE. This Order delegates and clarifies responsibilities to the Maintenance Managers and establishes guidance and organizational support for the maintenance and safe operation of Western Area Power Administration (WAPA) rights-of-way (ROW).
2. SCOPE. The provisions of this Order apply to all organizational elements of WAPA.
3. REFERENCES. See Attachment 1.
4. DEFINITIONS.
 - a. Danger Trees. Trees located within or adjacent to the easement or permit area that present an immediate hazard to the facility or have the potential to encroach within the safe distance to the conductor as a result of bending, growing, swinging, or falling toward the conductor.
 - b. Emergency Situations. An emergency situation occurs when there is not time to notify a landowner or Government entity prior to removing a danger tree and the tree poses an immediate danger to WAPA's facility as well as the welfare of the public and WAPA's maintenance personnel.
 - c. Encroachments. Encroachments are those uses or developments that occur within the transmission line easement or permit area that impair WAPA's rights to operate and maintain the facilities or present a safety hazard. Examples of potential encroachments are houses, businesses, signs, light structures, outbuildings, landfills, roadways, etc.
 - d. Maintenance Manager. The individual located in the Area or District Office who is accountable for managing maintenance and/or operations functions. For example, in the Loveland Area Office this would be the Assistant Area Manager for Maintenance; in the Huron District Office this would be the District Manager.
 - e. WAPA Authorized Representative. The WAPA field representative in the Area or District who has the authority to take a maintenance action. (This will be the Area Manager or his designee.)

DISTRIBUTION:
All Supervisors - WAPA-Wide

INITIATED BY:
Division of Lands and
Division of Power System
Maintenance

03-01-95

5. **POLICY.** The Maintenance Managers have the authority and responsibility for maintenance of WAPA's transmission line easement and permit areas in a manner to ensure the safe and reliable operations of the line, as well as to protect the environment, the well-being of the public, and WAPA's maintenance personnel. This responsibility includes the routine maintenance of access routes; vegetation management, especially danger trees; identification of potential encroachments; and positive landowner relations. Area Realty Officers, Area Environmental Managers, Area Safety Managers, and, when necessary, the Headquarters Office of General Counsel and Division of Lands will provide support to Maintenance Managers. Through this program, it will be WAPA's long-term goal to significantly reduce, if not eliminate, tree cutting and trimming activities.
6. **BACKGROUND.** WAPA's easements are acquired across private land while permits are generally associated with ROWs across Federal lands. WAPA's rights to maintain vegetation, including danger trees, to challenge a use that is considered to impair or encroach upon WAPA's rights, and to access the transmission line are dictated by the language in contract easements across private land and in terms and conditions specified in Federal ROW permits.
 - a. **Private Land.** Generally, the easement contract language provides for the perpetual right to access, construct, operate, and maintain the transmission line facility in a manner that ensures safe operation and system integrity.
 - (1) **Vegetation Management and Control.** Responsibility for these functions are often WAPA's and may, based upon the terms of the easement contract, require compensation to the landowner for damages to crops or trees. Contract language may also specify that "orchards" are allowed under the conductor. Contracts are generally reviewed by the Area Realty Officers to determine the extent of WAPA's right to maintain or clear vegetation, including removal of danger trees.
 - (2) **Landowner's Use of the Easement Area.** Easement contracts specify WAPA's rights to operate and maintain the transmission line facilities, often including the right of access. Where landowners have added uses or developments in the easement area, the Maintenance Managers must determine, through the review of the easement contract, whether the use or development must be removed or mitigated to protect WAPA's rights.
 - (3) **General Access Rights Language.** Language defining WAPA's access rights is usually provided in the easement contract. To ensure that open and safe access is available across private land, the easement contract must be thoroughly researched and verified to identify access routes and any restrictions that regulate their use.
 - b. **Government Land.** ROW permits are usually issued for a specific term and specify stipulations or conditions associated with vegetation management, compatible land uses, and access rights.

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- (1) Vegetation Management and Control. Responsibility for these functions are WAPA's, but are restricted based upon land and resource plans that dictate tree removal or trimming criteria within and adjacent to the ROW area.
- (2) ROW Use and Development. Uses or developments within WAPA's ROW are authorized by the government entity managing the land and are usually reviewed and concurred upon by a WAPA authorized representative prior to the use being allowed.
- (3) Access Routes. Access routes are normally authorized by separate permits or agreements and contain specific terms and conditions that may restrict the season of use and rights for upgrading of the authorized access routes. Federal land agencies often times restrict access during specific seasons of the year to limit or control WAPA's access as well as public access.

7. RESPONSIBILITIES.

- a. Area Managers. Provide oversight of the ROW maintenance program in their respective Areas.
- b. Area Office Maintenance Managers. Develop long-term strategies and programs, in coordination with Area safety, environmental, and realty personnel, to resolve danger tree, vegetation, encroachment, and access problems in and along WAPA's transmission line easements and ROW permit areas.
- c. Area Safety Managers. Support the Maintenance Managers in providing interpretation of Occupational Safety and Health Administration guidance for resolution of danger tree problems around energized conductors as well as ensuring the Area ROW program meets WAPA's safety goals and objectives.
- d. Area Office Environmental Managers. Support the Maintenance Managers in ensuring that maintenance activities employed to resolve danger tree, vegetation, encroachment, and access problems are in compliance with environmental laws and regulations.
- e. Area Realty Officers. Support the Maintenance Managers in the identification and resolution of danger tree, vegetation, encroachment, public relations, and access problems. The Area Realty Officers also provide coordination in working with the landowners and have the responsibility of identifying land rights, including vegetation control rights.
- f. General Counsel. Provides legal advice, counsel, and representation in the pursuit of available legal remedies in the resolution of danger tree, vegetation, encroachment, and access problems.
- g. Headquarters Director, Division of Lands. Provides real property acquisition support and realty advice to the Maintenance Managers and Area Realty Officers in resolving danger tree, vegetation, encroachment, and access problems.

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8. **GENERAL GUIDANCE.** As a component of each Area Office's routine maintenance activities, each Maintenance Manager will develop a ROW management program, including performance measures, for his area of responsibility and will coordinate its development and implementation with Area safety, environmental, and realty personnel as well as Headquarters Division of Lands and Office of General Counsel, when necessary. For the purpose of this guidance, vegetation management and control shall pertain to danger trees. This program will include a long-term strategy to inventory WAPA's rights as they pertain to danger trees, restrictions to use and developments, and access. The program will identify potential problem areas or situations to be resolved and the resolution process.
- a. **Danger Tree Management.** It shall be the responsibility of the Area Realty Officers to inventory the vegetation management rights, including any compensation rights to landowners, on a transmission line project on an as-needed basis. The following guidance is provided for tree management practices within and adjacent to easement areas as they pertain to private land and ROW permit areas as they pertain to Government land. Prior to danger tree removal, efforts will be made to notify landowners through coordination with the Area Realty Officers. Such notifications or attempts to notify landowners shall be documented.
- (1) **Easements on Private Land.**
- (a) Where provided in the easement contract, the Maintenance Managers may remove all danger trees within and adjacent to the easement that present an existing or potential hazard to the facility and/or human life.
- (b) Compensation shall be paid to the landowner when specifically addressed in the easement contract; otherwise, the Maintenance Managers have discretion in mitigating the removal of trees, including reasonable compensation to the landowner and/or the planting of low growing vegetation suitable in meeting environmental requirements.
- (c) Where the easement contract does not provide for the rights to remove danger trees in or adjacent to the easement area, the Maintenance Managers have discretion in removing such trees after notification to the landowner and negotiating any damages with the landowner. Headquarters Office of General Counsel and Division of Lands will provide assistance and consultation to support the Maintenance Managers and support the future expansion of easement rights to include tree removal.
- (d) Where easement contracts specify that trees may only be topped or trimmed within the easement area, the Headquarters Division of Lands will support the Maintenance Manager in obtaining modifications to the contract to allow tree removal, where necessary.

(2) ROW Permits on Government Land.

- (a) Where provided in the ROW permit, the Maintenance Managers may remove danger trees within the permit areas.
- (b) Where land use plans or permit terms dictate that trees may only be topped within the permit areas, the Headquarters Division of Lands will support the Maintenance Manager in obtaining modifications to the ROW permit to allow tree removal, where necessary.
- (c) Where the ROW permit does not provide for the removal of danger trees in or adjacent to the ROW, the Maintenance Managers have discretion in removing such trees after notification to the Federal land managers. Headquarters Division of Lands will provide support to the Maintenance Managers to expand ROW rights to include tree removal.

- (3) Tree Removal Criteria. The following table provides criteria for tree removal or trimming when the clear distance from the nearest point on a tree to the conductor is less than the distances specified for the voltage shown. The distances shown in the table were taken from the Power System Safety Manual 1994, Appendix B, Table B-1 and increased by 5 feet to allow for tree growth. The Maintenance Managers have discretion in applying a more stringent criteria based upon the danger tree problems, landownership, terrain, and contract easement or permit rights to remove such trees.

TRANSMISSION LINE ROW DANGER TREE REMOVAL REQUIREMENTS	
Line Voltage	Minimum Clearance Between Conductor and Danger Trees
69-kV	15 feet
115-kV	15 feet 8 inches
138-kV	16 feet 4 inches
161-kV	16 feet 8 inches
230-kV	18 feet
345-kV	20 feet 4 inches
500-kV	24 feet

- (4) Customer Focus. It is WAPA's policy that landowners are our customers. Maintenance Managers have the responsibility to ensure early notification to the private landowner or government entity prior to the removal activity within or adjacent to easement or permit areas. Where emergency removal of danger trees is necessary within or adjacent to the easement or permit areas and prior notice was not possible, the Maintenance Manager is responsible for initiating or coordinating notification after the fact. The Area Realty Officers will provide support in mitigating such actions.

b. Encroachments.

- (1) The Maintenance Managers shall be accountable for identifying potential encroachments. The Area Realty Officer is accountable for verification and resolution. Where encroachments are found to be compatible with WAPA's rights, a license will be issued by the WAPA authorized representative. Where the encroachment is found to be incompatible, the Realty Officer shall coordinate the removal or mitigate the use or development. The Area Realty Officer may consult or ask assistance from the Headquarters Division of Lands and Office of General Counsel in those cases involving complex legal issues and landowner investments.
- (2) For situations where uses or developments are located within ROW permit areas on Government land that appear to impair WAPA's rights to operate and maintain its facilities, the Area Realty Officer will be responsible for contacting the government entity and resolving the problem. If necessary, the Area Realty Officer may consult with or ask assistance from the Headquarters Division of Lands and Office of General Counsel.

c. Access Routes.

- (1) To ensure safe, reliable access to WAPA's facilities for maintenance purposes, it shall be the responsibility of the Maintenance Managers to identify and locate access routes in support of facility maintenance programs across private and Government land, where necessary. Maintenance Managers have the discretion to reopen blocked access routes where WAPA's right of access is being impeded. Area Realty Officers will be responsible to respond to the Maintenance Managers when requested to coordinate the reopening of such routes with the landowners and/or Government agency and will be supported by the Headquarters Division of Lands and Office of General Counsel, when necessary.
- (2) Where new access is needed across private land, the Area Realty Officer must consult with the Area Environmental Manager and the Headquarters Division of Lands to develop an acquisition plan to obtain access easements. Where access is needed across Government land, the Area Realty Officer shall perform the same coordination as for private land except that WAPA will obtain ROW permit amendments. In either case, WAPA will strive to obtain access routes with the fewest restrictions as to season of use or impacts to resources.

/s/ signed by J. M. Shafer

J. M. Shafer
Administrator

REFERENCES

1. DOE 4300.1C, REAL PROPERTY MANAGEMENT, of 06-28-92, which establishes Department of Energy policies and procedures for the acquisition, use, inventory, and disposal of real property or interests therein.
2. WAPA 5400.1A, ENVIRONMENTAL CONSIDERATIONS IN THE PLANNING, DESIGN, CONSTRUCTION, AND MAINTENANCE OF POWER FACILITIES AND ACTIVITIES, of 11-10-94, which describes environmental requirements that may be necessary to support maintenance activities.
3. WAPA Engineering Manual (EM) 6460.3, PROPERTY DAMAGE INVESTIGATION APPRAISAL AND SETTLEMENT, of 10-20-88, which establishes policy for the quick investigation and settlement for all legitimate damages caused by activities of WAPA personnel or contractors on the right-of-way resulting from construction, reconstruction, operation, and maintenance activities.
4. WAPA EM 6404, CONSTRUCTION MANAGEMENT PRACTICES AND PROCEDURES, Chapter V, Real Estate, of 02-20-90, which establishes responsibilities for the acquisition of real estate, in support of construction projects, and the allowance for other uses of the real estate through an authorization process.
5. WAPA Power System Maintenance Manual, Chapter 12, JOB HAZARD ANALYSIS, of November 1991.
6. WAPA Power System Safety Manual, of 1994.
7. WAPA Power System Operations Manual, Chapter 1, POWER SYSTEM SWITCHING PROCEDURE, of July 1993.
8. Chain Saw Operations Guideline, of July 1992.
9. Transmission Line Right-of-Way Handbook, of February 1990, which provides an overview of right-of-way requirements, encroachment identification and resolution, and damage claim settlement.

