



*Inspector Training for  
Tree Cutting Activities  
at  
Coal Mines*

# ***Training Goals:***



- *Outline MSHA's Jurisdiction for Tree Cutting*
- *Revisit MSHA Policy and Training Requirements for Contractors and Miners*
- *Enhance Inspector awareness of Tree Cutting Activities*
- *Provide Safety Guidance on Tree Cutting Hazards*

# ***History:***

- *In Calendar Year 2004 two tree cutting fatalities associated with mining activities occurred on coal mine properties*
- *In Calendar Year 2003 one tree cutting fatality associated with mining activity occurred on mine property*
- *Jurisdiction for the tree cutting activities was assumed by MSHA*
- *The three fatalities were deemed to be chargeable as mining fatalities*

# ***Tree Cutting Fatality Summaries:***

- *11/10/03 - A tree cutter was in the process of cutting a tree, clearing brush when the tree splintered, striking the victim.*
- *03/12/04 – While cutting a leaning tree, the tree fell into another tree and slid down the tree, falling onto the victim.*
- *12-02-04 – A tree cutter felled a tree where another tree was wedged against it. As the cut tree fell, the wedged tree also fell, striking and crushing the victim.*

# ***MSHA Policy:***



- ***Miners and independent contractors that perform tree cutting as “service work” at mines must be trained under Part 48***
- ***Per existing MSHA policy, those persons “regularly exposed” to the hazards at a mine must have comprehensive training***
- ***Regularly exposed means exposure to mine hazards on a frequent basis (a pattern of recurring exposure), or extended exposure of more than five days***
- ***Existing training plans or new training plans will need to address tree cutting activities***

# ***Subject Matter for Tree Cutting Training***

- ***Personal Protective Equipment***
- ***Chain Saw Safety***
- ***Tree Cutting Techniques***
- ***Tree Harvesting Plan***
- ***Work areas***

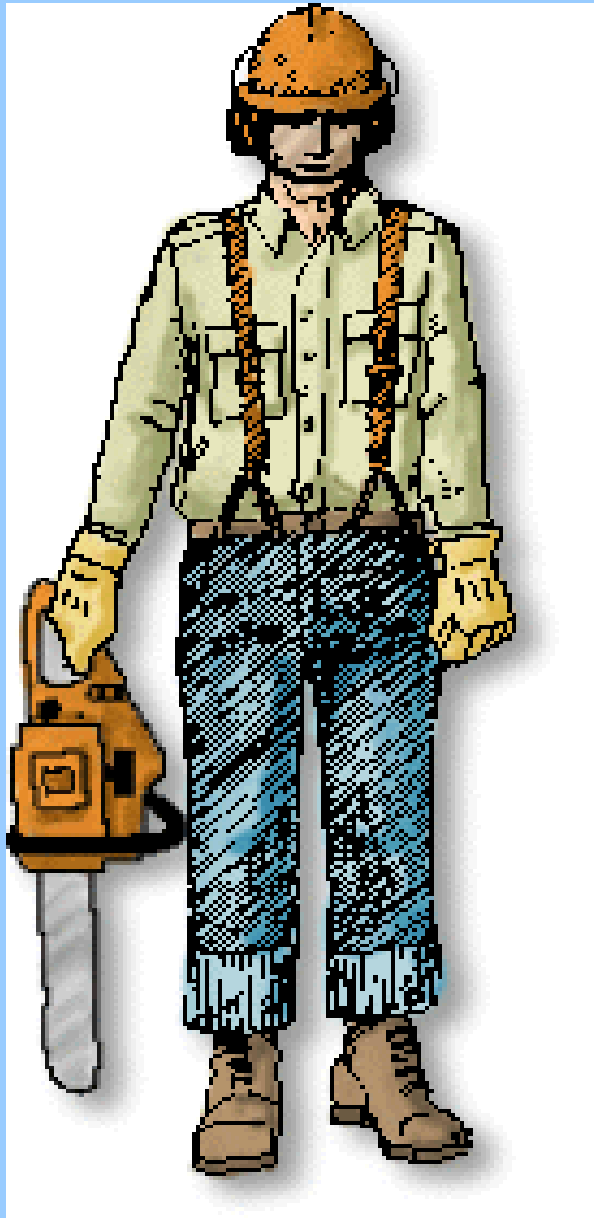
*These may vary depending on the specific conditions and hazards on site*

*Note – As a basis for tree cutting safety, this training references OSHA standards which are not enforceable under the Mine Act*

***PERSONAL PROTECTIVE EQUIPMENT (PPE)  
may prevent or lessen the severity of injury***



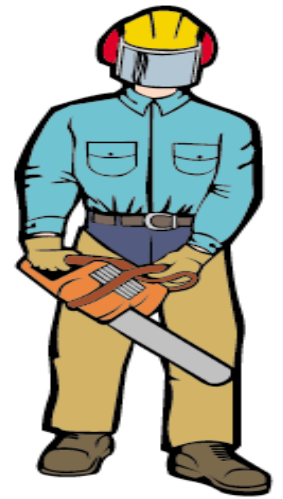
- ***SHOULD BE INSPECTED BEFORE EACH SHIFT***
- ***MSHA REQUIRMENTS PER 75.1700 WOULD APPLY***
- ***WHILE NOT REQUIRED, THE OSHA REQUIREMENTS FOR PPE ARE GOOD GUIDANCE***



- ***Loggers who manually fell trees with chain saws are exposed to the greatest logging risks. OSHA requirements which reduce some of the risks are presented in the following areas:***
- ***Required Training and Qualification for Loggers***
- ***Chainsaw***
- ***Other Hand Tools and Equipment***
- ***Personal Protective Equipment***
  - ***Head Protection***
  - ***Hearing Protection***
  - ***Eye/Face Protection***
  - ***Leg Protection***
  - ***Foot Protection***
  - ***Hand Protection***



# ***Highlights of PPE***



***PPE should be inspected prior to use on each work shift to ensure it is in serviceable condition***

***•The following PPE should be used when hazards make it necessary.***

***--Head Protection***

***--Hearing Protection***

***--Eye/Face Protection***

***--Leg Protection***

***--Foot Protection***

***--Hand Protection***



***This tree cutter is limiting potential injury by using his personal protective equipment.***

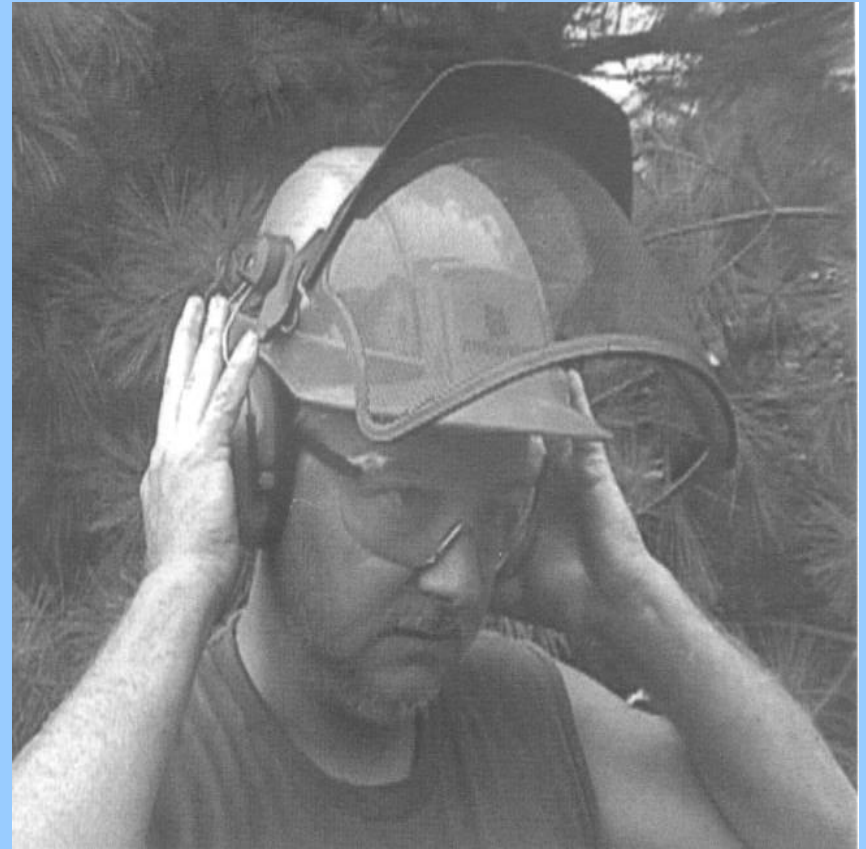


# **HEARING PROTECTION**



- *Made available to all workers*
- *Chosen to limit exposure to less than 90 Decibels (dba) for 8 hours*
  - *Acceptable muffs or plugs*
- *Used and cared for according to the manufacturer*

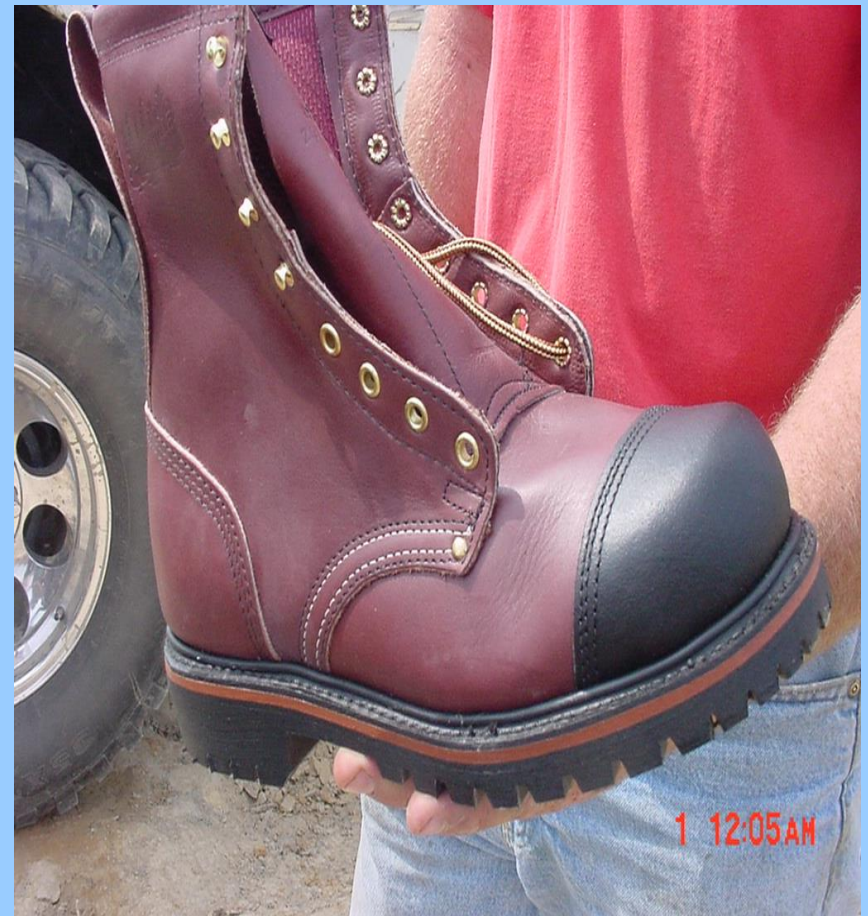
*Using a mesh screen  
like this one can  
prevent the loss of  
an eye or other  
facial injuries*



*Making contact with  
a running chain  
saw can be deadly.  
This worker is  
taking no chances  
by using leg  
protection*



*They may cost more  
but cut-resistant  
boots like these  
work and are safer  
for everyone who  
operates a chain  
saw*



# *CHAIN SAWS*



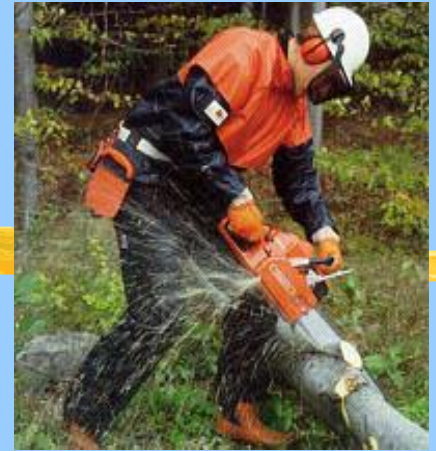
# ***Before Starting the Saw***



- *Fuel the saw at least 10 feet from sources of ignition.*
- *Start the saw at least 10 feet from fueling area, with chain brake engaged, and with the chainsaw on the ground or otherwise firmly supported.*
- *Check the fuel container for the following features:*
  - *Is metal or plastic*
  - *Does not exceed a 3 gallon capacity*
  - *Is approved by the Underwriters Laboratory, Factory Mutual (FM) or the Department of Transportation (DOT).*



## ***While Running the Saw***



- *Keep hands on the handles, and maintain secure footing while operating the chainsaw.*
- *Clear the area of obstacles that might interfere with cutting the tree or using the retreat path.*
- *Do not cut directly overhead.*
- *Shut off or throttle released prior to retreating.*
- *Shut off or the chain brake engaged whenever the saw is carried more than 50 feet, or on hazardous terrain.*



# **SAFETY GUIDELINES FOR CHAIN SAW OPERATIONS**

## **GENERAL CHAIN SAW SAFETY:**

*Chainsaws are an integral part of many tree cutting operations. Chainsaw related injuries are still reported frequently. Most chainsaw injuries are the results of saw “kickback.” Kickback occurs when the saw bar tip or the top of the saw bar strikes an object and throws the saw in the direction of the operator. Severe injuries are reported to the legs, hands, arms, and face. Proper training, techniques, equipment, and personal protective equipment can reduce the potential of kickback and chain saw related injuries.*

***IMPORTANT: Refer to the chain saw manufacturer’s operators manual before operating any chain saw.***

# CHAINSAW GUIDELINES

- *Proper personal protective equipment is used by all saw operators.*
- *Transporting the chainsaw: **By Hand:** Stop the chainsaw engine. Grip the saw handle and place the muffler at the side away from the body with the guide bar to the rear. **By Vehicle:** Keep the chain and bar covered with a chain guard. Properly secure the saw to prevent turnover, fuel and oil spillage, and damage to the saw.*
- *Chainsaws equipped with chain brake.*



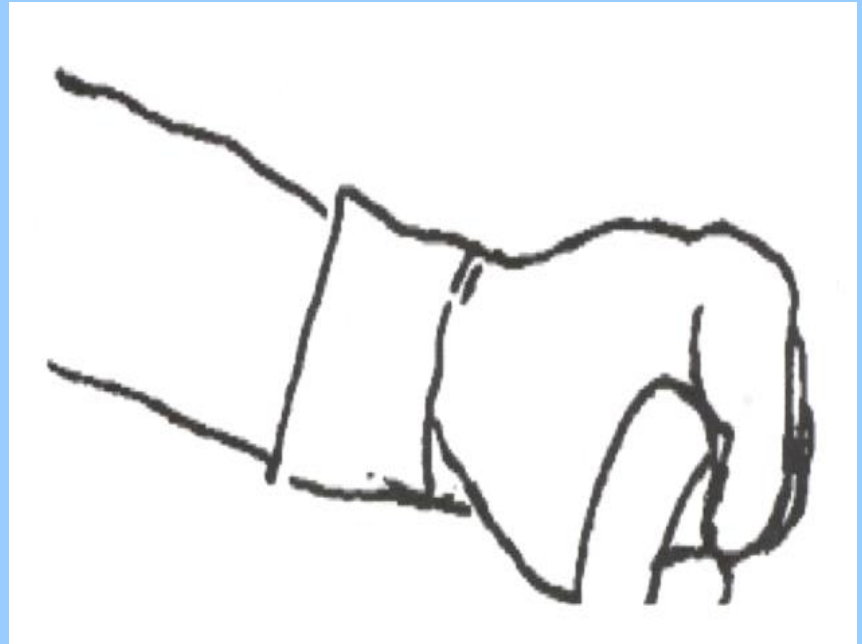
# CHAINSAW GUIDELINES

- *Always start the saw on the ground. Engage the chain brake, place one foot through the handle, hold the top handle firmly, and make an even pull on the starter rope. DO NOT DROP START A SAW OR START A SAW ON YOUR KNEE.*
- *Adjust the engine idle speed so the chain is not moving when the engine is idling.*
- *When moving from tree to tree or when moving to another work area within 50 feet where hazardous conditions exist or when moving farther than 50 feet, stop the chainsaw or engage the chain brake.*



# CHAINSAW GUIDELINES

- *Always maintain a firm grip with both hands on the saw for control. Position the thumb and fingers around the top handle grip for best and safest control.*
- *Never use the saw above shoulder height and never over reach. The chainsaw shall not be used to cut directly overhead.*
- *Always keep the bar nose clear of other objects during cutting to prevent kickback. Avoid cutting with the upper part of the bar or use extreme caution when this technique cannot be avoided.*



# Making the Cuts



***The safe felling of a tree includes making three precise and strategic cuts.***



***1. Top Cut***



***2. Bottom or Undercut***



***3. Back Cut***

***The notch created by the top and bottom cuts in the picture above is called an "Open-face Notch."***

# The Correct Cut

## 1. Starting Point

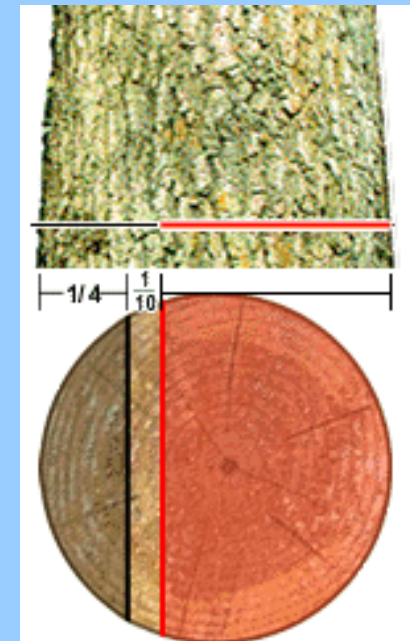
**Important - begin on the opposite side of the notch at the same level as the notched corner**

## 2. Angle of Attack

**Important - cut flat along a horizontal plane**

## 3. Ending Point

**Very important - stop at the point that will leave a hinge width that is  $1/10$  the tree's diameter**





# ***A Common Incorrect Cut***

---



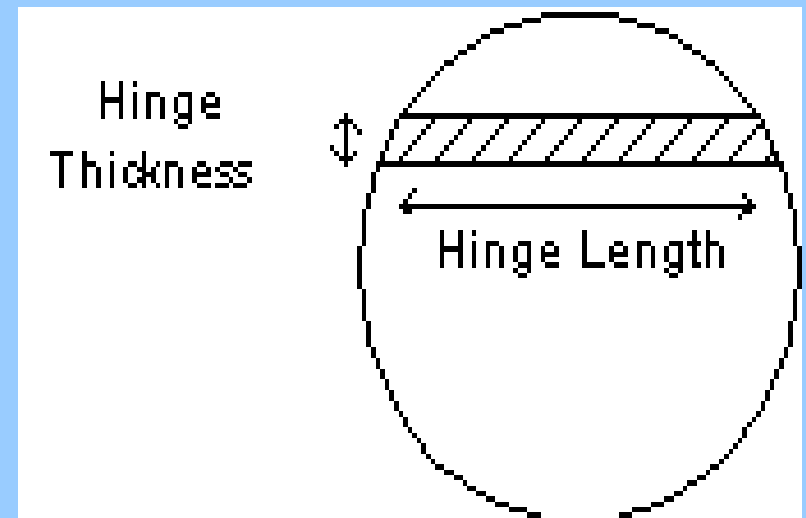
***Here the top cut is not steep enough . . .***



***. . . resulting in a notch of less than 70 degrees.***

# Felling Hinge

***The hinge is the wood between the undercut (face cut/notch) and the back cut. The purpose of the hinge is to provide sufficient wood to hold the tree to the stump during the majority of the tree's fall, and to guide the tree's fall in the intended direction. The position of the hinge will affect the direction of fall. The size of the hinge is important to prevent splitting, fiber pull, barber chairs, and other undesirable and unsafe conditions.***





**Limbing and Bucking:** Limbing is cutting branches off of felled or standing trees. Bucking is sawing felled trees into sections called logs. The length of the logs is dependent on the species of the tree and type of final product.

***Primary hazards include unstable logs, and hazards associated with using chainsaws.***

***Examples of proper bucking to relieve tension for top and bottom bind are provided below.***

***Prior to limbing, loggers should evaluate five potential hazards as follows:***

- Overhead hazards.***
- Spring Poles.***
- Butt Movement Forward (creates back pressure on limbs).***
- Butt Twist (creates sideways pressure on limbs).***
- Butt off the ground (creates tension on the tree stem).***

# ***BEFORE LIMBING***

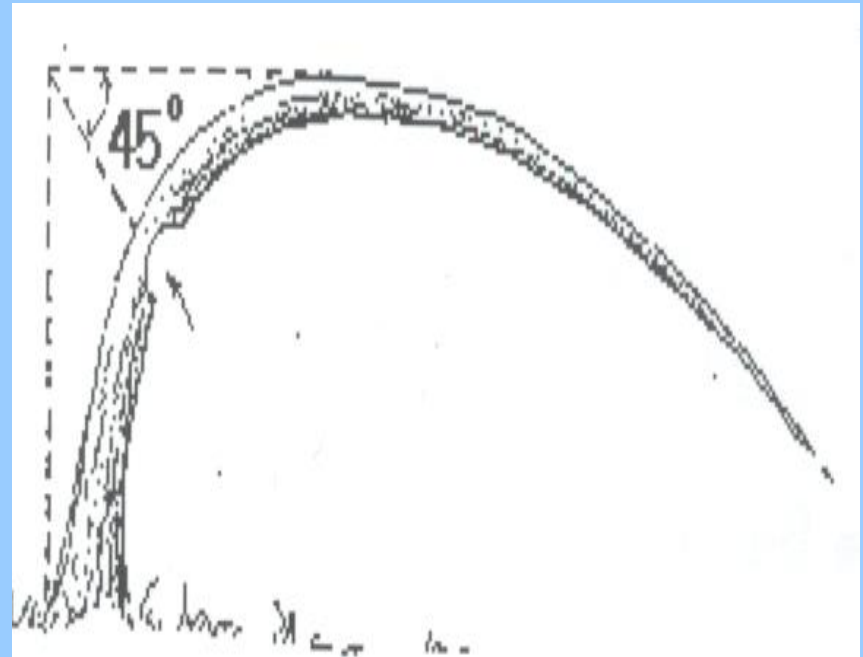
---



***BEFORE RUSHING  
IN TO LIMB, CHECK  
FOR OVERHEAD  
HAZARDS***

# SPRING POLES

- *Safest way to release a spring pole is to shave wood from the underside*
- *To find best point to shave, determine straight line up from stump*
- *Find where it meets a horizontal line over from highest point*
- *Come down to pole at 45 degrees*

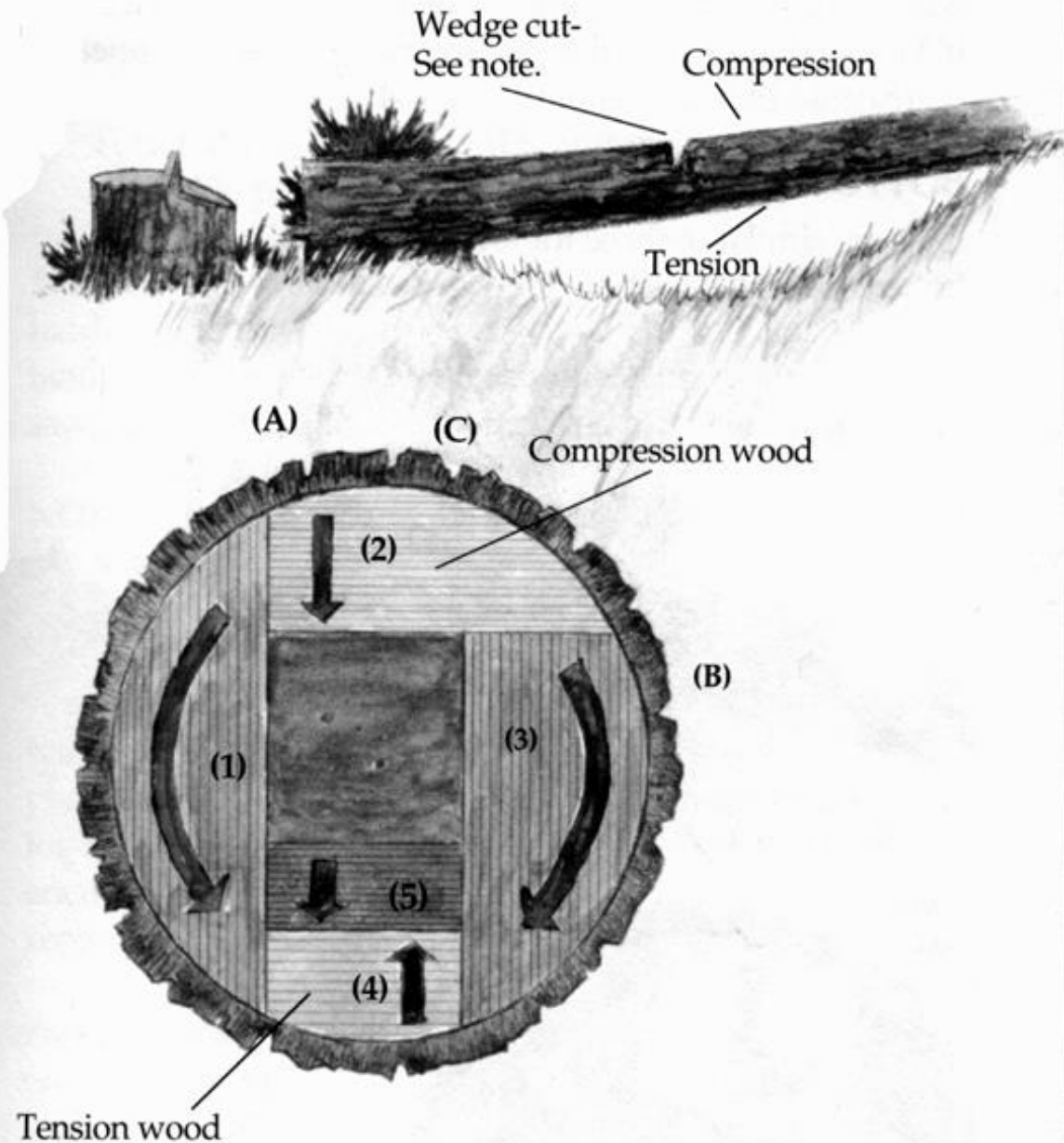


# Top Bind

Arrows indicate saw travel direction and cross-hatching indicates the heartwood that will break. Depending upon the soundness of the wood and the timber lie, it may be advantageous to use the end of the bar and bore from point (C) in making cuts number (1) and number (3) if it appears there could be a danger of the log slabbing.

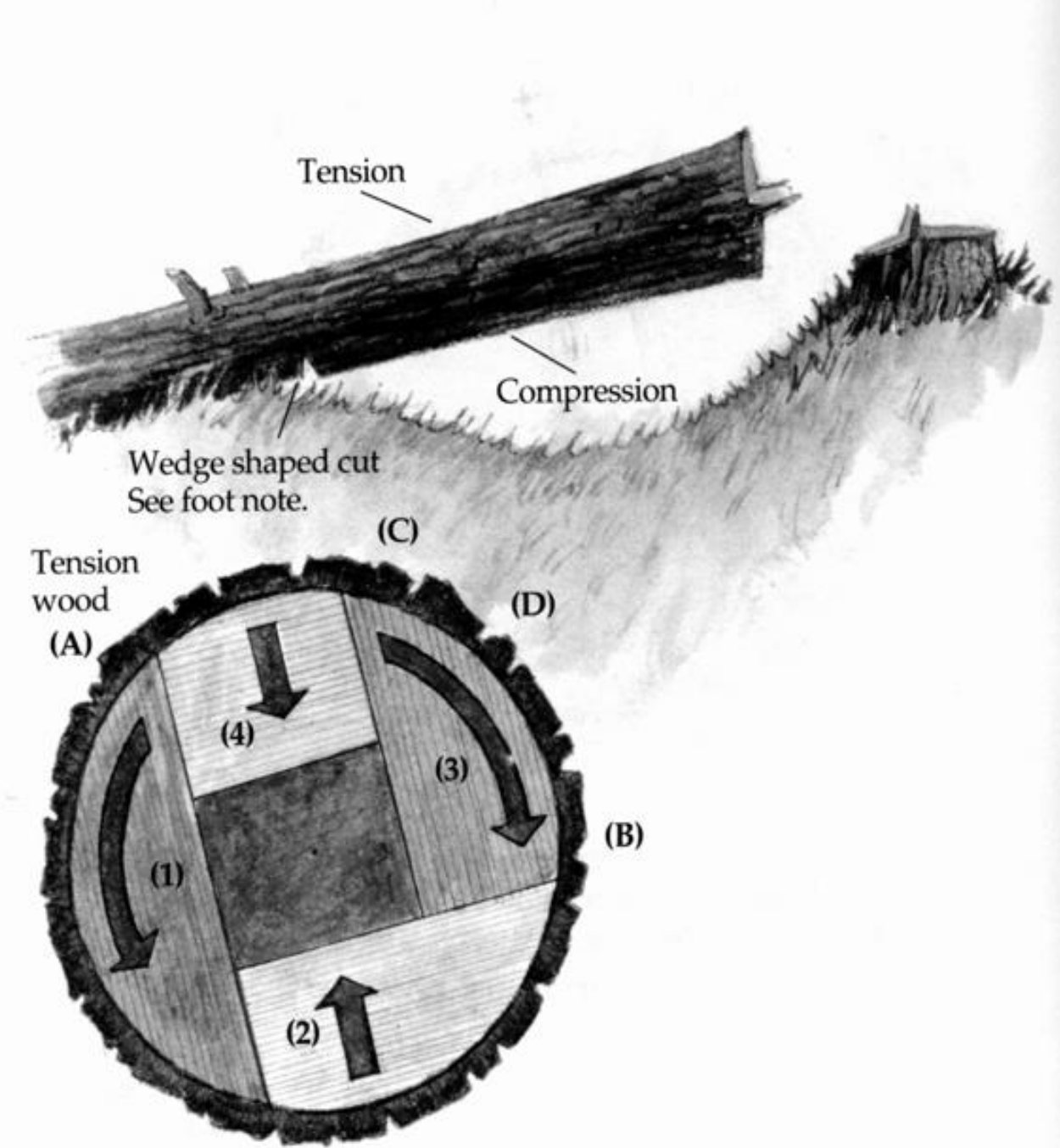
**NOTE:** A wedge section could be removed when sawing cut (2) if the top bind is excessive, to allow the tree cut to close as cuts (4) and (5) are made.

## TOP BIND



# Bottom Bind

Cuts are similar to those for top bind, except top and bottom cuts are reversed.



# ***Examples of unsafe conditions...***



***Barber's Chair***



***Side Scarring***



***Stalled Tree***



# ***The following are Unacceptable Practices***

***--Domino Felling: cutting notches and back cuts in a series of trees and pushing them over with another tree***

***--Swing Dutchman***

***--Bypass/Dutchman in the Notch***



# ***Another Unsafe Condition...***



**This tree  
was not cut  
correctly.**

**This tree had hinge cut and notched to fall down hill – yet it fell sideways and hit a person.**



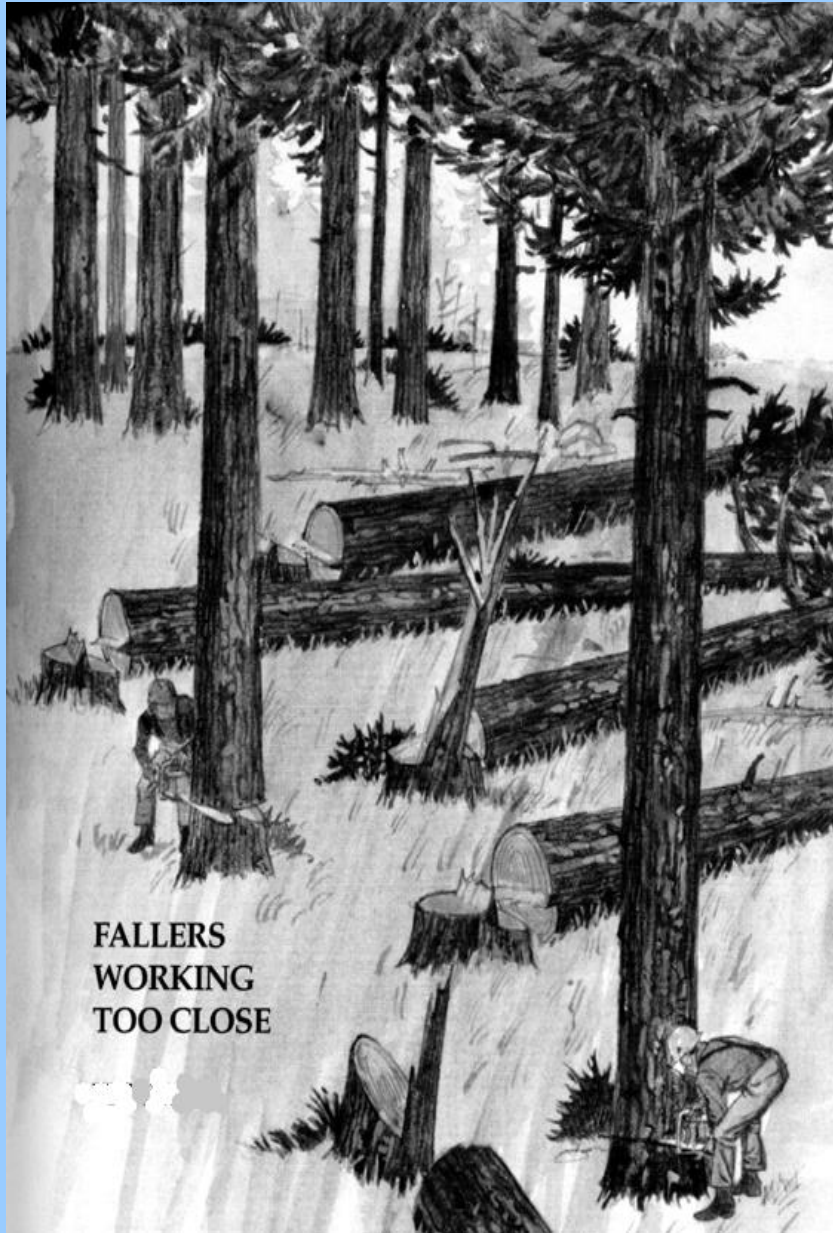
**Rock outcrop in  
cut area – clear  
cutters have to  
work around this**





**These trees  
were not cut  
correctly.**

**2004 3 12**



- ***A tree harvesting plan should be developed to address the hazards associated with a specific logging site.***
- ***Hazards to consider in developing the plan include:***
  - Overhead hazards including electric lines (29 CFR 1910.333(c)(3))***
  - Danger Trees, including Stubs, Spring Poles, Wind Blowns, and Widow Makers.***
  - General Environmental and Working Conditions***
  - Adequate separation of operations while maintaining visual or audible contact***

# ***Did You Know?***

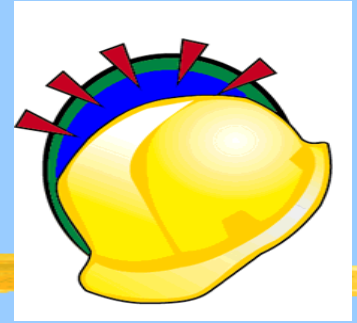


***More people are killed while felling trees than during any other logging activity.***

***These accidents CAN be avoided!***



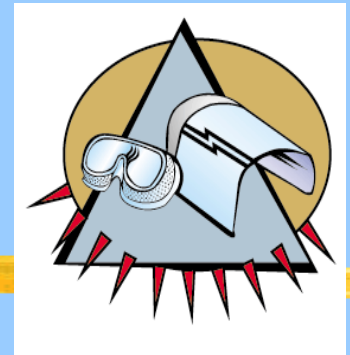
# ***What are the general safe practices?***



- Assess for and limit hazards associated with electrical storms, strong winds which may affect the fall of a tree, heavy rain or snow, extreme cold, dense fog, fires, mudslides, and darkness.***
- Employees are spaced and the duties of each employee must be organized so the actions of one employee will not create a hazard for any other employee.***
- Trees are felled in a manner that does not create a hazard to employees ( i.e. work areas must be assigned so that trees cannot fall into an adjacent occupied work area).***



# ***General Safe Practices (continued)***




- ***Generally, employees should not approach a feller or mechanical felling operation any closer than 2 tree-lengths of the trees being felled, until the feller or felling machine operator has acknowledged that it is safe to do so.***
- ***Felling is done uphill from or on the same level as previously felled trees. This will limit the hazards associated with the rolling or sliding of logs or trees.***
- ***Each employee performing a logging operation at a logging work site works in a position or location that is within visual or audible contact with another employee.***
- ***The employer accounts for each employee at the end of each shift.***

# ***To Safely Fell a Tree....***



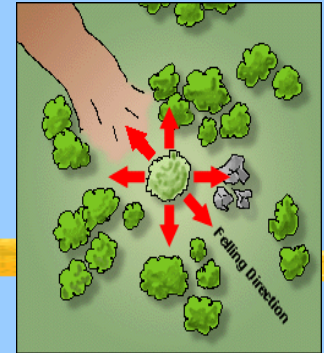
- ***Eliminate or minimize exposure to potential hazards found in the tree and in the surrounding area***
- ***Determine an appropriate felling direction***
- ***Plan and clear a retreat path.***
- ***Determine the proper hinge size.***
- ***Use a proper felling technique in making the cuts.***

# ***Considerations Prior to Felling Checklist***



- ***Determine the felling direction and how to deal with forward lean, back lean, and/or side lean.***
- ***What hazards are present in the area where you will be working.***
- ***Provide a retreat path so you can reach safety while the tree is falling.***
- ***Determine the proper hinge size to safely guide the tree in its fall.***
- ***Proper felling methods allow you to safely fell the tree.***

# ***Identifying the Appropriate Felling Direction: Factors to consider***



***--This planning step is very important because it determines the location and type of cuts to be made as well as prevents damage to the tree and harm to yourself.***

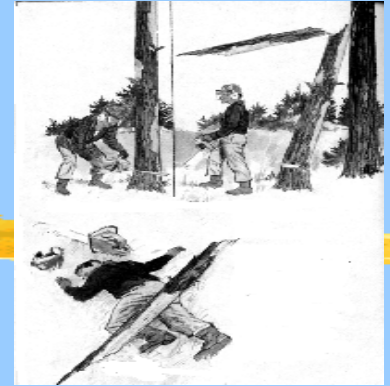
- ***Clear Fall Path: Along with a clear landing, this is the most important factor in deciding what direction to fell a tree. Visualize the fall path in all directions and identify those directions that are free of other trees. Finding a clear path will eliminate lodged trees, throwback, and damage to the tree being felled as well as the other trees.***

# More Factors to Consider...



- **Clear Landing**: Avoid felling a tree onto stumps, large rocks, or uneven ground. This will prevent cracking and other damage to the tree.
- **Lean of Tree**: It is generally easier and safer to fell a tree in the direction that it is already leaning. This makes for a cleaner fall and eliminates the need to use wedges, allowing gravity to do the work.
- **Ease of Removal**: When possible, fell the tree so the butt faces the skid road. Also, fell the tree consistent with the felling pattern of other trees. This also makes for efficient limbing and removal.
- **Slope of Ground**: Fell in a direction that will minimize the chance that the tree will roll or slide.

# ***Some Hazards and methods for dealing with them...***



***Throwback: As the tree falls through other trees or lands on objects, those objects or branches may get thrown back toward the logger***

***--If possible, avoid felling into other trees or onto objects. Don't turn your back on the tree as it falls, and hide behind a standing tree if possible.***

***Lodged Tree: A tree that has not fallen completely to the ground because it is lodged or leaning against another tree.***

***--Do not work in the presence of lodged trees. Have these death traps pushed or pulled down by a machine.***

**Area yet to be cleared – heavy brush requires clearing of escape paths prior to cutting**

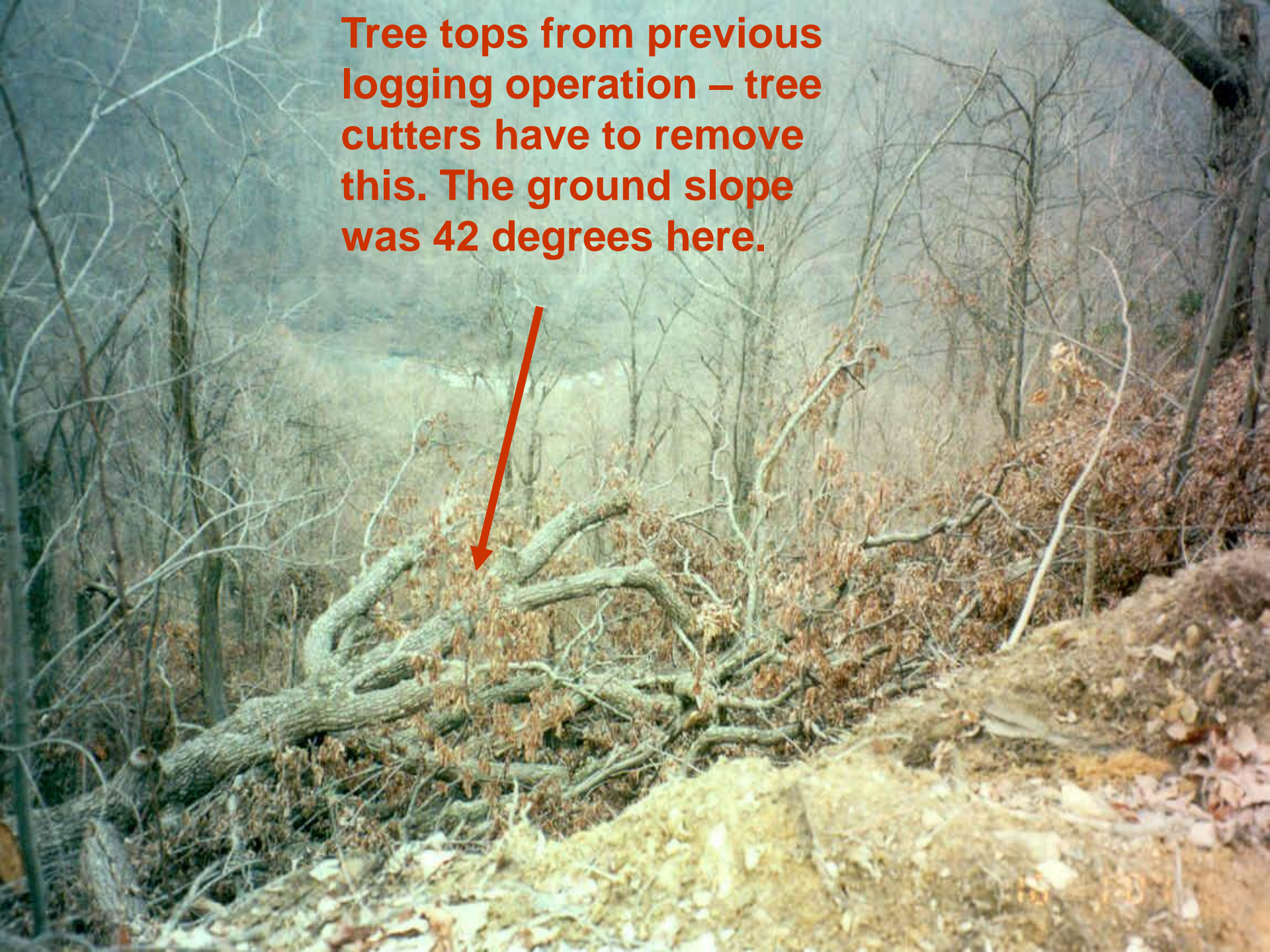
**Leaning tree**



**Tree tops from previous logging**



**Tree tops from previous logging operation – tree cutters have to remove this. The ground slope was 42 degrees here.**





**Leaning  
trees yet to  
be cleared**



16 11 01

# ***More Hazards...***



***Terrain: If the tree falls onto stumps, rocks, or uneven ground, a hazard may be created.***

***--If possible, move the obstacle***

***Widow Maker: Broken off limbs that are hanging freely in the tree to be felled or in the trees close by.***

***--Knock them down or pull them down with a machine.***

***Snag: Standing dead tree, standing broken tree, or a standing rotted tree to be felled or nearby.***

***--Use a machine to bring it down.***

***OR***

***--It must be felled or avoided by at least two tree lengths.***

# ***More Hazards...***



***Spring Pole: A tree, segment of a tree, limb, or sapling which is under stress or tension due to the pressure or weight of another tree or object.***


***--Use a machine to release the tension or release it with a chain saw.***

***Entanglement: Vines or limbs of other trees intertwined with the limbs of the tree to be felled.***

***-- Undo the entanglement if possible. OR Use a machine to fell the tree.***

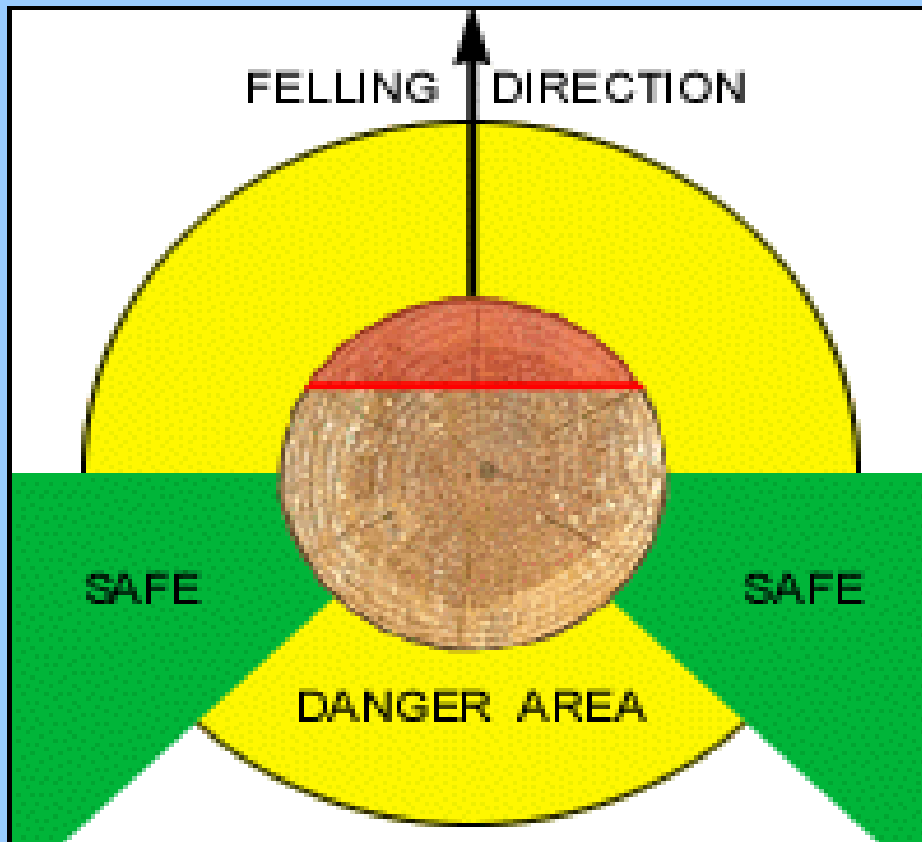
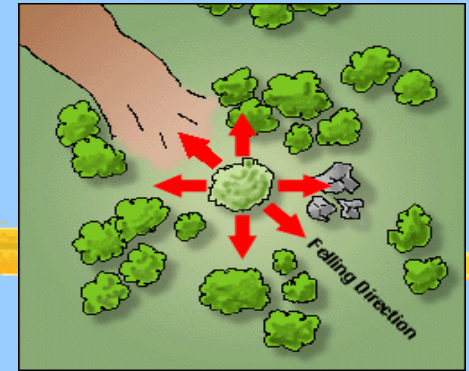
***Extreme Weather (high winds) and Personnel and/or Machinery in the work area also are potential hazards***

# ***Precautions to be taken when "danger trees" are in the felling area!***



- Danger trees must be felled or removed using mechanical or other techniques to minimize employee exposure prior to working in the area of danger trees.*
- Before felling or removing a danger tree, loose bark and damage must be removed or held in place.*
- If a danger tree cannot be felled or removed, it must be marked. There shall be no work allowed within 2 tree-lengths of it, unless the employer demonstrates that a shorter distance will not create a hazard for an employee.*
- When cutting a spring pole or other trees under stress, no employee other than the feller must be within 2 tree-lengths of the tree when the stress is released.*

# Retreat Path



***Plan your escape route and clear a path BEFORE you begin cutting!***

# ***General Safety for Machines***



- *Machines are maintained, inspected at the beginning of each shift, and not used if defect affects operation or safety*
- *Manufacturer's instructions are in each vehicle and followed by operators and mechanics*
- *Started and operated by trained employees*
- *Seats securely fastened and seat belts used*

# ***General Safety for Machines***



- *Tools secured during transport*
- *Transport employees in a safe manner*
- *Machines with Rollover Protective Structure (ROPS)*
- *Machines with Falling Object Protective Structure (FOPS) or overhead guards*
- *Have a fire extinguisher*

# *First Aid Training Suggestions*



- *The definition of First aid*
- *Shock*
- *Application of dressings and slings*
- *Treatment of strains, sprains, and fractures*
- *Immobilization of injured persons*
- *Handling and transporting injured persons*
- *Basic anatomy*
- *Artificial Respiration or CPR*



# *First Aid Suggestions (continued)*



- *Treatment of bites, stings, or contact with poisonous plants or animals*
- *Patient assessment and first aid for the following:*
  - *Respiratory arrest*
  - *Cardiac arrest*
  - *Hemorrhage*
  - *Lacerations/abrasions*
  - *Amputations*
  - *Musculoskeletal injuries*
  - *Shock*
  - *Eye injuries*
  - *Burns*
  - *Loss of consciousness*
  - *Extreme temperature exposure (hypothermia/hyperthermia)*
  - *Paralysis*
  - *Poisoning*
  - *Loss of mental functioning (psychosis/hallucinations, etc.)*
  - *Drug overdose*

## ***First Aid Kits Should Be...***



- *Well stocked*
- *Inspected often*
- *Available when needed*
- *Kept clean*
- *At each cutting site, landing, and worker transport vehicle*



***Remember.....Poor work practices can kill!***