

## Excerpts from OSHA's Logging e-tool

<http://www.osha.gov/SLTC/etools/logging/mainpage.html>

Adapted for use under grant number SH-19503-09-60-F-20 from the Occupational Safety and Health Administration, U.S. Department of Labor.

### Tree felling hazards

<http://www.osha.gov/SLTC/etools/logging/manual/felling/hazards/hazards.html>

Hazard	Ways to Eliminate or Avoid
<p><b>Throwback</b> As the tree falls through other trees or lands on objects, those objects or branches may get thrown back toward the logger.</p>	<p>If possible, avoid felling into other trees or onto objects. Don't turn your back on the tree as it falls, and look up as you escape along the retreat path.</p>
<p><b>Terrain</b> If the tree falls onto stumps, rocks, or uneven ground, a hazard may be created.</p>	<p>If possible, move the obstacle, or change the felling direction.</p>
<p><b>Lodged Tree</b> A tree that has not fallen completely to the ground because it is lodged or leaning against another tree.</p>	<p>Do not work in the presence of lodged trees. Have these death traps pushed or pulled down by a machine.</p>
<p><b>Widowmaker</b> Broken off limbs that are hanging freely in the tree to be felled or in the trees close by.</p>	<p>Knock them down or pull them down with a machine. Avoid working underneath them.</p>
<p><b>Snag</b> Standing dead tree, standing broken tree, or a standing rotted tree to be felled or nearby.</p>	<p>Use a machine to bring it down.</p> <p>OR</p> <p>It must be felled or avoided by at least two tree lengths, unless the employer can demonstrate that a shorter distance will not create a hazard for an employee.</p>
<p><b>Spring Pole</b> 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.</p>	<p>Use a machine to release the tension or release it with a chain saw.</p>
<p><b>Extreme Weather</b> Strong wind.</p>	<p>Do not fell trees during high winds.</p>
<p><b>Entanglement</b> Vines or limbs of other trees intertwined with the limbs of the tree to be felled.</p>	<p>Undo the entanglement if possible.</p> <p>OR</p> <p>Use a machine to fell the tree.</p>
<p><b>Resources</b> Other workers or machines in the immediate area.</p>	<p>Request the workers or machines to be moved.</p>

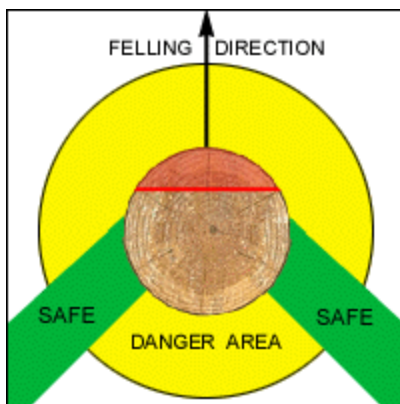
## Identifying Appropriate Felling Direction

[http://www.osha.gov/SLTC/etools/logging/manual/felling/felling\\_direction/felling\\_direction.html](http://www.osha.gov/SLTC/etools/logging/manual/felling/felling_direction/felling_direction.html)

Factors to Consider
<b>Clear Fall Path</b> 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.
<b>Clear Landing</b> Avoid felling a tree onto stumps, large rocks, or uneven ground. This will prevent cracking and other damage to the tree.
<b>Lean of Tree</b> 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.
<b>Ease of Removal</b> 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.
<b>Slope of Ground</b> Fell in a direction that will minimize the chance that the tree will roll or slide.

## Retreat Path

[http://www.osha.gov/SLTC/etools/logging/manual/felling/retreat\\_path/retreat\\_path.html](http://www.osha.gov/SLTC/etools/logging/manual/felling/retreat_path/retreat_path.html)



**You must plan your escape route and clear a path BEFORE you begin cutting.**

### Direction of Safe Retreat

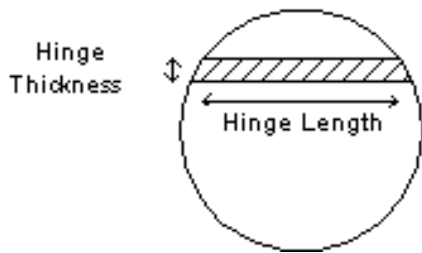
- 45 degrees from the sides and back on either side
- NEVER move away directly behind the tree—you can be seriously hurt if the tree butt kicks back during the fall

### How to Retreat

- Using a bore cut and a release cut will make it easier to retreat in plenty of time
- Don't turn back on the falling tree
- Walk quickly away to a distance of 20 feet from the falling tree
- Position yourself behind a standing tree if possible

## Felling Hinge

[http://www.osha.gov/SLTC/etools/logging/manual/felling/retreat\\_path/retreat\\_path.html](http://www.osha.gov/SLTC/etools/logging/manual/felling/retreat_path/retreat_path.html)



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 actions.

**The following describes a proper hinge:** (items listed below are recommended good work practices, not OSHA standards)

The length of the hinge should be 80% of the diameter of the tree at breast height. Example: For a 12-inch diameter tree the hinge should be 9.6 inches long (12 inches  $\times$  0.8).

The width of the hinge should be 10% of the diameter of the tree at breast height. Example: For a 12-inch diameter tree the hinge should be 1.2 inches long (12 inches  $\times$  0.1).

The hinge on a tree with no side lean should be perpendicular to the intended direction of fall.

## Making the cuts

<http://www.osha.gov/SLTC/etools/logging/manual/felling/cuts/cuts.html>

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






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

## Highlights of Manual Felling Techniques:

- An undercut must be made in each tree being felled. The undercut must be of a size so the tree will not split and will fall in the intended direction.
- A backcut must be made in each tree being felled. The backcut must leave sufficient hinge wood to hold the tree to the stump during most of its fall so that the hinge is able to guide the tree's fall in the intended direction. Except in Open Face felling, the backcut must be above the level of the horizontal facecut in order to provide an adequate platform to prevent kickback.
- The backcut may be at or below the horizontal facecut in tree pulling operations.
- Domino felling is prohibited.

## Kinds of notches

<http://www.osha.gov/SLTC/etools/logging/manual/felling/cuts/notches.html>

Notch	 <b>Open-faced Notch</b>	 <b>Conventional Notch</b>	 <b>Humbolt Notch</b>
<b>Total angle</b>	ideally 90 degrees; at least 70 degrees	45 degrees	45 degrees
<b>Top Cut</b>	angled downward 70 degrees	angled downward 45 degrees	flat horizontal
<b>Bottom Cut</b>	angled upward 20 degrees	flat horizontal	angled upward 45 degrees
<b>Back Cut</b>	horizontal; at the same height as the corner of the notch	horizontal; at least 1 inch above the bottom cut	horizontal; at least 1 inch above the top cut
<b>Depth</b>	1/4 - 1/3 of tree diameter	1/4 - 1/3 of tree diameter	1/4 - 1/3 of tree diameter
<b>Point of notch closure</b>	just before tree hits ground	middle of fall	middle of fall
<b>Degree of safety</b>	high	medium	medium
<b>Advantages</b>	greater accuracy of felling into target area  hinge stays intact until tree hits ground  less danger of kickback and other out-of-control movement	familiar to many loggers	saves slightly more wood  familiar to many loggers
<b>Disadvantages</b>	hinge may have to be cut off	hinge breaks early	hinge breaks early

**While all three of these notches are acceptable, the Open-faced Notch is clearly the safest and most accurate.**

## Dangerous Results of Incorrect Felling

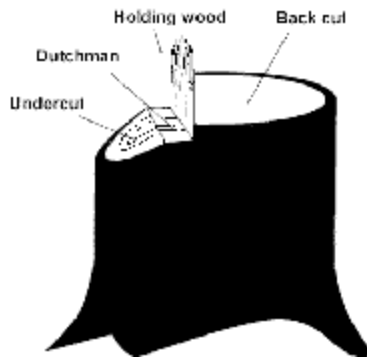
<http://www.osha.gov/SLTC/etools/logging/manual/felling/cuts/dangers/dangers.html>



**Barber Chair**



**Lodged Tree**



**Dutchman's Notch**



**Stalled Tree**

### **Barber Chair**

The splitting of the butt of the log during the latter part of the fall. The tree often remains attached to the stump, thus creating a danger zone and ruining much of the log. Caused by a Dutchman notch.

### **Throwback**

- Limbs or other material thrown back toward the logger when the falling tree contacts standing trees or fallen trees.
- Caused by not felling the tree in a clear path or onto a clear landing.

### **Lodged Tree (also called A Hung Tree)**

- A cut tree that has not fallen completely to the ground, but is lodged or leaning against another tree. This is extremely dangerous. Do NOT work in the presence of hung trees. Have these death-traps pushed or pulled down by a machine.
- Caused by poor judgment of felling path or inaccurate cutting.

### **Dutchman**

- The seat that interferes with the smooth closing of the notch.
- Caused when one of the notch cuts is made too deep and extends beyond the endpoint of the other notch cut, known as "Bypass."

### **Kickback**

- When a falling tree hits the ground or other object it can bounce back causing the log to move back over the stump with great force. This is the main reason you should never stand or retreat directly behind the tree.
- Increased chance of kickback by not making the back cut above the notch on a conventional or Humbolt notch.

### **Stalled Tree**

- A tree that has just begun to fall but is stopped by its own stump. This is almost as dangerous as a lodged tree and requires a machine to push it over.
- Caused by a Dutchman notch.