Arborist Operations
MIOSHA Compliance & Safety

Adapted from a presentation by:
Consultation Education and Training (CET) Division
Michigan Occupational Safety & Health Administration
Michigan Department of Labor & Economic Growth
www.michigan.gov/miosha - (517) 322-1809

The MIOSHA Green Industry Alliance

Formed in 2008, members of the Alliance Include:

- **Arboriculture Society of Michigan (ASM)**
- **Michigan Green Industry Association (MGIA)**
- **Michigan Nursery and Landscape Association (MNLA)**
- **Michigan Turfgrass Foundation (MTF)**
- **MIOSHA Compliance, Education & Training (CET)**
- **Tree Care Industry Association (TCIA)**
- **Utility Line Clearance Coalition (ULCC)**

Further information on the Alliance Partners appears at the end of this program.

Receive MIOSHA CET Training and Division Announcements via Email!

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If you would like to be added to this list, please visit:
www.michigan.gov/mioshatraining

If you need further assistance, please contact:

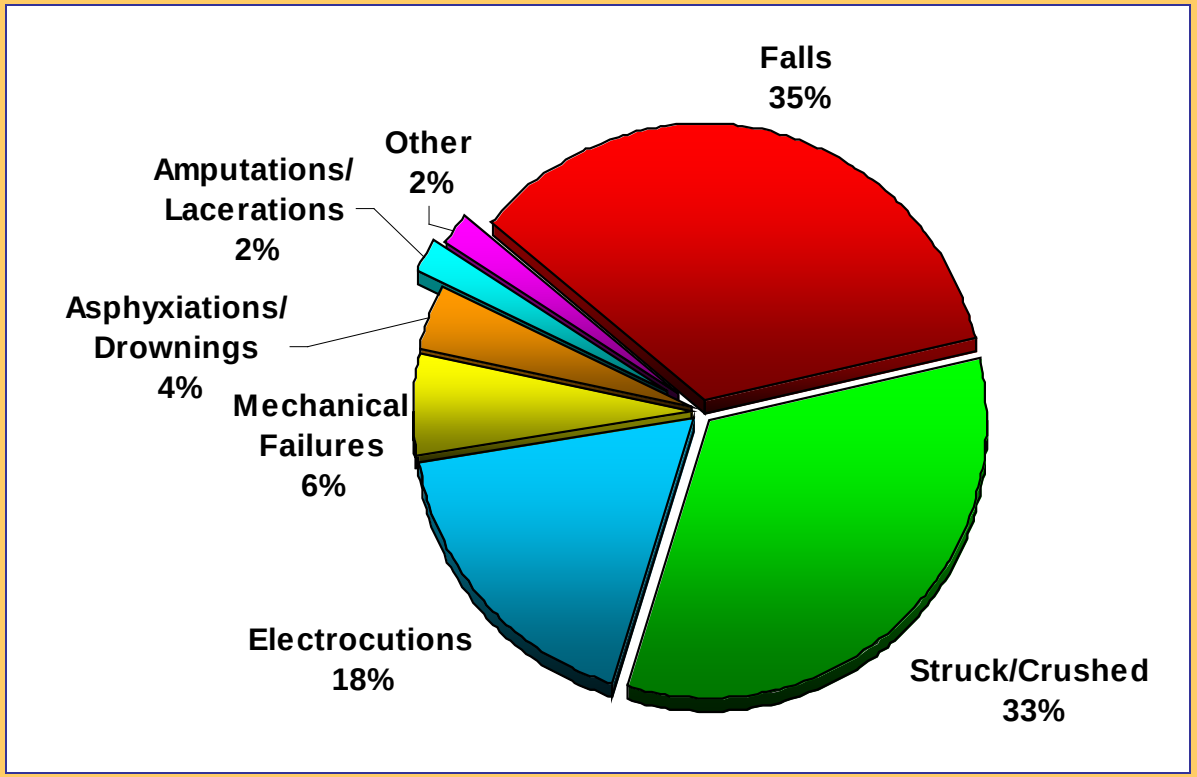
MIOSHA Consultation Education and Training Division
(517) 322-1809

Industry Standards

Please refer to:
ANSI Z133.1 - 2006
for Arboricultural Operations
– Safety Requirements
(available in Spanish)
for additional details on safe work practices and techniques concerning line clearance tree trimming.

Fatal Accidents in Arboriculture

In 2006, federal OSHA recorded 51 occupational fatalities in Standard Industrial Classification (SIC) 0783. The pie chart gives a rough breakdown:



What is the difference between "Tree Trimming (Arboriculture)" and "Logging"?

Here is MIOSHA's rule of thumb…if trees are being harvested mainly **as a product to sell**, it's **Logging** and you're regulated by **Part 51**. If the trees are being removed **as a service**...it's **tree trimming (Arboriculture)** and you're regulated by **Part 53**.

MIOSHA Definition:

Tree worker

Means an employee who does tree pruning, trimming, repairing or removal and works with the equipment used in such operations.

We also refer to this person as an ***Arborist***.

Employer Responsibilities

An employer shall:

R.5311(a)* Provide **training** to each new employee regarding the requirements of Part 53, the **job hazards and safeguards** before starting an assigned job. ***A job briefing shall be conducted before any tree job involving unusual hazards is begun***.

R.5311(b) Not allow a **tool or equipment to be used** which is **not guarded** according to State standards, has a **defective guard** or is otherwise **unsafe**.

R.5311(c) Develop **rescue procedures** such as, but not limited to, removal of injured, stricken or electrically shocked employees from work positions aloft.

* - *refers to specific clauses within MIOSHA Part 53*

Employee Responsibilities

An employee shall:

R.5312(a) Report any **tool, equipment** or **safeguard** which is **defective**.

R5312(b) Use **personal protective equipment** prescribed by the State safety standards.

Employee Responsibilities

An employee **shall <u>not</u>**:

R.5312(c) remove a **guard** except for authorized operational or maintenance purposes. The guard shall be replaced or equivalent guarding provided before the equipment is returned for normal use.

R.5312(d) operate **any equipment unless trained** in the operating procedures, hazards and safeguards and has been authorized to do so.

PPE

Personal Protective Equipment

R.5313(1) Eye protection **shall be provided and used** as prescribed in Part 33.

R.5313(2) Head protection shall be **provided and used**.

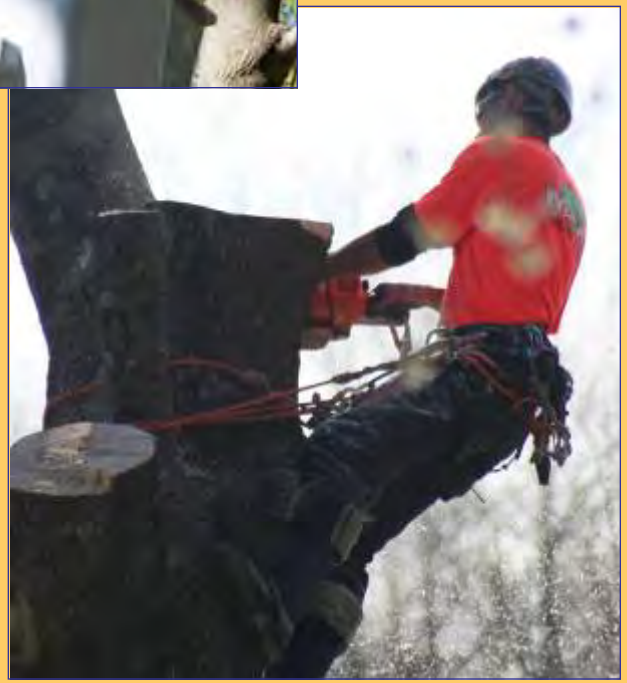
Reflective Clothing

When employees are exposed to vehicular traffic, the employer shall provide them with high-visibility safety apparel (vests) that conform to ANSI-ISEA 107-2004 standards for Class II (daytime) or Class III (nighttime).

PPE

Fall Protection

- A safety belt, safety strap, tree trimming saddle belt, or rope saddle shall be **provided** to and **used** by an employee when working aloft in a tree. **A safety strap shall be worn and attached when aloft in a bucket of an aerial device. R.5313(3)**



PPE

Fall Protection

- A climbing rope **shall not** be used to **lower tree parts or handle equipment**. It shall be **inspected** before each day's use. **R.5313(5)**

Good or Bad??

Is he using two means of securement, required by ANSI for running a chain saw in a tree? Are those approved safety glasses, or just regular sun glasses?

What's Wrong with this Picture?

Answer: Arborists shall use a second point of attachment when using a chain saw in a tree (ANSI Z133, 6.3.8)

Chain Saw Injuries

There were over 28,500* chain saw injuries in 1999 according to the U.S. Consumer Product Safety Commission.

The average injury required 110 stitches.

36% of injuries were to the legs and knees.

The estimated cost per injury in 2000 was over $12,000.

Worker's compensation costs are estimated at over $350 million annually.

* These statistics are based on professional cutters – not the average consumer or construction worker doing some site clearing.

The Price of Protection

Chaps	$73.50
Hard hat with hearing protection & face shield	69.25
Eye protection	6.25
Total	$149.00

Compare this to the estimated cost of $12,000.00 per injury

Fire Prevention

Flammable liquids shall be stored in an approved safety container equipped with an automatic closing cap and flame arrestor. R.5314(1)

Equipment shall be stopped while being refueled, serviced or maintained. Restarting of portable equipment such as a chain saw shall be accomplished **not less** than **10 feet** from the refueling point. R.5314(2)

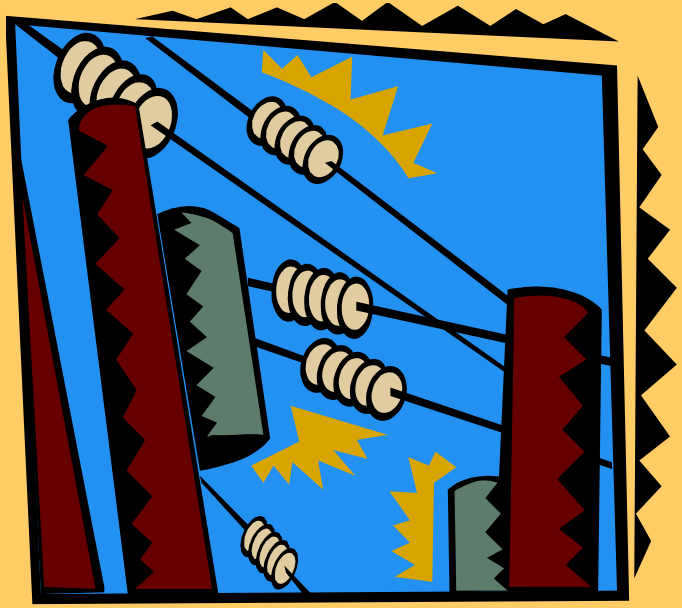
Smoking shall be **prohibited** while refueling. R.5314(3)

Traffic Control

Where the fall of a limb or tree would create a hazard for an employee, pedestrian or vehicular traffic, a means such as, but not limited to, a barrier or traffic control director shall be used to prevent injury. R.5315

Electrical Hazards: What Standard Applies?

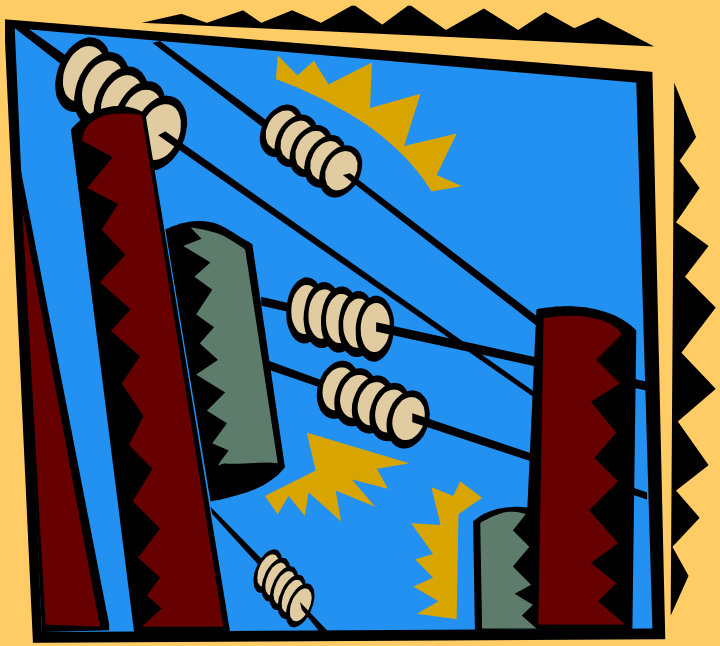
MIOSHA uses this rule of thumb:



- If the employee works for the utility owner or operator, or if his/her employer contracts for the utility, then **Part 86** applies.
- If the arborist is being paid to prune or maintain trees for someone other than the utility and his/her exposure to electrical hazards is incidental, then **Part 53** applies.

Electrical Hazards

- An electric conductor or communication line shall be **considered energized** unless the utility system's operator or owner indicates otherwise and they have **visibly grounded** the conductor or line. R.5321(1)



- A tree worker or qualified line clearance tree trimmer shall not make a direct contact with an energized conductor. R.5321(3)

Definition:

Qualified line clearance arborist Means an employee trained to work in the proximity of energized conductors such as, but not limited to, an employee for an electric power or communications company.

Electrical Hazards

- A tree worker shall maintain their body and tools not less than the distance prescribed in **Table 1** from an energized conductor. If these distances cannot be maintained, the conductor shall be de-energized before the work is started. **R.5321(4)**

Part 53 - Table 1
Minimum Working Distances
For Tree Workers

VOLTAGE	MINIMUM DISTANCE
0 to 300 volts	1 foot (.305 M)
301 to 750 volts	2 feet (.610 M)
751 to 50 kV	10 feet (3.05 M)
50 kV or more	10 feet (3.05 M) plus .4 inch per 1000 volts

13.8 kV to 25 kV are considered standard distribution lines.

Electrical Hazards

A **qualified line clearance tree trimmer** shall maintain their body and tools ***not less than*** the distance prescribed in **Table 2** from an energized conductor, except the trimmer may remove branches hanging on a conductor using approved insulated tools and equipment when the voltage is below 10 kV. **R.5321(5)**

Part 53 - Table 2*
Minimum Approach Distances for Qualified Line Clearance Tree Trimmers

Voltage Range (Phase to Phase)	Minimum Working Distance
0 to 750 V	1 ft. (.305 M)
751 to 35 kV	2 ft. 4 in. (.711 M)
35.1 kV to 46.0 kV	2 ft. 6 in. (.762 M)
46.1 kV to 72.5 kV	3 ft. 0 in. (.914 M)
72.6 kV to 121.0 kV	3 ft. 4 in. (1.016 M)
138.0 kV to 145.0 kV	3 ft. 6 in. (1.067 M)
161.0 kV to 169.0 kV	3 ft. 8 in. (1.118 M)
230.0 kV to 242.0 kV	5 ft. 0 in. (1.524 M)
345.0 kV to 362.0 kV	7 ft. 0 in. (2.134 M)
500.0 kV to 552.0 kV	11 ft. 0 in. (3.453 M)
700.0 kV to 765.0 kV	15 ft. 0 in. (4. 572 M)

* Values in this table differ from ANSI Z133.1-2006, Table 1.

Electrical Hazards

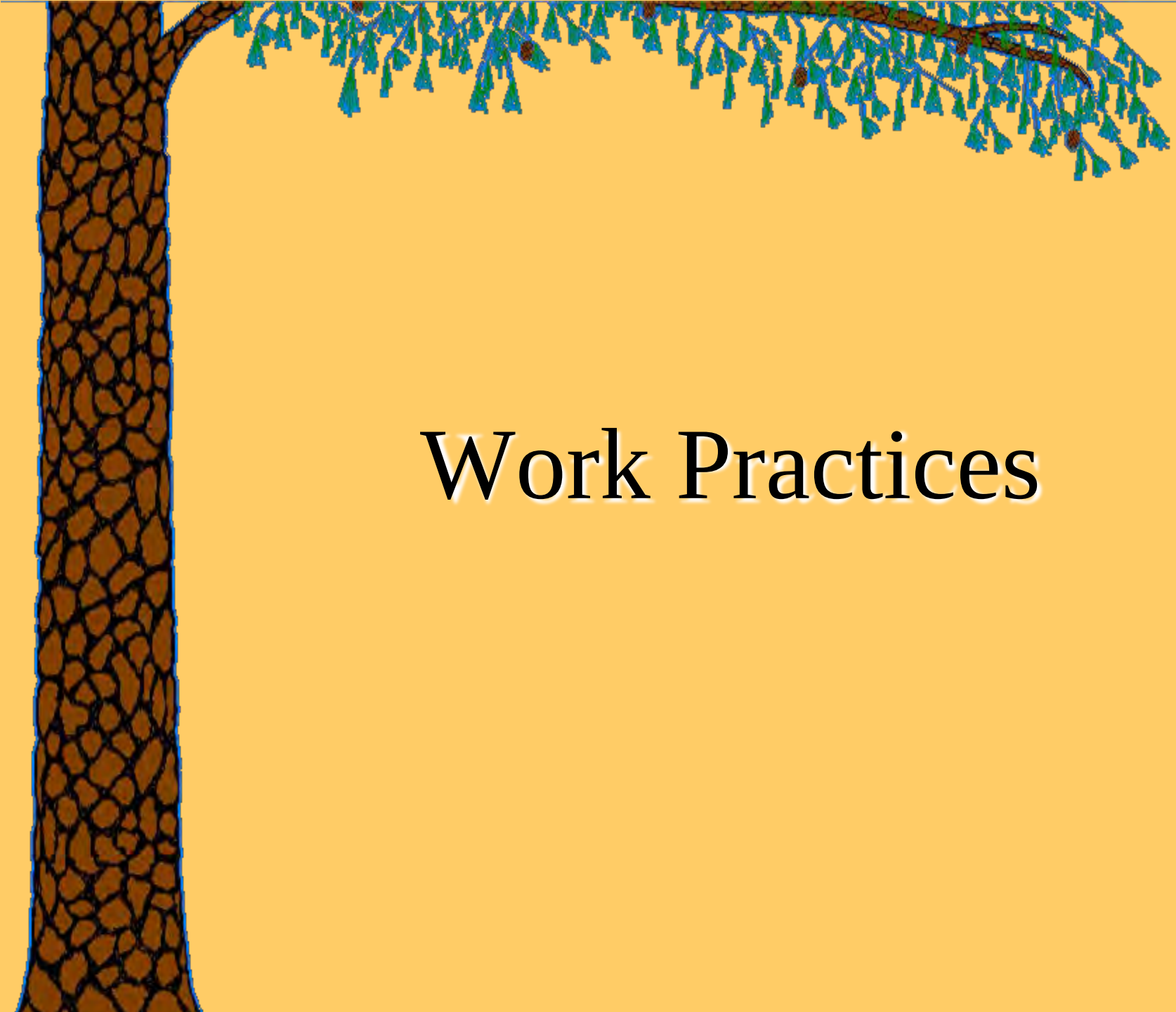
A branch hanging on a conductor energized at more than 10 kV, shall be removed after the line is de-energized or removed by an authorized and trained systems operator employee or owner employee using approved protective tools and equipment. R.5321(6)

Under Part 86

A second line-clearance tree trimmer within normal (unassisted) voice communication shall be present if:

- A line-clearance trimmer is to approach more closely than 10 feet of any conductor or electric apparatus energized at more than 750 volts
- Branches or limbs being removed are closer to lines energized at more than 750 volts than the distances listed in Table R-6
- Roping is necessary to remove branches or limbs from such conductors or apparatus. **R.1910.269(r)1)(ii)(A-C)**

Please refer to Part 86 for complete rules of tree trimming around power lines.



Work Practices

Climbing in Storm Conditions

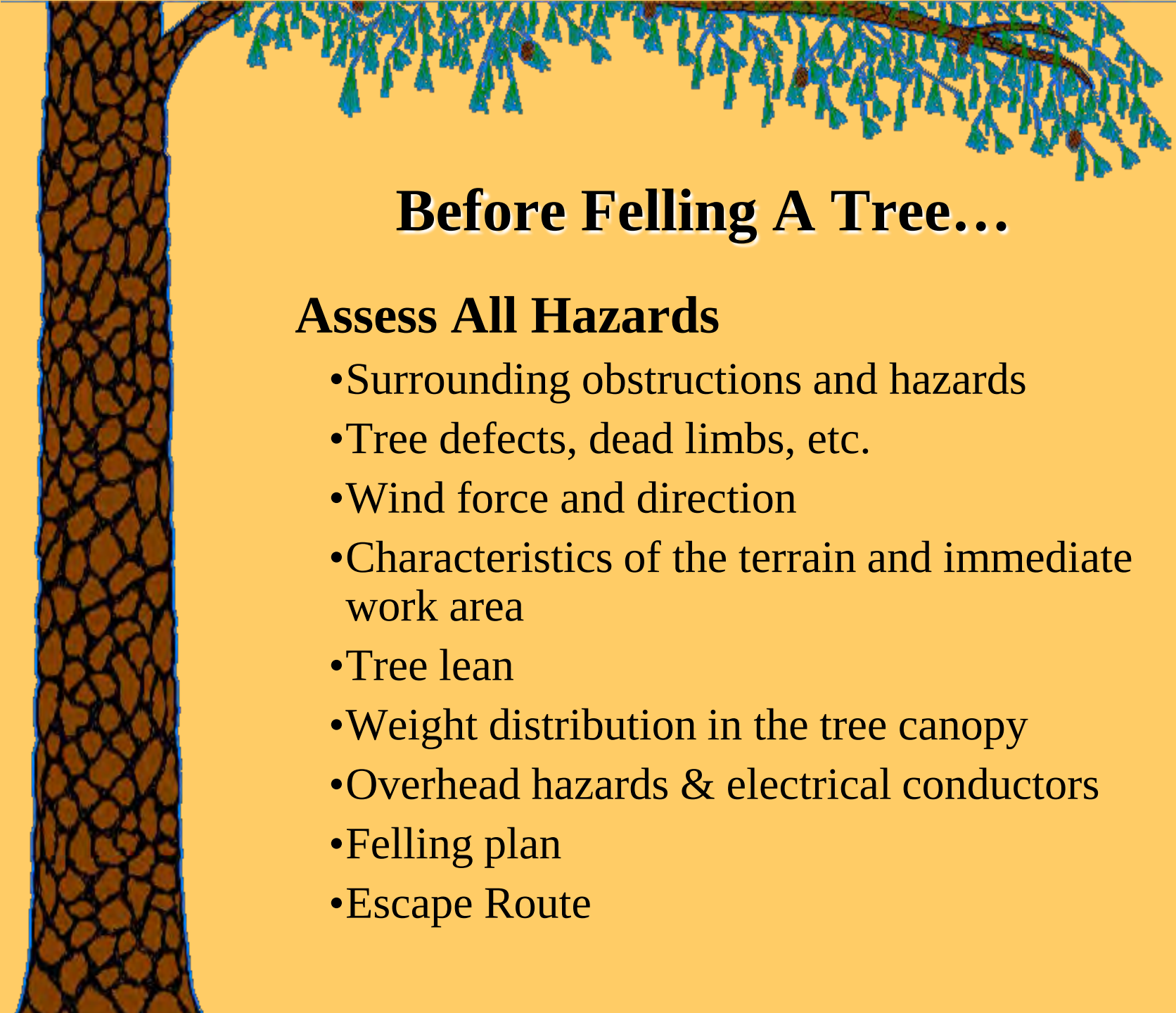
- An employee **shall not climb** a tree during a storm or high wind or when covered in ice or snow, except when performing emergency service. R.5331(5)

Pruning & Trimming

- If another employee is present, a verbal warning shall be given by the employee aloft **before** dropping a limb. **R.5332(1)**
- A **separate work rope**, controlled by an employee on the ground, shall be used to lower limbs which cannot be dropped. The work rope **shall not use** the same crotch over which the climbing rope is run. **R.5332(2)**
- Whenever an employee is aloft in excess of 15 feet (4.572 M), a **second employee** or supervisor shall be within vocal hearing distance of the treed employee. **R.5332(4)**

Limbing and Topping

- When possible, an employee cutting a limb shall work from the side opposite and uphill of the cut. **R.5333(1)**
- When topping, equipment such as a crane shall be used to lower branches and limbs if the tree cannot stand the strain. **R.5334(1)**



Before Felling A Tree…

Assess All Hazards

- Surrounding obstructions and hazards
- Tree defects, dead limbs, etc.
- Wind force and direction
- Characteristics of the terrain and immediate work area
- Tree lean
- Weight distribution in the tree canopy
- Overhead hazards & electrical conductors
- Felling plan
- Escape Route

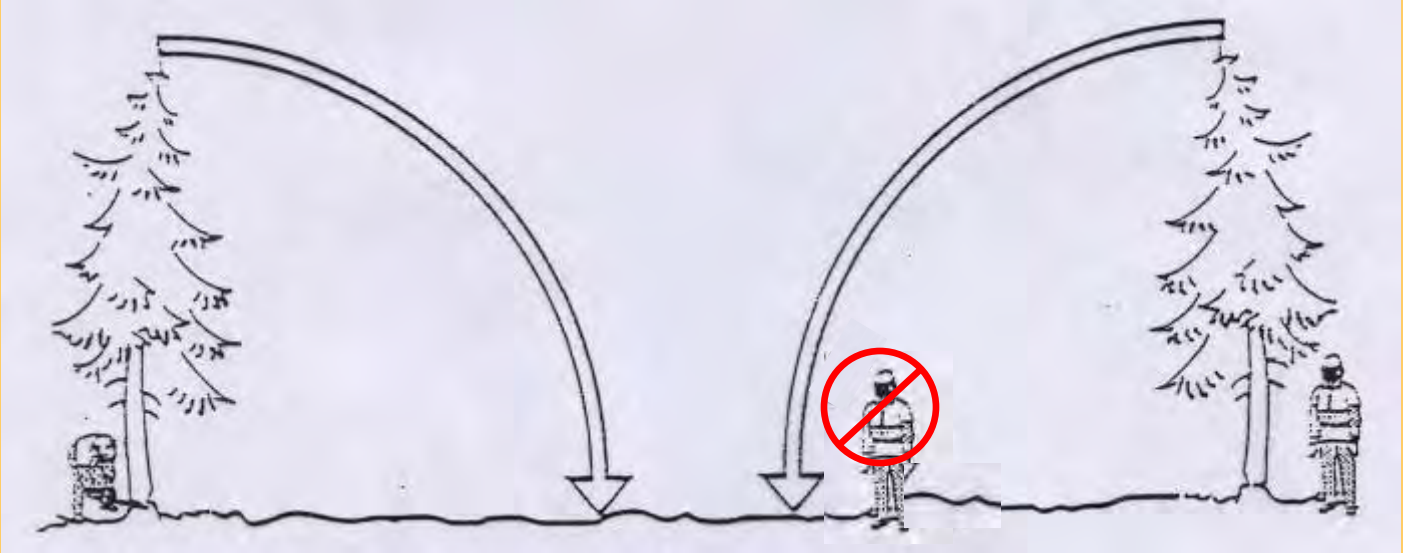
Felling

- Before a cut is started, a **feller shall check** for other employees and dead limbs, angle of tree, wind condition, location of other trees and other hazards, and plan his path of retreat. **R.5336(1)**
- Each assisting employee on the ground shall be instructed exactly what they are to do. Other employees shall be cleared to a distance of **twice the height** of the tree being cut. **R.5336(2)**

Felling

- The saw **shall be shut off** before the feller starts the retreat. **R.5336(6)**
- Where a tree is likely to slide or roll, a feller shall cut **from the uphill side**. **R.5336(7)**
- Just before the tree is ready to fall, an **audible warning** shall be given. **R.5336(8)**
- If there is a danger of a tree falling the wrong way, such a means as **wedges, block and tackle or rope** shall be used to control the fall. **R.5336(9)**

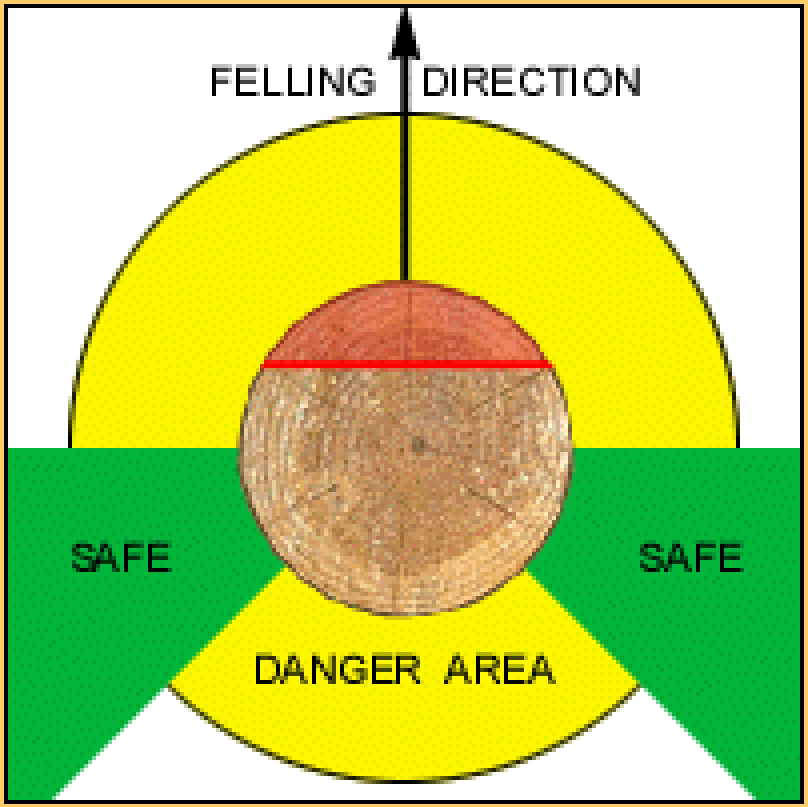
Drop Zones in Tree Felling



Safe Drop Zones

The **MIOSHA-required distance** between a tree that is to be felled and anyone else working nearby is **at least 2 tree lengths**. Make sure that no-one else is in this “drop zone” before or during felling.

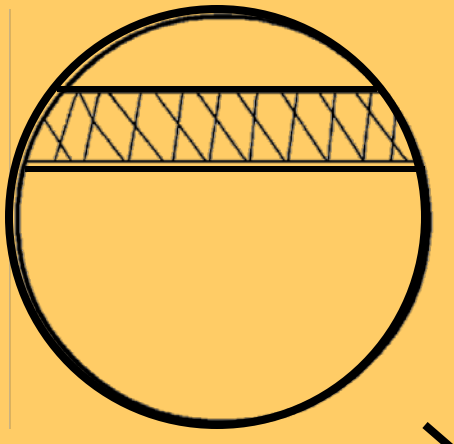
Retreat Path



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

Escape Route

Felling Direction



"Bad side" of tree

"Good side" of tree

Some side lean or most of the tree's weight on this side...

Escape Route

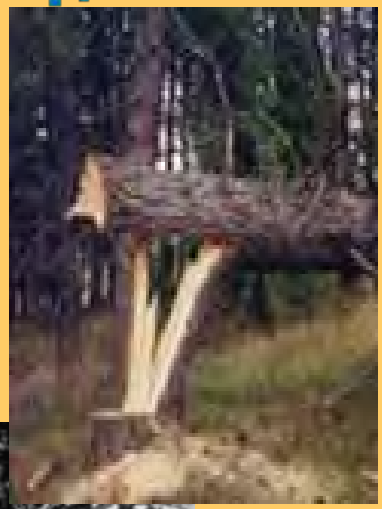
45° back & away

Felling Hazards

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 (discussed later in this program), no notch, or excessive front lean.



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. They should be pushed or pulled down by a machine.

- Caused by poor judgment of felling path or inaccurate cutting.

“Open Face” Felling

- Generally, the safest of all felling techniques is the “open face” technique. The “face cut” or “notch” is formed with a steeply angled, downward cut and a second cut angled slightly upward to meet the first cut, creating a notch opening of between 70 and 90 degrees.
- The open face cut allows the tree to be controlled all the way to the ground without the hinge being broken.

The “Open Face” Notch

Top cut should come in at 50-60 degrees.

Second cut forms notch and should come in at 20-30 degrees to form a 70-90 degree notch.

Open Face Felling

Notch: 70-90°

Hinge width: 80% of tree diameter

Hinge thickness: 10% of tree diameter

Backcut: level with and parallel to the apex of the notch.

Here a bore cut is used to form the back cut. Note that it is level with the apex of the notch.

Conventional & Humboldt Notches

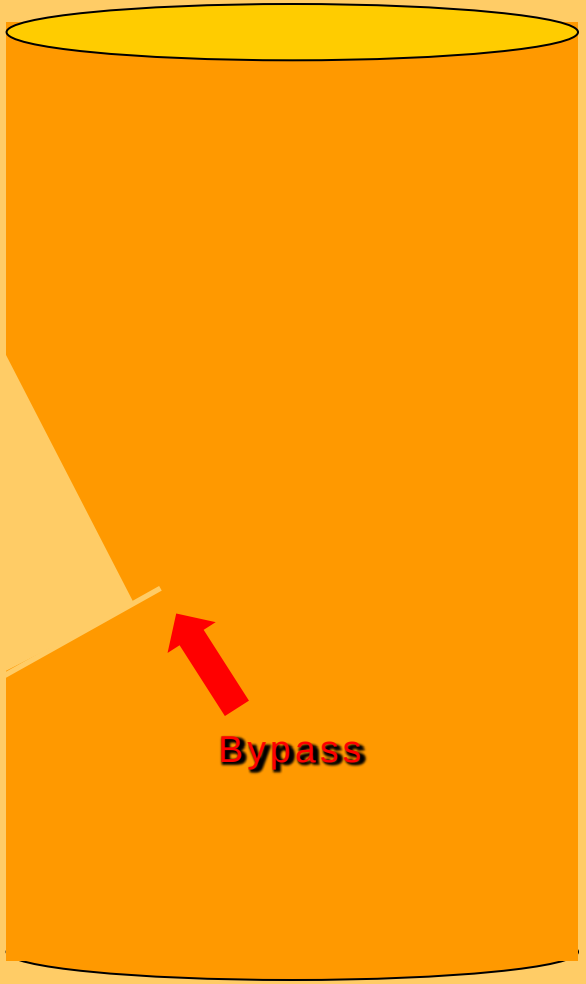
Notch opening: 45°

Back cut: parallel to and above the notch apex, creating a ledge to prevent the trunk from kicking back.

A Humboldt notch consists of a horizontal face cut and an angled cut below it. It is usually reserved for larger trees on steep slopes.

Quality Counts! Avoid Bypass

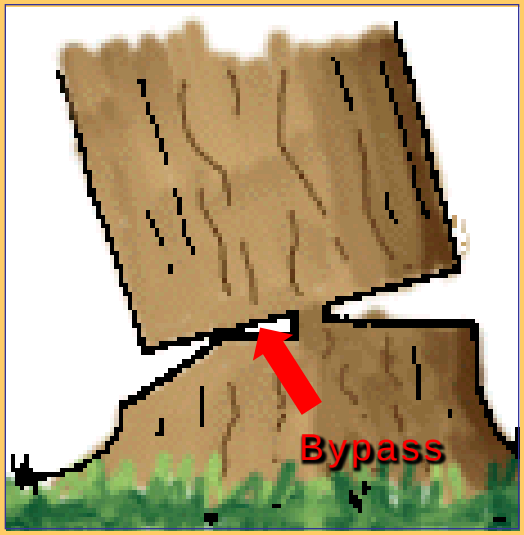
- "Bypass" is when one of the notch cuts extends beyond the endpoint of the other notch cut. Bypass creates undesirable results such as barber chairing, cracked tree butts, excessive fiber pull and misdirected fall of the tree.



Felling Hazards

Dutchman

- The seat that interferes with the notch closing
- Caused by bypass



Dutchman

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 why you 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 Humboldt 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 or too small of a notch opening.

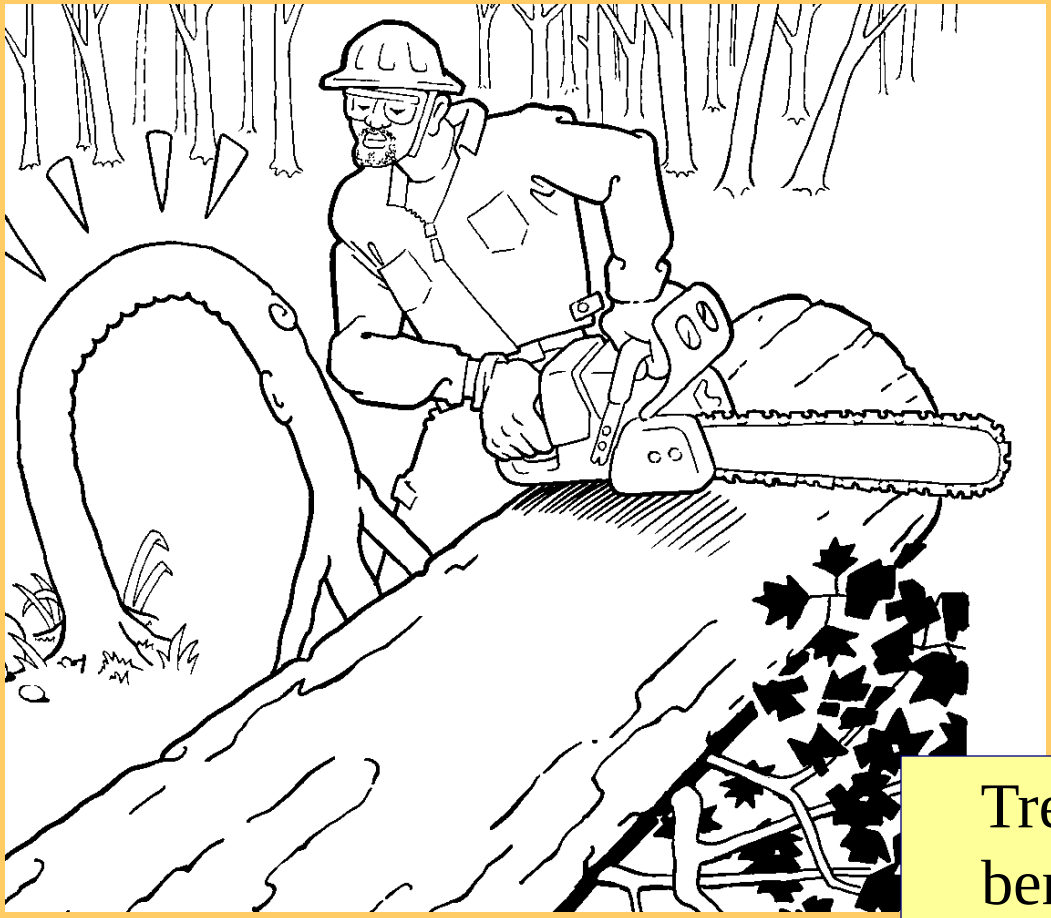
Barberchair

Splitting of the butt of the log as the tree falls.

Barber Chair trees can swing up and break your jaw or your neck!

Barber Chairs can be prevented by using a proper face cut.

Spring Poles



Tree limbs bent under tension.

Spring Poles are Dangerous!

Rules for operating around spring poles:

1 – Avoid if at all possible. Do not work anywhere near them.

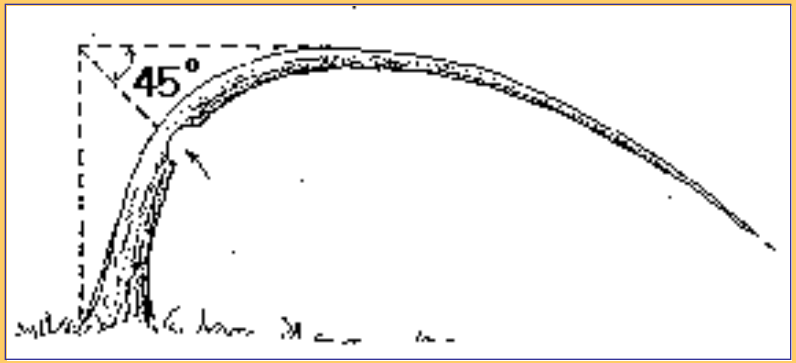
2 – If you cannot avoid them, the first option to make them safe is with mechanical equipment. Either use equipment to remove the tree/log causing the spring pole, or use a harvester to cut the spring pole.

3 – If mechanical equipment is not available, and if you MUST work near a spring pole, then it must be made safe. Use the information in the next slide as a **last resort**!

Spring Poles

The safest way to release a springpole is to shave a sufficient amount of wood from the underside of the springpole to allow the wood fiber on the top side to release slowly.

To decide optimum point of springpole release, determine a straight vertical line from the stump to where it meets a straight horizontal line from the highest point of bend, and come down at a 45° angle from where the two lines intersect.



Felling

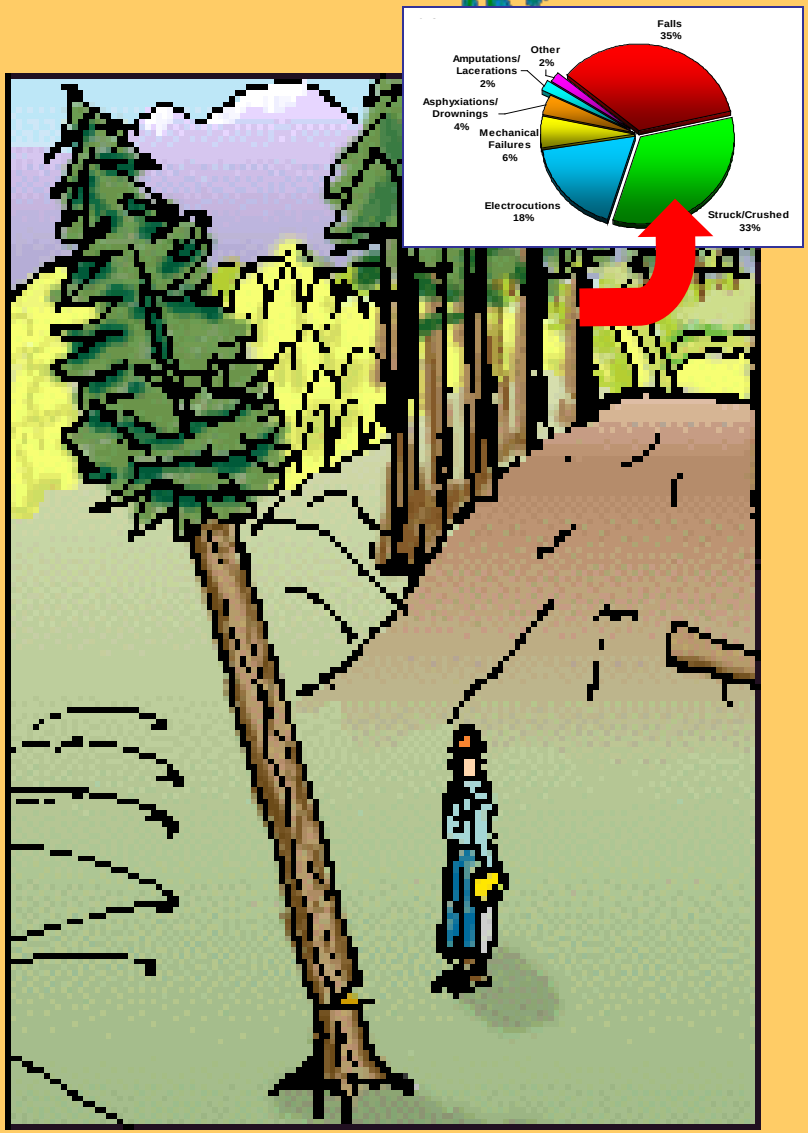
- A back cut shall leave sufficient hinge wood (the fiber between notch apex and back cut) to guide the tree's fall in the desired direction and to hold the tree to the stump during most of its fall. A back cut shall be about 2 inches (50.8mm) above the undercut and as level as possible (See figure 1). R.5336(4)*

* This standard provides guidance on the conventional and Humboldt felling techniques. Open-face felling came into widespread practice after this guidance was written.

Felling Trees

Almost *one-third* of all fatal struck-by accidents in tree care occur during tree felling.

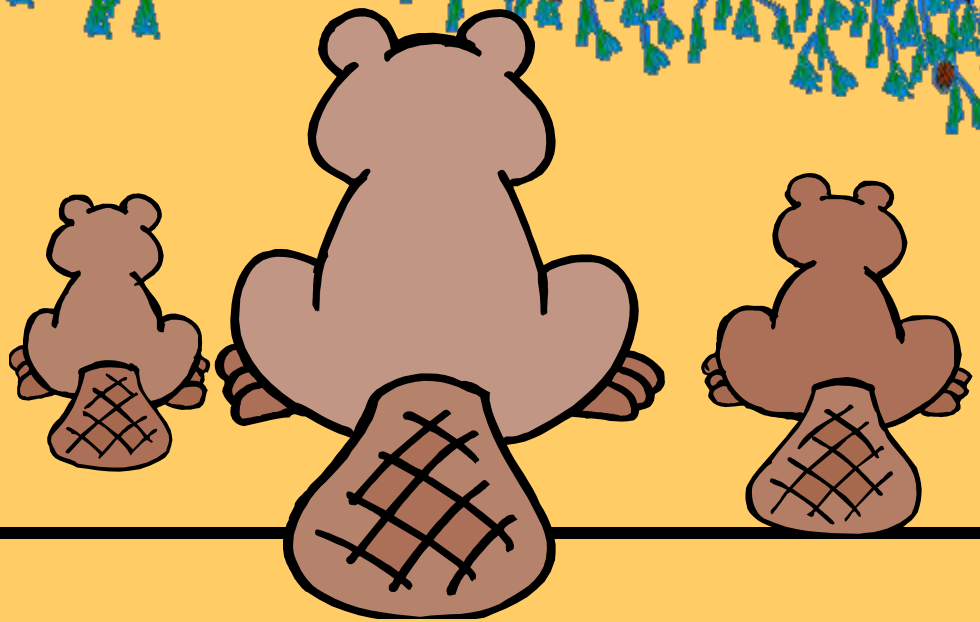
These accidents CAN be avoided!



Hurt at Work??

- You've carefully thought out all the angles.
- You've done it a thousand times.
- It comes naturally to you.
- You know what you're doing, its what you've been trained to do your whole life.
- Nothing could possibly go wrong, right?

Think Again!



Accidents can happen to anyone.
Training helps reduce accidents!

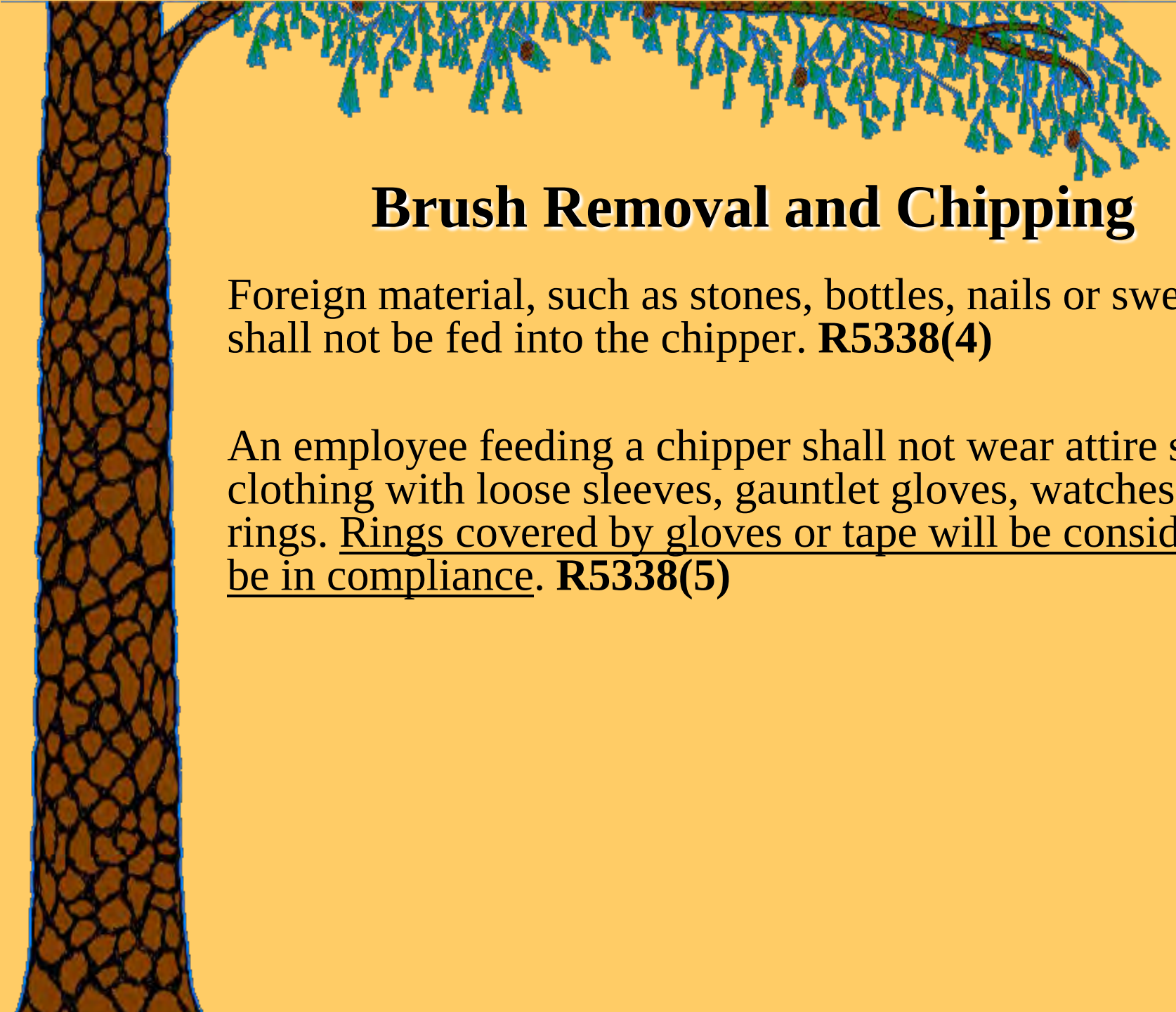
Brush Removal and Chipping

Don’t let cut brush or logs become a hazard in the work area. R5338(1)

A chipper **shall be fed from the side of the center line** of the opening and the employee feeding the chipper shall immediately turn away when brush is taken into the rotor chamber. Where applicable, the chipper shall be fed from the curb side. R5338(2)

Brush Removal and Chipping

An employee **shall not place any part of the body** on the chipper table nor shall the discharge chute be raised while the rotor is turning. **R5338(3)**



Brush Removal and Chipping

Foreign material, such as stones, bottles, nails or sweepings, shall not be fed into the chipper. **R5338(4)**

An employee feeding a chipper shall not wear attire such as, clothing with loose sleeves, gauntlet gloves, watches or rings. Rings covered by gloves or tape will be considered to be in compliance. **R5338(5)**

Tools And Equipment

- Provide auto **back up alarm** for mobile equipment where area is congested or vision of driver is obscured (if not assisted by other employee). **R.5341(4)**

Mobile Equipment

- Provide slip resistant surface, work platforms or steps. **R.5341(8)**
- Provide pad or traction for outrigger feet. **R.5341(9)**
- Require outriggers to be extended when lifting or digging. **R.5341(10)**

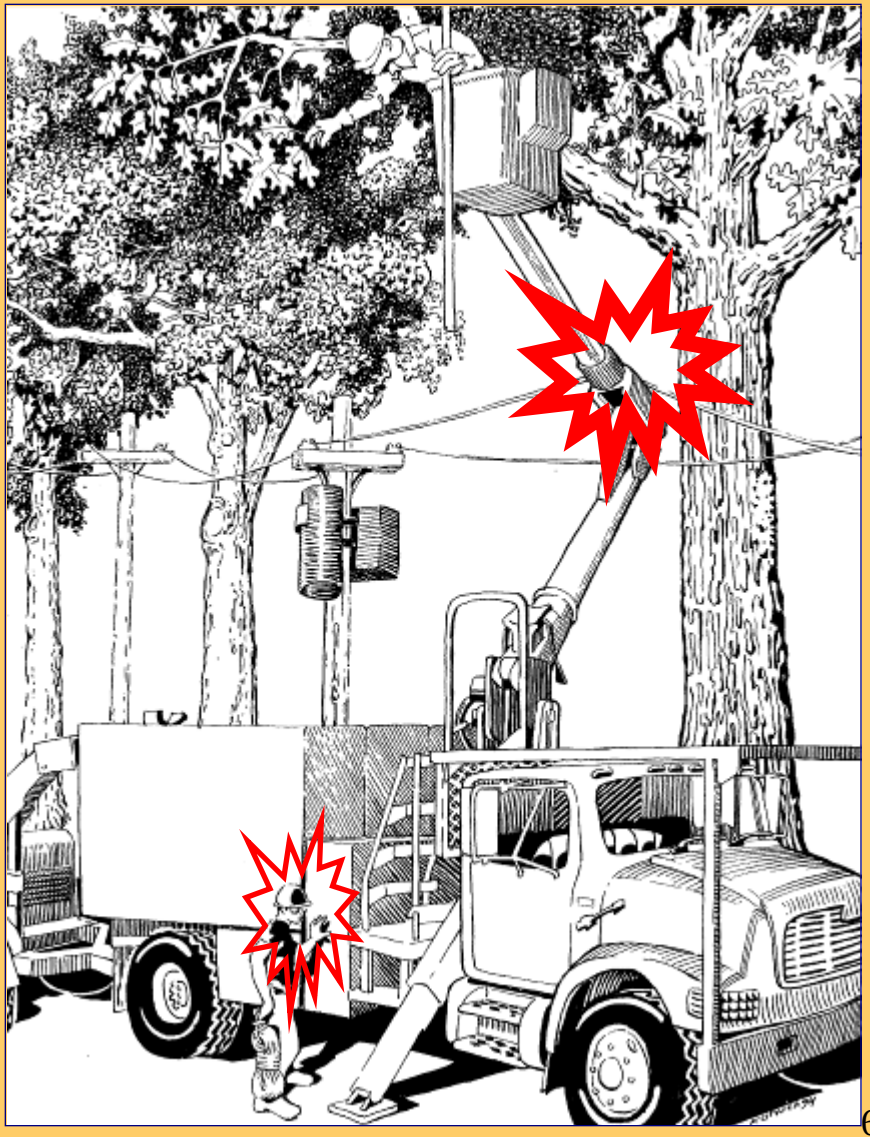
Aerial Lifts

- Aerial lift **shall not** be used for **“materials handling”** unless designed for it. R.5342(3)
- Employees cannot **ride in bucket** when lift is moved. R.5342(4)

- An aerial lift used for tree trimming, pruning or removal of a tree shall be used and maintained as prescribed in the General Industry Safety Standard, Part 58. R.5342(1)

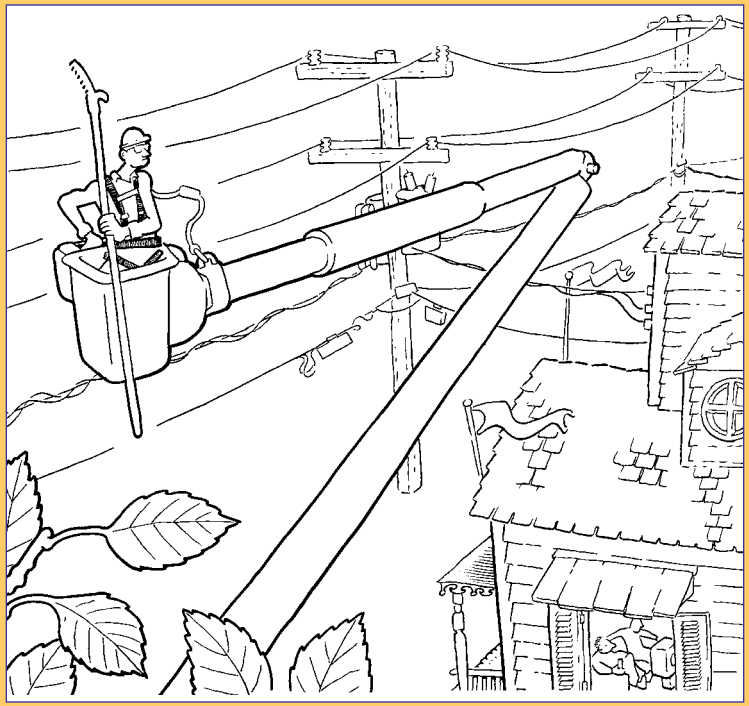
Danger!!

A bucket of an aerial lift **shall not** be depended on to be electrically insulated.
R.5342(2)



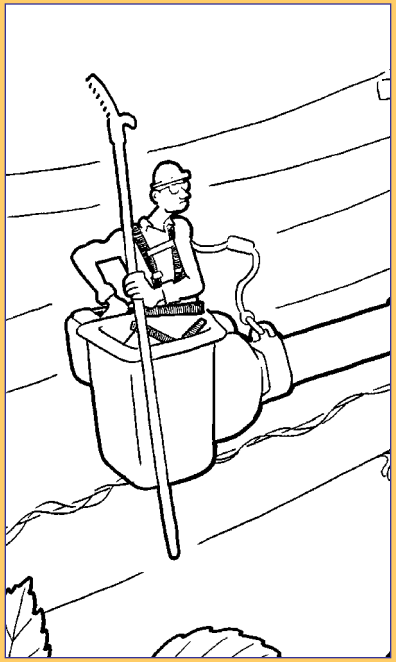
Part 58 - Vehicle Mounted Elevating and Rotating Work Platforms

This standard was revised as of **June, 2008**. If you operate aerials lifts, get a copy of Part 58 and make sure you are familiar with requirements.



Part 58 – Operator Training & Permitting

Rule 5815. (1) Employer provides each aerial lift operator with **training** regarding the equipment AND issues/re-issues **permits** to employees. Training include: purpose and function of controls; understanding the manufacturer's operating instructions and safety rules; and understanding all decals, warnings, and instructions displayed on the vehicle.



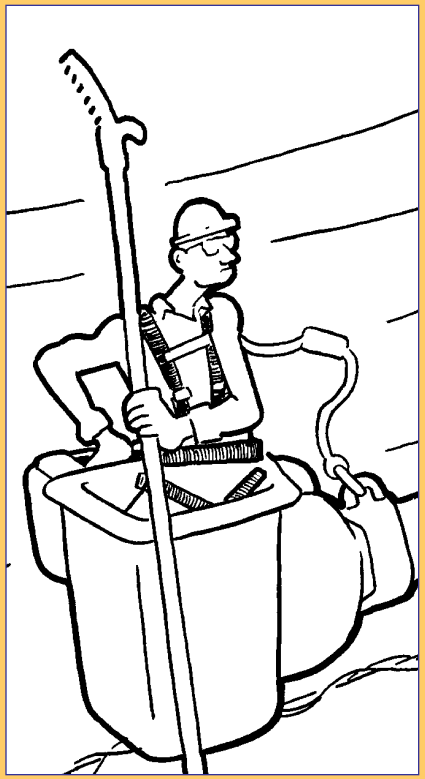
Part 58 – Lift Operator Permits

Rule 5815. (2) Employer provides the lift operator with a permit, signifying they have received training.

Rule 5815. (4) A permit shall be carried by the operator or be available at the job site/work place and shall be displayed upon request by a DLEG (MIOSHA) representative.

Rule 5815. (5) A permit shall indicate the type of aerial work platforms an operator …is qualified to operate.

Rule 5815. (6) Permit is valid only when working for the employer who issued it. A permit shall be issued for a period of not more than 3 years.



Part 58 – Lift Operator Permits

Rule 5815. (7) A permit shall contain **all of the following**:

(a) Firm name,

(b) operator's name,

(c) Name of issuing authority (Authorized by),

SAMPLE PERMIT

AERIAL WORK PLATFORM PERMIT

(Firm Name)

_____

(Name)

Type of aerial work platform authorized to operate:

Date Issued	Type	Authorized by	Expiration Date
	Articulating boom aerial device		

(d) The types of aerial lift the operator is authorized to operate (Example: articulating boom aerial device);

(e) Date issued; and

(f) Expiration date.

Notifying the Utility

Unless verified, assume all electrical parts are energized. If work must be done closer than the *minimum safe approach* distance, the owner of the lines must be contacted and the *energy isolated* **before** the minimum safe approach distances are encroached.

Part 58

Table 1- Minimum Clearance Distances for Equipment*

Voltage	Clearance with boom raised	Clearance, boom lowered and no load, in transit
0 to 50 kV	10 feet	4 feet
Over 50 kV	10 feet + 0.4 inch per each 1 kV over 50kV	10 feet
50 to 345 kV		10 feet
346 to 750 kV		15 feet

* Table 1 does not apply to qualified line clearance arborists (tree trimmers), qualified linemen or qualified telecommunications employees.

Part 58 – Aerial Lift Fall Protection

Insure use of a **body belt** and **lanyard** rigged as **fall restraint**; i.e., **so the employee cannot fall any distance**, or a **full-body harness** with **fall arrest lanyard** attached to boom or basket. R.5836(1)

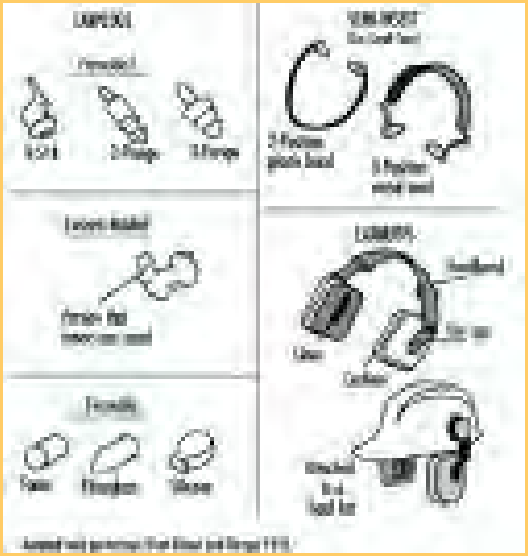
Part 58 – Aerial Lift Inspection & Maint.

Rule 5831(1)(a) Each aerial work platform shall be inspected, maintained, repaired, and kept in proper working condition in accordance with the manufacturer's or owner's operating/maintenance/repair manual(s).

Rule 5831(1)(b) Any aerial work platform found not to be in a safe operating condition shall be removed from service until repaired. All repairs shall be made by an authorized person.

Rule 5831(1)(c) If the aerial work platform is rated and used as an insulated aerial device, the electrical insulating components shall be tested for compliance with the rating of the aerial work platform in accordance with ANSI A92.2 - 2002.

Noise Exposure and Hearing Protection, Part 380



- Administer a continuing, **effective** hearing conservation program when employee noise exposures equal or exceed the action level.

Hearing Conservation Program

To be fully compliant, the employer must:

- Conduct noise **monitoring** (dosimeter testing)
- Establish and maintain an **audiometric** (hearing) testing program with ***baseline*** and ***annual*** testing.
- Provide at no cost to employees a selection of **hearing protection** (i.e., at least two types)
- Provide employee **training** on:
  - Effects of noise on hearing; purpose of hearing protection; and instructions on selection, fitting, use and care of hearing protection; purpose of audiometric testing and explanation of test procedures
- **Post** a copy of the standard
- Keep **records** of employee exposure and audiometric tests

Hearing Conservation Program

- Most employers do not have the equipment or expertise to conduct noise monitoring (dosimeter testing) on their own.

- In order to assist employers, a MIOSHA CET consultant can perform monitoring; or CET offers a "self-program" where they show the employer how to use the dosimeter and lend them the equipment.

How Many MIOSHA/ ANSI Violations Can You Spot?

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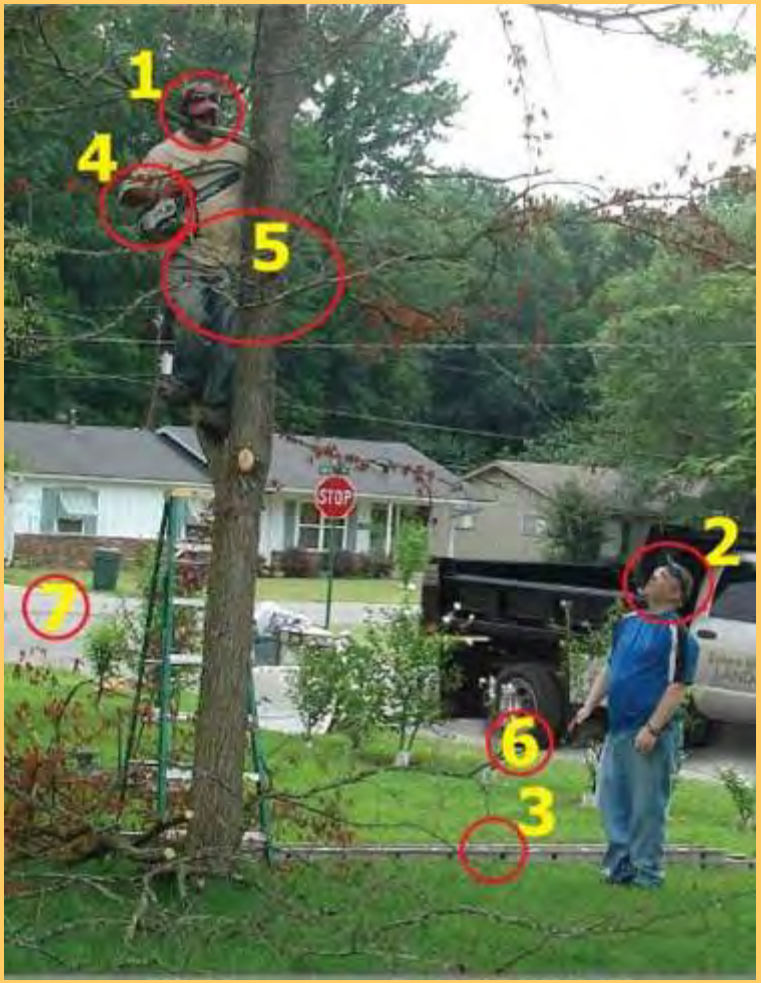
How Many MIOSHA/ ANSI Violations Can You Spot?



1. Climber lacks appropriate PPE
2. Ground person lacks appropriate PPE
3. Aluminum ladder – not to be used around electrical conductors
4. Chain saws must be operated with two hands
5. No fall protection
6. No wheel chocks
7. No traffic cones/signs

Remember, safety isn’t cheap, but it is priceless!

Green Industry Alliance Links

Arboriculture Society of Michigan (ASM)
www.asm-isa.org
Michigan Green Industry Association (MGIA)
www.landscape.org
Michigan Nursery and Landscape Association (MNLA)
www.mnla.org
Michigan Turfgrass Foundation (MTF)
www.michiganturfgrass.org
MIOSHA
www.michigan.gov/dleg
Tree Care Industry Association (TCIA)
www.tcia.org
Utility Line Clearance Coalition (ULCC)
www.theulcc.com

Thank You for Viewing this Presentation!

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