

Module 3:

Flammable and combustible liquids/SDS Low Sulfur Diesel
Powerlines
Separation of Operations
Chain Shot / Slasher Safety / Blind Spots



Flammable & Combustible Liquids

Definition: Safety Data Sheets (Replaces the MSDS book) convey a chemical's hazards.

1. Chemicals in the Workplace

- a. There are 750,000 hazardous chemicals used in the workplace around the world.
 - i. Hundreds more are added every year.
 - ii. Chemicals are used for a variety of purposes.
 - iii. Employees must know how to protect themselves from chemical hazards.
- b. What is a Hazardous Chemical?
 - i. A hazardous chemical is any substance that poses a physical or health hazard to you or others in the workplace.

2. Hazards of Chemicals

- a. Physical
 - i. Fires
 - ii. Explosions
- b. Health hazards:
 - i. Cancer
 - ii. Skin irritation
 - iii. Respiratory ailments
 - iv. Health Hazards can be Acute or Chronic
 1. Acute health hazards occur rapidly after an exposure.
 2. Chronic health hazards occur gradually after repeated exposures.
- c. There are three main "Routes of Entry"
 - i. Absorption
 1. Occurs when contact with exposed skin allows a chemical to be absorbed into the body.
 2. To prevent absorption, wear proper protective equipment:
 - a) Chemical gloves (Nitrile works well)
 - b) Aprons
 - c) Coveralls
 - ii. Inhalation
 1. Can occur when chemicals become airborne in the form of a vapor, mist or dust allowing them to be inhaled into the lungs.
 2. To prevent inhaling hazardous chemicals, you must select and use proper respiratory protection.
 - iii. Ingestion
 1. Can occur when hazardous chemicals are eaten or swallowed.
 - a) To avoid ingesting hazardous chemicals never do the following while handling hazardous chemicals:
 - i. Eat
 - ii. Drink
 - iii. Apply makeup.
 - iv. Always wash hands after handling chemicals.

3. There are three main sources of information used to convey a chemical's hazards
 - a. Chemical Manufacturer's Label is the first source of information
 - i. Manufacturer's Labels
 1. Manufacturer's labels provide the following information
 2. Commercial name of the chemical
 3. Name and address of the manufacturer
 4. Potential hazards
 5. Safe work practices
 6. PPE required
 - ii. Supplemental Hazard Labels
 - iii. Safety Data Sheets (SDS)
 1. The SDS includes information such as:
 - a) The physical, health, and environmental health hazards; protective measures
 - b) Safety precautions for handling, storing, and transporting the chemical.
 - c) The information contained in the SDS must be in English (although it may be in other languages as well).
 - d) OSHA requires that SDS preparers provide specific minimum information as detailed in Appendix D of 29 CFR 1910.1200.
 - i. The SDS preparers may also include additional information in various section(s).
 - ii. The SDS must also state that no applicable information was found when the preparer does not find relevant information for any required element.
 2. Safety Data Sheets Sections 1 through 8 contain General information:
 - a) Identification: includes product identifier; manufacturer or distributor name; address, phone number; emergency phone number; recommended use; restrictions on use.
 - b) Hazard(s): identification includes all hazards regarding the chemical; required label elements.
 - c) Composition: information on ingredients includes information on chemical ingredients; trade secret claims.
 - d) First-aid measures includes important symptoms/effects, acute, delayed; required treatment.
 - e) Fire-fighting measures lists suitable extinguishing techniques, equipment and chemical hazards from fire.
 - f) Accidental release measures list emergency procedures; protective equipment; proper methods of containment and cleanup.
 - g) Handling and storage lists precautions for safe handling and storage, including incompatibilities.
 - h) Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); ACGIH Threshold Limit Values (TLVs); and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the SDS where available as well as appropriate engineering controls; personal protective equipment (PPE).
 3. Sections 9 through 11 and 16, contain other technical and scientific information.
 - a) Physical & chemical properties list the chemical's characteristics.
 - b) Stability & reactivity list chemical stability and possibility of hazardous reactions.

- c) Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.
 - d) Exposure control
 - e) Other Information includes date of preparation or last revision.
4. The SDS must also contain Sections 12 through 15 to be consistent with the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS), but OSHA will not enforce the content of these sections because they concern matters handled by other agencies. Sections 12 through 15 include:
- a) Ecological Information
 - b) Disposal Information
 - c) Transport Information
 - d) Regulatory Information
5. Employers must ensure that SDSs are readily accessible to employees.
6. SDS Pictograms:



a) Health Hazard

- i. **Carcinogen:** A substance capable of causing cancer in living tissue.
- ii. **Mutagenicity:** A mutagen is a physical or chemical agent that changes the genetic material.
- ii. **Reproductive Toxicity:** Includes adverse effects on sexual function and fertility in adult males and females.
- iii. **Respiratory Sensitizer:** Means a chemical that will lead to hypersensitivity of the airways following inhalation of the chemical (See Appendix A to 29 CFR 1910.1200, section A. 4.). In contrast to **respiratory** irritation, **respiratory** sensitization is an immunological response to previous exposure to a chemical.
- iv. **Target Organ Toxicity: (Specific target organ toxicity (single exposure) (STOT-SE))** means specific non-lethal effects on organs or organ systems in the body following single exposure to a chemical. All significant health effects that can impair function, whether reversible or irreversible, occurring immediately after exposure or following a delay, are included in this category of hazard.
- v. **Aspiration Toxicity:** Means the entry of a liquid or solid chemical directly through the oral or nasal cavity, or indirectly from vomiting, into the trachea (windpipe) and lower respiratory system.

b) Flame

- i. **Flammables:** liquid is a combustible liquid which can be easily ignited in air at ambient temperatures.
- ii. **Pyrophorics:** is a substance that ignites spontaneously in air at or below 54 °C (129 °F, for gases) or within 5 minutes after coming into contact with air for liquids and solids.
- iii. **Self-Heating:** self-ignition, and spontaneous combustion.
- iv. **Emits Flammable Gas:** means a solid or liquid substance or mixture which, by interaction with water, is liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.
- v. **Self-Reactives:** A thermally unstable liquid or solid substance liable to undergo a strongly exothermic decomposition even without participation of oxygen (air).
- vi. **Organic Peroxides:** The peroxy group is chemically unstable and can decompose with varying degrees of severity. All organic peroxides will burn vigorously, and once ignited will be difficult to extinguish.



c) Exclamation Mark

- i. Irritant (skin and eye)
- ii. Skin Sensitizer
- iii. Acute Toxicity (harmful)
- iii. Narcotic Effects: is associated with a variety of effects including drowsiness, itching, sleeplessness, inability to concentrate, apathy, lessened physical activity, constriction of the pupils, dilation of the subcutaneous blood vessels causing flushing of the face and neck, constipation, nausea, vomiting and, most significantly, respiratory depression.
- iv. Respiratory Tract Irritant
- v. Hazardous to Ozone Layer (Non-Mandatory)

d) Gas Cylinder

- i. Gases Under Pressure

e) Corrosion

- i. Skin Corrosion/Burns
- ii. Eye Damage
- iii. Corrosive to Metals



f) Exploding Bomb

- i. Explosives
- ii. Self-Reactives
- iii. Organic Peroxides

g) Flame Over Circle

- i. Oxidizers



h) Skull and Crossbones

- i. Acute Toxicity (fatal or toxic)

i) Environment (Non-Mandatory)

- i. Aquatic Toxicity

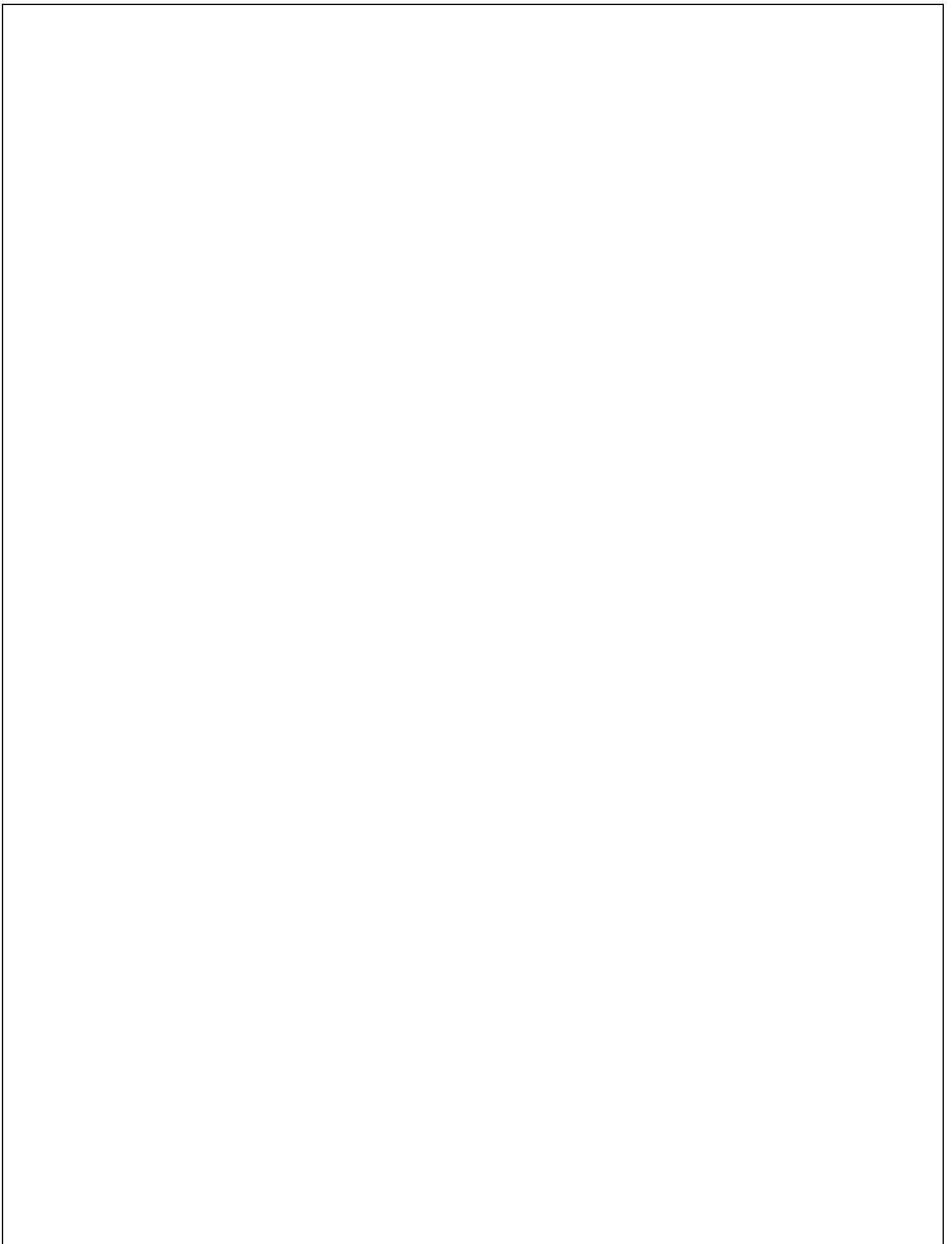


4. Have a plan when handling chemicals.

a. Storage: Understand the rules

- i. Check the label for any specific instructions.
- ii. Protect from any potential ignition sources.
- iii. Keep all equipment that will come in contact with the product
- iv. Practice good hygiene when working with the products.
- v. Most lubricants come as packaged goods in drums, cases, pails or other similar containers. All containers should be handled with care and the heavier containers should be loaded and unloaded with a forklift. Dropping the containers could result in leakage. When storing the lubricants, remember:
 - a) Outdoor storage is never recommended under any circumstance. Even inside the drums, exposure to the elements and varying temperatures can alter lubricant properties. Containers themselves can also be damaged. Drums in particular should never be stored outdoors. If drums must be stored outside, they should be laid sideways holes horizontally or slightly tilted using a block, so water does not pool on top.
 - b) Storage in a warehouse or indoors is preferred. Product should be handled in a safe manner with labels clearly visible. Ensure all handling equipment conforms to the appropriate safety standards, as it will be required to move drums. Lubricants stored in a warehouse should follow the "first in, first out" rule.

- c) In any capacity, make sure products are labeled properly and in accordance with the appropriate regulations.
 - a. Example of regulations:
 - 1. Oxygen and Acetylene spare cylinders can't be stored together, but they can be on a cart together if they are being used.
 - 2. The secondary containment system "must have sufficient capacity to contain at least 10% of the total volume of the primary containers or 100% of the volume of the largest container, whichever is greater."



Group Activity

Chemical name	Section 4	Section 5	Section 11	Pictograms?



Name: _____

Flammable & Combustible Liquids Quiz

1. Safety Data Sheets (SDS) replaces what?

- A. The Right to Know
- B. Nothing
- C. DOT
- D. NIOSH
- E. Material Safety Data Sheets (MSDS)

2. What is in Section 5 of the SDS?

- A. A pictogram
- B. 1st Aid
- C. Fire Fighting measures
- D. Nothing useful

3. What does this pictogram mean?

- A. Carcinogen & Mutagenicity
- B. Reproductive, Aspiration & Target Organ Toxicity
- C. Respiratory Sensitizer
- D. All of Above



4. Can you store Oxygen and Acetylene together?

- A. True
- B. False

5. Is Section 8 of the SDS, Exposure controls/personal protection?

- A. True
- B. False



Ultra-Low Sulfur Diesel

Definition: Ultra-low sulfur diesel fuel has been refined so that its sulfur content is 15 parts per million (ppm) or less. This is 97 percent cleaner than the standard highway-use diesel fuel sold in the US, which contains an average of 500 ppm of sulfur.

1. What has changed:

- a. Flash point - is the lowest temperature at which a liquid can give off vapor to form an ignitable mixture in air near the surface of the liquid. (The lower the flash point, the easier it is to ignite the material.)



- i. Old Historic Diesel: Flash Point: >130°F/>54°
- ii. Low Sulfur Diesel: Flash Point: >125°F/>52°
- iii. **Ultra-Low Sulfur Diesel: Flash point > 100.0 °F (> 37.8 °C)**

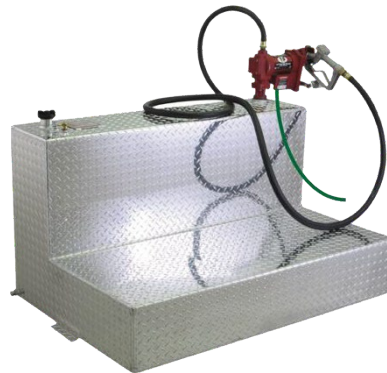
2. Why this matters?

- a. It is not hard for our Diesel tanks to reach 100°F
- b. At 100°F Diesel is dangerous
 - i. Ignition can come from
 - 1. Smoking
 - 2. Static Electricity
 - 3. Any spark



3. What can be done to mitigate the danger?

- a. Don't smoke while handling Ultra Low Sulfur Diesel
- b. Ground the Diesel transfer pump
- c. Use fuel hose that has the grounded wire inside (sometimes cheaper than the hoses that don't have the grounded wire)
- d. Pay attention on what you are doing to avoid producing a spark while fueling
- e. Wear PPE
 - i. Gloves
 - ii. Eye protection





Powerline Safety

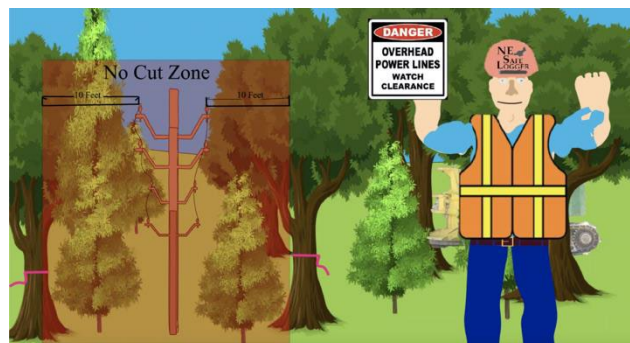
1. Guidelines:

- a. Look
- b. Identify
- c. Mark the unsafe zone.
 - i. There is no rule on what you need use just that you need to mark the unsafe zone.

1. Example of possible signs.



2. You can also use ribbon also.

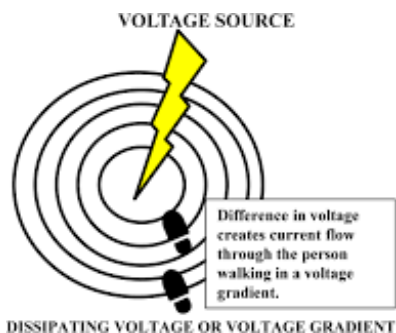


d. Safe Distances: Don't be greedy!

- i. You should never operate a piece of equipment closer than 10 feet from an energized residential powerline. 20 feet from larger voltage powerlines.
- ii. 10 or 20 feet includes equipment booms, trees, and tree branches.

2. What do you do if you come in contact with a powerline?

- a. Stop
- b. See if you can get off the line without doing any more damage.
 - i. If you can get off the line without doing any more damage
 1. Call the power company to have them come out and inspect the lines. (i.e., You can do damage 2,500 feet away and never know it and endanger yourself, your employees, and the public).
 2. If you see any damage, stay away, call the power company tell them what you have done.
 - ii. If you can't get off the powerline.
 1. Stay in the piece of equipment unless it catches fire.
 2. Warn everybody to stay away (no closer than 200 feet)
 3. Call the power company to report that you have contacted a power line and that you can't get off the line.
 4. Make yourself comfortable you will be there awhile.
 - a. Do not Pee off the machine. (Urine conducts electricity)
 5. If you have to get off the piece of equipment:



- a. Only get off if it is an emergency. Because of Step & Touch Potential
- b. Never touch the ground and the machine at the same time (Touch Potential).
- c. This is the one time that you should not use 3-point contact.
- d. Climb down as close to the ground as you can get then jump.
- e. Do not jump for distance jump for a good landing (Step Potential)
- f. Land with your feet together without taking a step.
- g. Then either shuffle your feet or hop away from the machine until you are 200 feet away.
- h. When you hit a powerline, you make a connection with the ground, essentially electrifying the ground.
- i. Good Video on Step & Touch Potential (The video says that you only need to get 30 meters (99 Feet) away. My research says because you cannot tell how well the ground will conduct electricity double the distance to 200 feet).
Youtube video: https://www.youtube.com/watch?v=E_Oug-mngLM
 - i. Make sure nobody gets any closer then 200 feet until the power company tells you that the power is off.
 - ii. Keep everyone away!
 - iii. Contact the power company (in doubt of that number call 911).

3. Osha Standard

- a. 1910.266(d)(8) "Overhead electric lines."
- b. 1910.266(d)(8)(i) Logging operations near overhead electric lines shall be done in accordance with the requirements of 29 CFR 1910.333(c)(3).
- c. 1910.266(d)(8)(ii) The employer shall notify the power company immediately if a felled tree makes contact with any power line. Each employee shall remain clear of the area until the power company advises that there are no electrical hazards.



Powerline Class Quiz

1. What are the steps of marking the powerlines?
 - a. Look, Identify, Mark... Don't be greedy!
 - b. Look, Ignore, Cut, Run!
 - c. Live, Love, Die, Rot!
 - d. Look, Identify, Mark, Cut it all!

2. What are the steps if you hit a powerline?
 - a. Jump, Run, Tell no one!
 - b. Get off the line (if you can), Warn everyone, Call the Power company & 911
 - c. Rip, Tear, Cut!
 - d. Get the off the line no matter what it takes!

3. What do you do if you can't get off the line?
 - a. Stay in the equipment (unless it is not safe to stay (i.e., Fire), Warn everyone to stayaway, Call the power company or Dial 911, Kick back & relax!
 - b. Get out of the equipment, Go home, Wait until the boss calls you!
 - c. Get out of the equipment, Do Jumping Jacks until your legs are tired!
 - d. Stay in the equipment, call 911, sleep!

4. If your equipment has made contact with an electrical line and you have to leave it due to an emergency, what should you do?"
 - a. Stay out of the smoke, get a low as you can without touching the ground, Jump to the ground with a good landing, shuffle or bunny hop until you are 200 feet away.
 - b. Jump as far as you can from the equipment, Scream, Run!
 - c. Jump high, land with your legs apart, Walk quickly away!
 - d. Jump, Run, Go home until your boss calls you back!



Separation of Operations

Separation of Operations Definition: This is the distance that people / equipment need to stay away from each other while working.

1. Each piece of equipment has an area around it that is not safe to be in when operating. Every piece is different but predictable.
 - a. Rule 1:
 - i. Never get any closer to a piece of logging equipment than 2 tree lengths or the distance that is written on the machine. (Usually on the boom). A feller buncher often has 100 meters written on the boom (100 Meters is equal to 328 feet or more like 5 tree lengths away)
 - b. Rule 2:
 - i. You can get closer than rule 1 if you have a plan and it is safe to do so and all the operators know the plan.
 - ii. Example- A grapple skidder needs to get closer than two tree lengths to a stroke delimeter. So, the grapple & limber operator need to have a plan and a way to communicate the plan. (Radio, lights, hand signals). All operators are allowed to change the plan or stop as long as they communicate their needs.
 - c. Communication is key. Nobody moves until the plan is agreed to and confirmed.
2. The Separation Of Operation OSHA standard (1910.266(d)(6), 1910.266(d)(6)(i), 1910.266(d)(6)(ii))
 - a. 1910.266(d)(6) Work areas.
 - i. 1910.266(d)(6)(i). Employees shall be spaced and the duties of each employee shall be organized so the actions of one employee will not create a hazard for any other employee.
 - ii. 1910.266(d)(6)(ii). Work areas shall be assigned so that trees cannot fall into an adjacent occupied work area. The distance between adjacent occupied work areas shall be at least two tree lengths of the trees being felled. The distance between adjacent occupied work areas shall reflect the degree of slope, the density of the growth, the height of the trees, the soil structure and other hazards reasonably anticipated at that work site. A distance of greater than two tree lengths shall be maintained between adjacent occupied work areas on any slope where rolling or sliding of trees or logs is reasonably foreseeable.



Group Activity

Scenarios

Scenario 1: The forester drives in on the job and needs to drive by a crane, slashing pine logs. How does the forester get by the crane?

- i. Solution 1: The forester waits until the crane operator sees him and grounds his boom and motions him by.
- ii. Solution 2: The forester calls the crane operator on the CB and asked to go by, and the forester waits for the crane operator to grounds the boom and tell the forester he can drive by.

Scenario 2: A grapple needs to skid by a working feller buncher.

- i. Solution 1: The grapple waits for the buncher to see the grapple and stops and grounds the head and motions the grapple by.
- ii. Solution 2: The grapple operator calls the buncher on the radio and the buncher stops and grounds the head and calls the grapple by.

Scenario 3: A hand feller needs to drop trees on a steep bank to a processor.

- i. Solution 1: Make a plan for the cutter to stay 500 away from the processor, and communicate with the each other by radio, phone or hand signals. Make sure they set a time that every (15 minutes or every other tree dropped) that they talk.
- ii. Solution 2: The processor stays behind the trees dropped and keeps the cutter in his sight, stopping and making contact with the cutter at regular intervals.



Chain Shot & Slasher Safety

Definitions:

Chain Shot: When a piece of saw chain separates from the end of a broken chain and travels at high speed. Chain shot can travel at the speed and force of a bullet.

Circular Slasher Saw: Saw that that can be attached to a crane or head of a delimber.

Safe Procedures:

- A. Make a plan for approaching saws (processor / fella buncher / Crane – slasher)
- B. Persons or equipment should never be in the “danger cone”.
- C. Always use good communication between employees.

The following has been excerpted from:

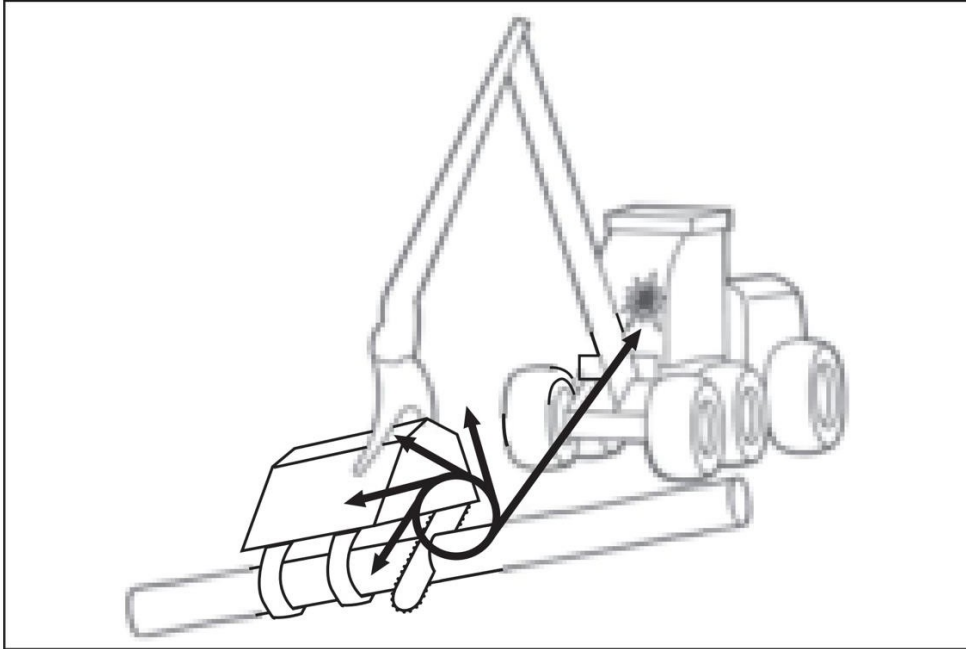
OREGON®

Mechanical Timber Harvesting Handbook

- a. Never engage in a cut with the machine operator, ground personnel or bystanders in the shot cone zone.
 - b. Always engage in a cut as close to the ground as possible.
 - c. Always use new parts when assembling and repairing saw chain.
 - d. Maintain saw chain in agreement with your manufacturer’s recommendations.
 - e. Never force a dull saw chain to cut. Sharp chain places less wear and tear on the cutting system.
 - f. Saw chain should be sharpened or replaced with a sharp chain at least once per operational shift, or more if damaged.
 - g. Depth gauges (rakers) must be maintained through the life of a saw chain.
 - h. Never exceed your saw chain manufacturer’s operation recommendations.
 - i. In cold cutting conditions:
 - i. Use a lighter-weight lubricant, if possible, doubling the flow rate.
 - ii. Periodically cycle the guide bar without cutting (air cuts) to increase lubricant present on the cutting system.
 - iii. Reduce bar feed force.
2. Conduct proper guide bar maintenance:
- a. Clean the guide bar groove from bar tip to bar tail and keep the oil hole open.
 - b. Turn the guide bar over to equalize wear on a daily basis.
 - c. Cycle the guide bar several times to remove moisture from the guide bar tip.
 - d. Ensure you maintain proper chain tension, checking it often.
 - e. At breaks and at the end of each shift, relieve saw chain tension to prevent damage to the guide bar tip, saw motor and/or the saw chain as the saw chain cools and contracts.
 - f. Reduce saw chain speed.



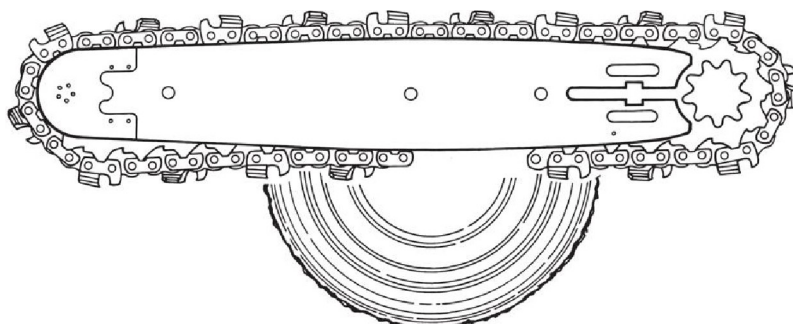
3. What is chain shot?



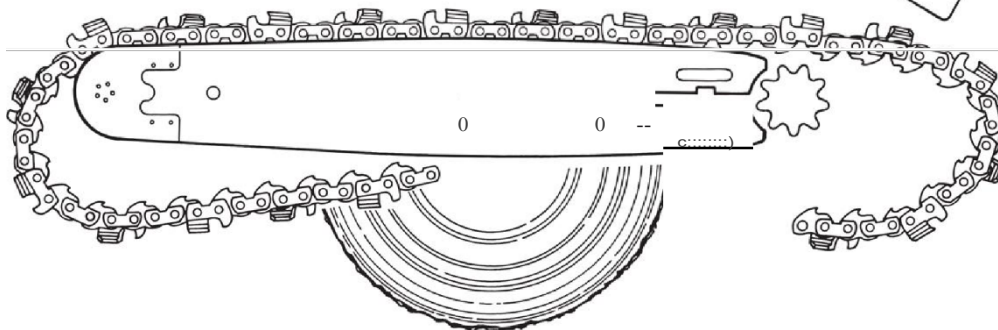
Chain shot can cause chain parts to be thrown in many directions, especially those along the plane of the saw bar.



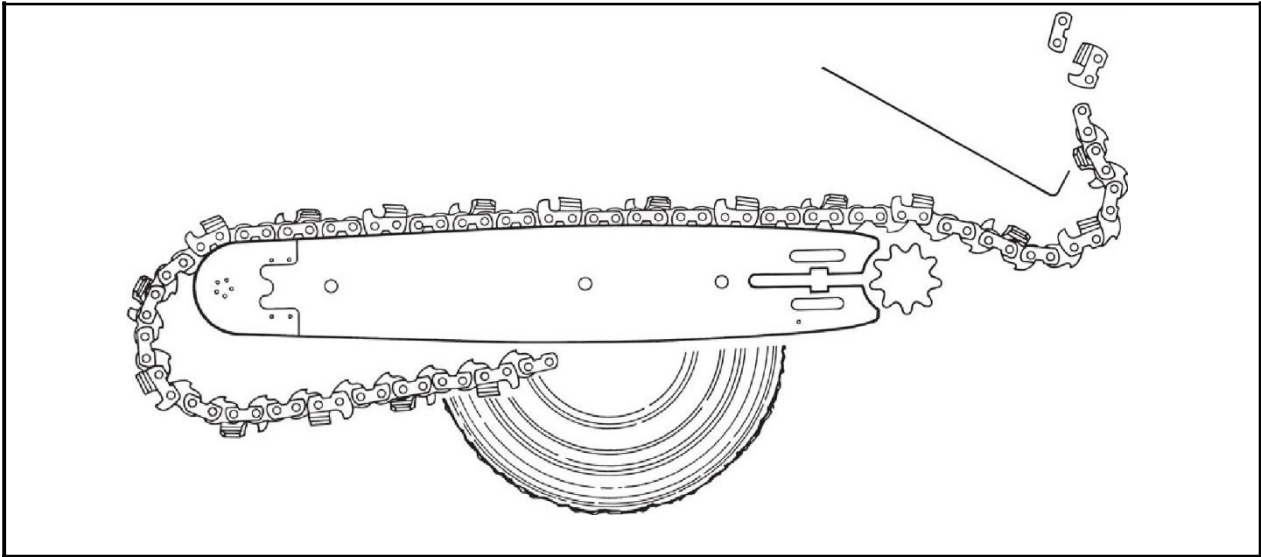
HOW CHAIN SHOT HAPPENS



1. After a chain break, the "free" end of the chain begins to whip away from the break.

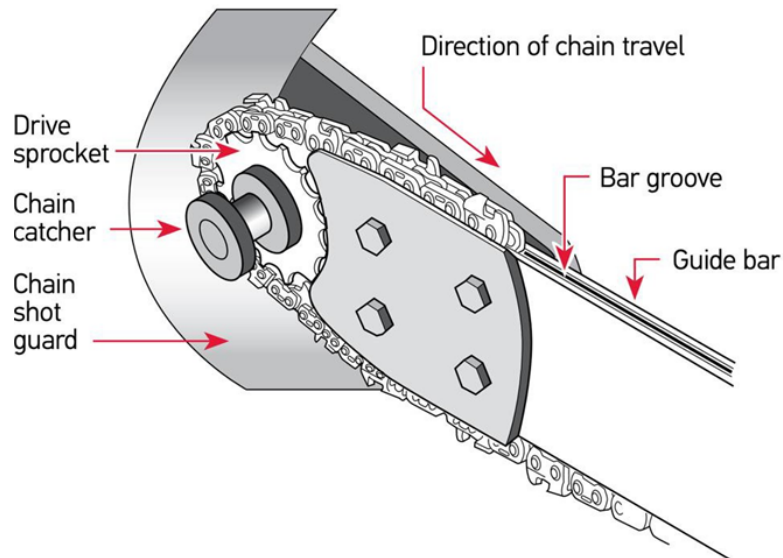


2. If the chain is not contained by the saw box or an energy-absorbing guard, the broken chain's free end can speed up rapidly and carry immense dynamic energy.
-



3. At the peak of the whip, chain parts may break loose and be ejected at high speed, especially if the free end of the chain strikes the saw box.

Parts of Chain & Bar System:



4. Circular saw safety.
 a. Clean & Inspection daily

- i. Look for:
1. Cracks
 2. Loose bolts
 3. Loose bearings
 4. Missing teeth
 5. Broken guards



- ii. Proper instillation:
 - 1. Bolts torqued
 - 2. Shimmed correctly
 - 3. Saw square
 - 4. Saw spins by hand smoothly

- 5. Make a plan with all operators about chain shot & Slasher Saw safety.
 - a. This is everybody's responsibility!
 - b. Communicate if you need to cross the danger zone so the operator can stop & wait for you to pass.
 - i. Only pass when all affected understand the plan and have stopped working.
 - c. Think long term safety when you set the yard up.

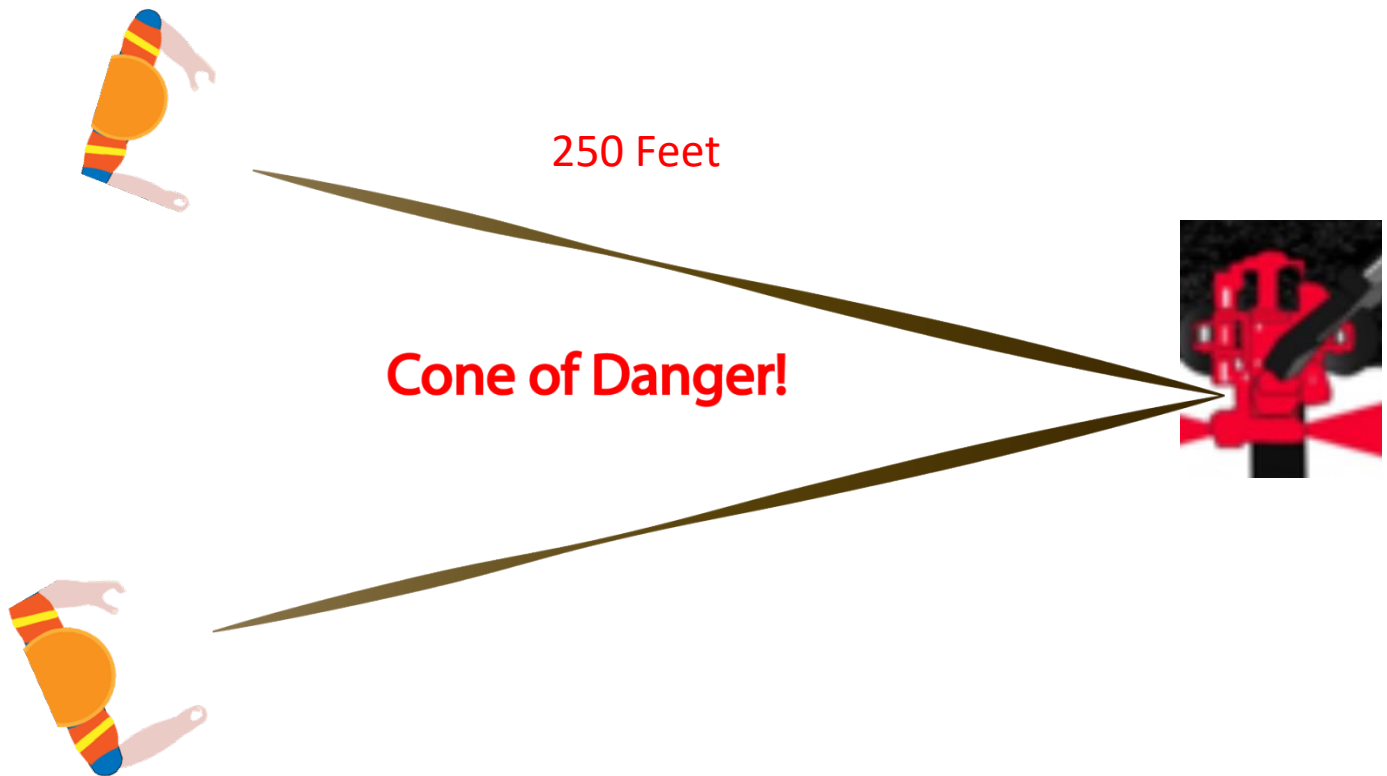
Resource: Slasher Saw Falls Off: https://www.youtube.com/watch?v=BLUP_YR-IEw (A little long but good to see a saw fall off. You may not want to watch the whole video.)

The Saw falls off at 4:44 mark -Then jump ahead to 6:31 end at 7:07. Feel free to watch it all and decide for yourself.



Group Activity

1. Bring 500 feet of rope. Mark the center of the rope ahead of time.
2. If possible, use a processor head or slasher (if not simulate a processor head or slasher).
3. Position a student holding the center of the rope at the processor (orSlasher) head. Lined up with the saw.
4. Have two students stand where they think it is safe to stand in reference to the saw. Have them stand there until the next two students walk out with the rope and see what they think.
5. Have two students walk away with each holding the ends of the rope until they hold the rope tight simulation the "cone of danger".



Name: _____

Chain Shot / Slasher Safety

1. What is the recommendation distance for standing or in a piece of equipment to a processor?
 - A. 100 feet.
 - B. 124 feet
 - C. 300 feet
 - D. 500 feet
 - E. 250 feet

2. Who is responsible for saw safety?
 - A. The Slasher / CLT Processor Operator
 - B. The Boss
 - C. You, Me, the boss (everyone)
 - D. Me

3. _____ is the most important thing you can do today?
 - A. Eating
 - B. Clock in
 - C. Good Communication
 - D. None of the above

4. Everybody on the job needs to know the plan.
 - A. True
 - B. False

5. Equipment should be checked daily.
 - A. True
 - B. False