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Feedback is welcome and may be sent to training@bcforestsafe.org

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Unit Introduction

What you will learn in this unit

By the end of this unit, you will be able to demonstrate knowledge of:

- Forest Harvesting Systems and Terminology
- Logging Plans

Section 1090-01: Forest Harvesting Systems and Terminology

What you will learn in this section

1.1 Cable logging, ground based mechanized harvesting, and related terms

1.2 Safety related to ground-based mechanized harvesting

1.3 Safety related to cable logging systems

Key Point 1.1: Cable Logging, Ground Based Mechanized Harvesting, and Related Terms

Cable logging is a practice used for logging on steep terrain. Cable logging is also used in areas that are not easily accessible or where equipment could cause damage to the forest floor.

It is a more environmentally friendly alternative to mechanized harvesting because it has a lesser impact on the forest floor and surrounding area and it reduces the need for a high density of roads to be built to access the harvestable trees.



Grapple yarder set up near Golden (photo by Chris Cole, RPF, PEng)

Manual tree falling is usually used in cable yarding blocks. Cable logging machines ("yarders") are then positioned and anchored on the landing or road, and use one or more cables to drag the logs from the felling site to the landing or roadside where they are delimbed and cut to length, usually by a processor. Cable systems require that a path be cleared in a straight line from the yarder to the backline anchor. Furthermore, the path must have a ground profile to accommodate the load path as it supports the payload.



The two main types of cable yarding machines are grapple yarders and towers.

Swing (Grapple) Yarder

A grapple yarder, also known as a swing yarder, is used for pulling logs from the woods to a logging road landing with a cable yarding system.

The grapple yarder has a large boom and two cables extending out from the landing site to felled logs in the cutblock. At the far end of the harvesting site, the cables are secured by a backspar. The backspar is often anchored onto an excavator or dozer so that the extended cables resemble a clothesline. Modern swing yarders and their winches are powered by hydraulics, providing high winch speeds for efficiency.

Swing yarders are manufactured in many sizes and configurations to suit the terrain. Many are self-propelled, their rotating structure and inclined boom can be mounted on either rubber-tired or track propelled vehicles.

Swing yarders can now be equipped with cameras above the grapple so the operator back in the cab can see the grapple, log, and surrounding area during operation, and while the grapple is out several hundred meters from the yarder cab.



Grapple yarder. Source: Chris Cole, RPF, PEng

While there are various rigging options, the most common one uses a grapple that can be lowered onto a log and closed around it via the cable system. Using a grapple avoids the need for people in the setting to attach chokers to the log.

The grapple yarder is used as an alternative to a skidder in specific types of terrain. Grapple yarders perform best in terrain where a skidder cannot travel or where skidder operation would cause environmental damage.

An experienced operator uses timing and cable tension to swing the grapple to the desired location. In practice, however, the main benefit of a swinging machine is that once the logs are yarded up to the machine, they can be swung to the side and landed. This allows the machine to be positioned in a small area such as on a road, and to land (set down) the logs on the road behind or in front of the machine.

Towers

A tower is a smaller mobile piece of yarding equipment used primarily for quick setup and shorter yarding distances.

Towers are designed for a given cable size which should not be exceeded.

Guy line drums are considered part of the tower. The guy lines and raising or hoisting lines are generally provided with the tower.



A tower is usually set up in a central landing to transport logs from the setting to the landing to be processed.

Used for smaller volumes and smaller cut blocks, the tower cannot be moved while rigging is in place. A tower yarder is positioned on the roadway or landing so adequate space needs to be left for piling logs.



The logs can only be pulled up to near the tower and then lowered to the ground, making it necessary for a shovel (log loader) to also be present to remove the logs once landed.

Components of a cable yarding system

Some of the components of a cable yarding system include:

| Component | Description |
|-----------|---|
| Mainline | The cable used to yard logs. |
| Strawline | A small diameter cable used in rigging up or moving larger cables or blocks |

| Component | Description |
|-----------|---|
| Guyline | Used to support the tower, and any tail trees, tails or intermediate supports. Yarders are equipped with drums holding the guylines necessary to support the tower. |
| Haulback | The cable used to outhaul the rigging or grapple when yarding. |
| Blocks | A pulley for line to go through. A metal case, enclosing one or more sheaves, provided with a hook, swivel, or gooseneck for attachment to an object and used to change the wire rope's direction. |
| Rigging | Lines, blocks, chokers, and all gear used in cable logging systems. Performing rigging jobs. |
| Choker | Any line used to choke a log or object. A noose of wire rope used to choke a log to be yarded. |

Cable Logging—Self-Quiz

- 1. The choker cable is used to do which of the following?
 - □ Haul and lift logs to the landing
 - □ Rig up or move larger cables or blocks
 - $\hfill\square$ Connect the logs to the carriage or haulback line.
- 2. The strawline is smaller than the mainline and guylines?
 - □ True
 - □ False



Now check your answers on the next page.

Cable Logging—Self-Quiz Answers

- The choker cable is used to do which of the following? Answer: Connect the logs to the carriage or haulback line.
- 2. The strawline is smaller than the mainline and guylines? Answer: **True**

Mechanized Harvesting Overview

Mechanized harvesting uses machines to cut trees, move them to a road and cut them to length and remove the limbs and tops before they are loaded onto logging trucks and transported to a mill or log yard.

The feller buncher is a machine that is used to cut trees at the stump and glace them in bunches for skidders to drag them to the road side. Some logging operations use excavators with grapples to move logs to the roadside although this is only done over short distances. This process is called hoe chucking or hoe forwarding. At the roadside, a machine called a processor picks up each tree, removes the limbs, top and defects. Once the processor cuts the tree into a log, it is placed in a deck beside the road until it is loaded onto a logging truck by a hydraulic log loader.

Cut to length or CTL logging is usually done by a harvester that cuts the tree and processes on the block where it was cut. The processor leaves decks of cut to length logs on the block for a forwarder to load up and take to the roadside, where they are unloaded.

The following reference includes good definitions for harvester, feller buncher, yarder, skidder and forwarder.

New technologies are discussed such as: Tier 4 diesel standards; better exhaust systems; better suspension for dampening vibrations felt in the cab; telematics for monitoring and managing equipment; fatigue monitoring systems and real-time monitoring software systems.



Reference

Workhorses of the Woods

http://biomassmagazine.com/articles/13266/workhorsesof-the-woods

When you are finished, continue in this section.

The following is a BC video about mechanical harvesting (from the Forest Practices Board). It shows many of the machines used for mechanical harvesting.



Video 1:30

YouTube—Forest Practices Board Mechanical Harvesting <u>https://www.youtube.com/watch?v=nbE3odKSmXY</u> When you are finished, continue in this section.

Mechanical Harvesting—Self-Quiz

- 1. A feller buncher is used for:
 - □ Cutting trees and placing them together in groups
 - □ Cable yarding
 - □ Loading logging trucks
- 2. A hoe chucker is used for:
 - □ Picking up logs and moving them to a roadside or landing
 - $\hfill \square$ Felling trees by shearing them near the ground
 - $\hfill\square$ Sliding and dragging logs from the stump to a landing



Now check your answers on the next page.

Mechanical Harvesting—Self-Quiz Answers

1. A feller buncher is used for:

Answer: Cutting trees and placing them together in groups

2. A hoe chucker is used for:

Answer: Picking up logs and moving them to a roadside or landing

Key Point 1.2: Safety Related to Ground-Based Mechanized Harvesting

The following information is a snapshot of the main safety information related to mechanized harvesting. More information is available in mechanized logging specific learning materials.

Mechanized harvesting is part of WorkSafeBC's high risk strategy which means that WorkSafeBC focuses on this industry to improve safety performance and reduce injuries. As part of this strategy, WorkSafeBC has identified important safety areas to focus on:

- Three-point contact procedures
- Steep slope assessment plans
- Maintenance workplan and lockout
- Phase congestion
- · Safe operation of traction assist and tethered equipment
- Emergency response
- Hearing protection

Three-point contact procedures

Most ground based mechanized harvesting activities are carried out from within the cab of heavy equipment. However, during operations, workers may be required to exit the protective cab environment to complete certain tasks and equipment checks. This is when workers are most vulnerable to serious injury. Ensure effective communication with all site personnel before exiting from a cab or approaching heavy equipment.



Log Loader. Source: Heavy Equipment Operator Training Guide

Ing_1090_Describe_Mechanized_Harvesting

Always use 3-point contact with the machine while entering or exiting equipment.



Steep Slope Assessment Plans

For mobile logging equipment, the degree of risk increases as slope becomes steeper. If the equipment manufacturer has provided it, follow the logging equipment's maximum slope operating stability limit. If the limit is not known, operate within the following limits:

- Rubber tired skidder must not be operated on a slope that exceeds 35%
- Crawler tractor, feller buncher, or excavator must not be operated on a slope that exceeds 40%
- Any other forestry equipment specifically designed for use on a steep slope must not be operated on a slope that exceeds 50%

• These limits can be exceeded if a risk analysis has been completed for the steep terrain on that block and site specific procedures have been developed.

For more information on how to do a steep slope logging assessment and plan, see the link below to a resource package from the BC Forest Safety Council.



Reference

BC Forest Safety Council Steep Slope Logging Resource Package <u>https://www.bcforestsafe.org/resource/harvesting-resource-packages/</u>

When you are finished, continue in this section.

Lock Out

The procedure for locking out mobile equipment is an important practice that must be clearly understood by everyone on your crew. Log haulers, equipment operators, mechanics and supervisors must all be familiar with how to secure the equipment from any unplanned movement on field sites and in the shop.

Lock out is best described as taking all the steps necessary to remove or secure energy sources so there will be no unexpected movement of the machine or equipment. The types of energy sources that need to be controlled include hydraulic, electrical and gravity. This could involve lowering all the attachments so they can't fall if there is a hydraulic leak, turning off the electrical power and computer so the grab arms on processor head won't unexpectedly close or blocking up a machine when a wheel is removed so if won't unexpectedly fall.

Remember that the equipment manufacturer is a good resource when you need lock out information that is specific to the make and model of a particular machine.

See below for another good resource is from the BC Forest Safety Council which includes procedures for specific equipment.



Reference

BC Forest Safety Council Lock Out Resource Package <u>https://www.bcforestsafe.org/resource/harvesting-resource-packages/</u>

When you are finished, continue in this section.

Phase Congestion

The term "phase congestion" means a situation where different logging phases operating simultaneously in a single worksite become bunched up, overcrowded or jammed (aka congested) in a manner which compromises the safe and efficient operation of the work being performed.

Watch the following video for information on how to prevent phase congestion.



Video 7:27

YouTube—BC Forest Safety Phase Congestion <u>https://www.youtube.com/watch?v=1Ux13XTRSKU</u> When you are finished, continue in this section.

Phase Integration

Phase integration refers to a situation where different phases are organized to operate simultaneously in a worksite as a single "integrated" phase.

Phase integration, while creating efficiencies, increases the complexity of the worksite and requires extra planning and awareness to ensure safety is maintained and desired efficiencies are actually achieved."

Stacking

Stacking describes a scenario where phases are physically stacked on a slope. Stacking could refer to phases which are integrated, or phases which are not integrated. Stacking could even refer to the same phase where work is being performed in two locations on the same slope.

Click the link below to read a WorkSafeBC investigation report summary concerning a skidder operator who was fatally struck by a tree:

https://www.worksafebc.com/en/resources/health-safety/incidentinvestigation-report-summaries/worker-forestry-operation-fatallystruck-tree?lang=en

Stacking creates significant safety hazards and phase planning should strive to prevent any kind of stacking which creates safety risks.



Reference

BC Forest Safety Phase Congestion Resource Package https://www.bcforestsafe.org/node/3109



An interactive online phase congestion training course is available from BC Forest Safety at the link below:

http://www.bcforestsafe.org/node/3558

Completion of the course is not required as part of the Entry Level Forestry Worker training program, but is recommended as additional training.

Safe operation of traction assist and tethered equipment

Winch assist refers to the practice of attaching a cable or cables to a forestry machine to increase its operability on slopes.

The cable's tension increases the machine's traction in order to prevent slippage and, to a lesser extent, increases the machine's stability on slopes. The increase in traction allows the machine to work on steeper slopes while reducing ground and soil disturbance.

Winch-assist systems are relatively new to North America and are used to increase the operating range of ground-based equipment. They reduce the need for hand fallers and cable yarding crews, some of the most dangerous jobs in forestry.

Benefits to using winch assist include:

- Safety: reduced risk of incidents associated with hand fallers and yarding crews
- Increased harvesting productivity
- Reduced costs
- Reduced site disturbance

A fundamental principle when using winch assist is that the machine must remain stable and have traction without the cable.



Proper deflection angle (image from FPInnovations)

Operational Best Practices

- The traction winch cable should only be used for traction assistance and never for other purposes, such as pulling logs or winching the machine into place
- Operate the machine only in places where the operator feels comfortable. The operator cannot be compelled to work in areas or conditions where they feel there is a safety risk (right to refuse unsafe work)
- The winch on a winch-assist system should be used whenever working on slopes over 40% unless the steep slope assessment has determined that winch-assist is unnecessary
- Always assume a wire rope could break at any time and operate accordingly
- An alternative plan must be in place for unsuitable working conditions (i.e., unsuitable weather or soil)
- Do not work near or pass under or over the cable while the machine is operating. Stay clear of the wire rope during operation
- Do not work near or below a machine that is operating
- Do not ride on or in remote-controlled machines when they are moving or operating

- Inspect and maintain all mechanical components as per the manufacturer's specifications (wire rope, winch, gearbox, pumps, control systems)
- Always wear a secured four-point or greater seat belt during operation
- Remove or secure all loose objects in the cab before operation

Emergency Response

WorkSafeBC has developed 12 tips to help forestry operations improve their emergency response:

- Be prepared for anything. Your work location and environment change regularly, even on a daily basis. You could be on a different site, drainage, or road system; the weather might be worse than yesterday; other contractors in the area might have come or gone. It's important for you and your crew to ask yourselves every morning: does our ERP have us covered today?
- 2. **911 is not a rescue plan**. You can't rely on 911in the bush. The call won't work from most satellite phones and, if you do get through, rescue personnel may not be able to respond effectively to a forestry incident. Some jurisdictions don't even have the capacity to respond in such remote locations. If you can only make one call for help, clarify who that should be at your current workplace. Landline numbers for BC ambulance are highly recommended.
- 3. **Go above and beyond.** When completing your first aid assessment, keep in mind that the first aid tables from WorksafeBC are a minimum standard only. It's important to factor in the level of risk due to the remote nature of the work and how difficult it would be to get to medical aid, rather than only focusing on the risk of the work activity it itself.
- 4. Knowledge is power. Make sure all workers on site know how to respond to an incident, don't rely only on a supervisor to coordinate help. The supervisor might not be available or could be the one actually needing assistance. It's essential that all workers are able to identify their physical work location at all times (e.g., latitude/longitude). They should also know where to find the communications equipment, how to use it, who to contact, and what to say.
- 5. **Don't be left hanging.** No one piece of communications equipment will work 100% all the time or in all areas. It's important to have a backup plan and or other options available for communications (e.g., satellite phones, radios, cell phones). If your plan involves relaying information through different parties, be sure to practice getting a message through.
- 6. **Don't make assumptions.** Perform cell and satellite phone tests at every site to know what kind of coverage you have. Remember to check and charge batteries often, and always carry spare batteries.
- 7. Know your plan and practice it. Don't wait for a real emergency to find out if your plan works. Conducting regular, realistic, and relevant emergency response drills is one of the best ways for you to verify

how effective your plan is. It also serves as an excellent training opportunity for your crew. Practice these drills at as many work sites and with as many workers as possible. After each drill, discuss what you and your crew learned and where things could be improved, and then implement changes as needed. The point isn't to do it perfectly, but to learn and improve your plan every time.

- 8. **Opportunities for learning.** Consider adding an ERP review component to every accident investigation your firm does. This way, your emergency response plan is evaluated frequently and in the context of actual events. The review could be as simple as asking: Was our ERP adequate for the situation? What if things had been worse? Were we able to communicate with outside help in a timely manner?
- 9. **Know your neighbors.** People in the bush need to look out for each other. Take the initiative to find out which firms are working close to yours and what equipment they have that might be able to respond and help you faster than anyone else.
- 10. **Many hands make light work**. Performing first aid treatment on a hillside is not the same as on the training room floor. It will be easier with a helper. As part of your plan, consider predetermining a helper to go with your 1st aider. Given the challenging environment and remote locations of forestry work, having someone to help stabilize the injured person on a slope, talk on the radio, or even keep things from blowing away, is an invaluable asset. Also, having more people on hand will be necessary when it comes to moving an injured worker. It's extremely difficult to move an injured person down a cut block and it will be a struggle to move a stretcher with fewer than 6 or 7 people.
- 11. **Plan beyond first aid**. Make sure your ERP goes beyond first aid and is adequate for other situations that would require emergency response, including fires, avalanches, landslides, sour gas, multiple injuries, etc.
- 12. **Prepare for evacuation**. Depending on your location and terrain, planning should account for evacuation by air or ground transport.

By air: Prepare for emergency heli extractions by communicating frequently with helicopter companies, having prearranged radio channels, and mapping out helicopter landing areas in advance. Familiarize yourself with the different machines that may be sent to you so you'll know if your equipment will fit. Ask yourself: do you have the right emergency transportation equipment for that configuration?

By ground: If BC ambulance is responding to your call, make sure you can verbally give driving directions to where you are and be prepared to rendezvous if necessary.

Watch the following video for a realistic emergency response in a forestry operation.



Video 8:48

YouTube—WorkSafeBC Every Minute Counts: Emergency Response Planning in Forestry https://www.worksafebc.com/en/resources/healthsafety/videos/every-minute-counts-emergency-responseplanning-in-forestry?lang=en When you are finished, continue in this section.

Hearing Protection

Read the safety alert linked below for more information on noise levels and hearing protection in forestry.



Reference

WorkSafeBC How loud is it? - Forestry <u>http://www.bcforestsafe.org/files/Safety_Alert_WSBC-</u> <u>How_Loud_Is_It-Forestry.pdf</u> When you are finished, continue in this section.

Additional Safety Information

Safe Work Procedures

• On each worksite, there will be Safe Work Procedures (SWPs) to understand and follow for many of the activities that you will be doing as part of your job. If there isn't a procedure or you are uncertain if the procedure you are following is correct, stop and contact your supervisor to get help.

Handling Heavy Loads

 Handling heavy loads with heavy equipment is a common activity for many forestry jobs. Make sure the equipment has the appropriate weight rating for the job and will not be overloaded. Elevated loads are a hazard for ground workers and other equipment in the area. When moving with a load, make sure to keep the load as low to the ground as possible and watch out for uneven or side sloping terrain. Always wear your seatbelt when operating heavy equipment and vehicles. Read the follow safety alert about a tank move that went wrong.

Reference WorkSafeBC

-Wheel Loader Operator Killed in Rollover

http://www.worksafebc.com/en/resources/healthsafety/hazard-alerts/wheel-loader-operator-killed-inrollover?lang=en When you are finished, continue in this section.

- A crush point exists at the point where two objects meet. The objects can be moving toward each other, or one object can be moving toward a stationary object. Crush points are hazardous because the objects coming together can easily crush body parts.
- Some forestry examples of crush points include grab arms or grapples, at the hinge point of articulating equipment, under lowering truck boxes.



- Safe separation distances need to be maintained between pieces of equipment and between workers on the ground and heavy equipment. Identify the hazard and safe zones on your worksite and make sure everyone one on site understands where those zones are so they can avoid being hit by equipment, vehicles, logs, rocks or debris.
- A dangerous tree is a tree that is a hazard to a worker due to its location or lean, its physical damage, overhead conditions, deterioration of its limbs, stem or root system, or any combination of these conditions. Tips for managing dangerous trees:
 - Don't overlook these trees. Small dangerous trees can be easy to miss, so take the time to do a thorough 360 inspection of your worksite.
 - Elimination of the hazard is most effective. Fall or remove the dangerous trees, with a machine if possible.
 - These trees are hazardous for many forestry operations not just falling. Silviculture or trucking are good examples.

- It may be effective to establish a no work zone around the dangerous tree. This zone should be well marked and communicated to all workers in the area.
- Blasting dangerous trees is an effective way to remove the hazard.

Chainshot

Chainshot occurs when a saw chain breaks and linkages are scattered into the surrounding area at high speeds. Most commonly the chainshot moves along the plane of the saw, which can cause a hazard to the operator if the saw is aligned with the cab or the body if using a chainsaw. Chainshot whistling through the air has as much kinetic energy as a bullet fired from a rifle!

Chainshot can happen on processing equipment or a manual saw.

A chain breaks for a number of reasons including:

- Improper tension –chain too loose
- Improper chain maintenance or repair (hammered rivets)
- Damaged sprocket, bar and/or chainLinkages from a failed chain
- Improper bar and chain lubrication
- Defective chain
- Excessive chain speed –new chainsaws can drive chains faster than their design and harvesters can be adjusted to push chain to excessive limits.
- Keep in mind that many chains fail at the instant they are damaged so chain shot cannot be totally avoided.



Reference

BC Forest Safety

Click on the link below to view a Chainshot Resource Package from BC Forest Safety:

https://www2.bcforestsafe.org/files/files/safety_info/chain_shot/ Chain%20Shot%20Resource%20Package.pdf

When you are finished, continue in this section.



Video 3:58

The link below presents an investigation of an incident in which a worker was almost killed when the link form a broken harvester chain shot through the window of the driver's cab:

https://www.youtube.com/watch?v=roT9mbYge0s When you are finished, continue in this section. The following guide from WorkSafeBC gives an overview of the requirements for mobile logging equipment in BC. This is for your reference only, in case you want more information.



Reference

WorkSafeBC

Understanding the Requirements for Mobile Logging Equipment in BC <u>https://www.worksafebc.com/en/resources/health-</u>

safety/information-sheets/requirements-for-mobilelogging-equipment-in-bc?lang=en

When you are finished, continue in this section.

Safety Related to Ground Based Mechanized Harvesting—Self-Quiz

- 1. Unless a steep slope assessment and site specific procedures have been developed, a rubber tired skidder must not be operated on a slope that exceeds a slope grade of which percent?
 - □ 25%
 - □ 35%
 - □ 50%
 - 65%
- 2. What is chainshot?
 - □ A cable yarding carriage
 - □ A chainsaw bar tool
 - □ Broken saw chain links fired at high speed
 - □ Broken links from a tow chain



Now check your answers on the next page.

Safety Related to Ground Based Mechanized Harvesting—Self-Quiz Answers

1. Unless a steep slope assessment and site specific procedures have been developed, a rubber tired skidder must not be operated on a slope that exceeds a slope grade of which percent?

Answer: 35%

2. What is chain shot?

Answer: Broken saw chain links fired at high speed

Key Point 1.3: Safety Related to Cable Logging Systems

The following information is a snapshot of the main safety information related to cable logging systems. More information is available in cable logging specific learning materials.

Clearing the Turn

The rigging crew must always get clear before a turn moves. Loggers standing in the bight of the line risk contact with a whipping cable, choked log, or thrown debris. Avoid a layout with a large bight area. A poor layout can make it difficult for the crew to get in the clear or judge where it is clear, especially near the front end.

Be aware of the following precautions:

- Locate the backline ahead of the road line whenever possible. This allows the rigging crew to move to a safe area that is out of the felled timber and not in the bight of the line
- Beware of flying debris picked up by the haulback and tossed downhill
- Corner blocks can create a large bight area. During setup, consider the ability of the rigging crew to get in the clear.



Learning Point

During downhill yarding, the logged-off side is generally the safest, as long as you are out of the bight.

Watch the following video for more tips on how to stay in the clear.



Video 8:48

YouTube—SAFERCouncil On The Hillside - In The Clear https://www.youtube.com/watch?v=bSziuGEI31Q

When you are finished, continue in this section.

Side Binds

A side bind is an unintentional bight in the line caused by trees, stumps, or other objects, preventing the line from running straight. Hazards created by side bound lines include fire hazards, lines that do not run freely because they are cut into stumps, logs, or other material, objects thrown in the air and striking workers because the line is side bound under a chunk or debris. Remember to always

Page 31 of 47 Date: November 13, 2020 string lines straight, clear side binds immediately, and to never get in the bight of a side bound line.



Worker in the bight will be hit by a side bound line

Downhill yarding is more hazardous than uphill yarding because logs, rocks, and debris may be knocked loose and may tumble down onto equipment and the roadway near the yarder.

Runaway trees: logs may get knocked loose and roll or slide down the hill towards the yarder or workers.

Anchors

Predicting the holding power of a stump is difficult. Some safe practices for using anchor stumps for cable logging include:

- All stumps used as anchors must be inspected daily
- If single stump is not adequate, multiple stumps must be tied together and used
- When notching stumps the notch should be place as close to the bottom of the stump as possible. When a backspar is required, guylines must be used.
- "A guyline secured to a stump must be wrapped at least 2 ½ times. The top wrap must be secured with three spikes. The number and position of spikes should be adequate to ensure that the guyline will handle the imposed stresses."
- Old growth stumps are often used as anchors during the cable harvesting of second growth timber, and due to their size can be stronger than the smaller second growth stumps for anchoring. However, all anchor stumps must the pulled on and tested for strength before relying on them.

Cable Logging Systems Safety—Self-Quiz

- 1. Why is downhill yarding more hazardous than uphill yarding?
 - □ Logs, rocks and debris may be knocked loose and roll down onto the yarder.
 - □ Yarding downhill is much faster
 - Logs don't stay in the chokers when yarded downhill
 - Downhill yarding is actually safer than uphill yarding
- 2. Can an old growth stump from the first pass logging be reused as an anchor?
 - \Box No, never use an old growth stump
 - □ Yes, always use old growth stumps
 - ☐ Yes, you can use an old growth stump if you can pull on it to test the strength of the stump
 - \Box No, never use an old stump because it might be rotten



Now check your answers on the next page.

Cable Logging Systems Safety—Self-Quiz Answers

1. Why is downhill yarding more hazardous than uphill yarding?

Answer: Logs, rocks and debris may be knocked loose and roll down onto the yarder.

2. Can an old growth stump from the first pass logging be reused as an anchor?

Answer: Yes, you can use an old growth stump if you can pull on it to test the strength of the stump

1090-02: Logging Plan

What you will learn in this section

2.1 Logging plans and why they are used

2.2 Pre-work meeting for the logging plan

2.3 Consequences related to deviations from the logging plan and knowing when to stop and consult

Key Point 2.1: Logging Plans and Why They are Used

Logging plans, also referred to as harvesting plans or operational plans, contain all the necessary information to carry out a successful harvest of a specific area. This includes safety information, a map of the area, directions on how to log the block, resources that need to protected like streams, riparian areas, sensitive soils, wildlife trees or dens and archeological or culturally important features.

Licensees are responsible for ensuring a written logging plan is developed and they work with the logging contractors on site to develop more detailed site specific plans.

Several basic elements must be considered in a logging plan, including the following:

- Worker safety and existing hazards
- Terrain and soil types
- The location of the block boundary
- Size and volume of timber
- Yarding or skidding distances
- Potential landing and haul road locations
- Type of logging system needed to harvest the block
- Environmental considerations

The logging plan must also consider the following:

- Communication
- First aid
- Terrain and other hazards
- Access and egress trails
- Crew transportation
- Harvesting methods
- Minimum distance between fallers (two-tree lengths)
- Minimum safe distance between equipment
- Safe opening of falling face

To create an appropriate logging plan, planning and layout personnel (engineers) conduct the necessary field work to locate the block boundary and road locations as well as identifying all the interior features of the block that will affect how it is harvested. For example information is gathered about timber types, steepness of slopes, roughness of terrain, or wildlife, cultural or recreational values. The presence of any hazards such as dangerous trees or unstable soils that could lead to landslides is also identified. All of this information is put into a logging plan for the safe and productive harvesting of timber from the identified area.



Video 11:47

The video below shows the different hazards that layout engineers need to consider during the layout planning process to ensure the safety of fallers and other workers:

https://www.youtube.com/watch?v=U0lkqXBQEUk&feature= emb_logo

When you are finished, continue in this section.

The logging supervisor and logging contractor should walk the block or planned worksite prior to the work starting to confirm the information in the logging plan and on the map and to spot any new hazards that need to be dealt with.

When checking a logging plan, it is suggested that the logging supervisor and logging contractor walk the block. The objective is to:

- Confirm that field layout (boundary and road marking) is consistent with the map
- Confirm feasibility of the logging plan
- Identify on the ground all riparian management areas (RMAS), wildlife tree patches (WTPs) and other special management areas shown on the field map

Specific parts of operational and site planning may include:

- A map of the area illustrating the topography and cutblock boundaries
- Identifying the location of permanent and temporary access structures such as roads, bridges and skid trails
- Known wildlife habitat areas; (streams, wetlands, lakes)
- Gullies
- Bridges, culverts, stream crossings
- Gravel pits
- Pipelines and power lines
- Water supply intakes

The plan must be communicated to all workers that will be on the site and this is usually done through a pre-work meeting.



An overhead view of a logging operation showing several phases



Example of a logging plan map

Ing_1090_Describe_Mechanized_Harvesting

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Logging Plans—Self-Quiz

- 1. A cutblock boundary is?
 - □ A specific area, with defined boundaries, authorized for harvest
 - □ A line you cannot cross or you will get hurt
 - $\hfill\square$ Where the cut will be made in the block of wood
 - □ The same as a legal lot line
- 2. Which of the following would be included in a logging plan?
 - □ Block boundary and road locations
 - □ Geographic coordinates "Lats and Longs"
 - □ Danger tree locations
 - Bluffs and sinks holes
 - □ Safety hazards
 - $\hfill \square$ All of these answers



Now check your answers on the next page.

Logging Plans—Self-Quiz Answers

1. A cutblock boundary is?

Answer: A specific area, with defined boundaries, authorized for harvest

2. Which of the following would be included in a logging plan? Answer: **All of these answers**

Key Point 2.2: Pre-work Meeting for the Logging Plan

The purpose of the pre-work meeting is to:

- Review logging plan and maps with all workers who are going to be on the worksite
- Answer questions and provide details of the plan, clear up problems that are identified
- Provide specific instructions to workers about how the block is to be logged, roads constructed, riparian areas or stream crossings managed, etc.
- Conduct the initial safety meeting which is required by regulation. See below for additional information on the initial safety meeting



Discussing the logging plan

Initial Safety Meeting

At the initial safety meeting, the supervisor and workers review the logging plan and map and discuss logging plan objectives, placement of workers and equipment, first aid coverage and the location of first aid equipment, Emergency Response Plans (ERPs), problem areas or specific hazards such as steep slopes, dangerous trees or difficult sections of road. It is also planned if any special equipment or tools are needed to complete the job safely.



Key Point 2.3: Consequences Related to Deviations from the Logging Plan and Knowing When to Stop and Consult

Good planning is crucial to keeping all workers safe in a harvesting area, and poor planning can create a range of hazards. The planning part of the process is just as important as the technique involved in the actual logging.

Always know where you are, how to get help in the event of an emergency, and what the emergency response plan is for your worksite.

The logging plan is created to communicate an overall plan for how to build roads and harvest trees safely in specific areas. All known safety hazards will be identified. However, unforeseen circumstances and changing conditions such as weather may reveal new safety hazards. If you see a safety hazard that has not been identified, stop and communicate this hazard to your supervisor. Your supervisor will then communicate information about the hazard to all worksite personnel and work to manage the hazard. Your supervisor may need to document the new safety hazard you have identified.

This procedure works for non-safety issues as well. If you find something new on the block that wasn't discussed at the pre-work meeting and isn't on the logging plan map, stop! Notify your supervisor immediately to find out what to do next. It is possible that important features like streams, culturally modified trees, or buried utilities were missed in the planning process.

Example of Incomplete Logging Plan

As the following safety alert describes, there was no indication of the steep rock cliff on the logging plan map, and there weren't any "safety hazard" ribbons hung in the field as per the ribboning standards.

A steep rock cliff that was a significant drop in the cutblock was not indicated on the logging plan or discussed in the pre-work meeting.

This would be an example of when the logging plan was either incomplete or not completed as per the requirements.



Reference

BC Forest Safety

The safety alert below discusses a feller buncher operator who came close to an unmarked rock cliff.



Knowing When to Stop and Consult

It is critical that all workers know they must be comfortable with the work plan *before* they start work, and to stop work under certain circumstances. It is the worker's right to refuse unsafe work. The

supervisors should reinforce these key principles.

"If you encounter an unsafe situation or difficulty – STOP work!"

Workers and supervisors MUST stop work when:

- Work conditions are too hazardous to proceed safely
- Proceeding may create undue hazards for themselves or others
- The logging plan is unclear
- There is uncertainty about who is responsible for the site or the plan
- Phase congestion is creating hazards for other phases
- Workers are outside of their comfort zone
- Dangerous trees cannot be safely removed
- Workers are uncertain of another worker's location
- Communication with other phases has become patchy
- Any legal requirements cannot be met

Deviations from the Logging Plan and Knowing when to Stop and Consult—Self-Quiz

- 1. The logging plan details everything that could possibly go wrong in the work area.
 - □ True
 - □ False
- 2. Fallers should never enter the 2-tree distance work area of another faller.
 - □ True
 - □ False



Now check your answers on the next page.

Deviations from the Logging Plan and Knowing when to Stop and Consult—Self-Quiz Answers

1. The logging plan details everything that could possibly go wrong in the work area.

Answer: False

2. Fallers should never enter the two-tree distance work area of another faller.

Answer: True