Unit	1009
Title	Recognize, Evaluate, and Control Hazards Related to Yarding
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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:

- General hazards and controls related to Yarding
- Road change hazards and controls
- Breaking out hazards and controls

Why it's important for you to learn this unit

Yarding is identified as a high risk work activity. You need to be able to demonstrate knowledge of potential hazards in all areas related to yarding, and the means to control them.

Are you ready to take this unit?

To take this unit, you need to have completed the following unit:

- 1002 – Describe Forest Industry

Does this unit apply to you?

This unit applies to you if you are in:

- Yarding occupations

Section 1009-01: General Hazards and Controls Related to Yarding

What you need to know about this section

By the end of this section, you will be able to demonstrate knowledge of the following key point:

1.1 General hazards related to yarding and the means to control them

Key Point 1.1: General Hazards Related to Yarding and the Means to Control Them

You need to be able to demonstrate knowledge of the hazards related to yarding and the means to control them.

This key point lists of some of the hazards that are present on the worksite.

General hazards

General hazards include the following:

- Overloading of yarding systems
- Cable failure
- Anchor failure
- Machine stability
- Equipment location

Overloading of yarding systems

Overloading of a yarding system occurs when the system is put under more strain than then it can handle which can result in catastrophic failure. It is important to develop procedures to avoid the chance of overloading the yarding system.

Machine capacity can be estimated with a fairly exact number from yarder specifications, and lines and angles in the setup, but other factors will cause this capacity to change. How much these factors affect the capacity is often unknown. Relying on experience and close observation of the timber, terrain, and anchors will provide the best information on how the yarding operation should be managed. Consider the following variables when determining payload capacity, and use a safety factor for caution:

- Anchor strength
- Guylines placement
- Lifting capacity
- Deflection
- Yarding distance
- Full versus partial suspension
- Timber size and species
- Terrain
- Age of machine
- Age of lines

Deflection is the description of the ground profile that determines the amount of clearance or lift that is available. It is the difference between the straight line of site between the top of the yarder and the tailhold and the actual ground profile. A good rule of thumb is that you want to be able to see the tracks of the yarder from where you hang the tailhold block. Good deflection allows for easy and safer yarding. Poor deflection makes yarding more difficult, reduces payload, and increases the load on guylines and anchors and increases hang ups.

It is acceptable to increase guyline size but do not increase the size of the yarding lines (example: mainline haulback line).

In some case, the harvesting plan may require fully suspending turns such as when yarding over fish streams. Consider the extra load when fully suspending turns. In partial suspension, the ground partly supports the load and increases rigging system capacity. Full suspension requires the rigging to support the entire load and decreases payload capacity. If full suspension is necessary, reduce the payload.

Cable failure

Wire rope most often fails because it is worn out or overloaded. Planning, equipment inspection, and safe operating procedures are the best way to prevent cable failure.

Workers must remain far enough in the clear to avoid being struck if lines do break and fall. Beware of thrown objects that may come with a broken line, such as parts of blocks or shackles; and beware of the possibility that the tower could collapse.

Always plan your escape routes in advance to know immediately where to go if lines fail and come crashing down.

Anchor failure

An anchor fails when the force being applied to it is greater than what it can support. Planning, equipment inspection, and safe operating procedures are the best way to prevent anchor failure. Always take the extra time to tie back your anchor if there is any possibility that it might fail.

Yarding can reduce the strength of an anchor stump. Repeated hard pulls or heavy loads increase the risk of progressive failure. Check all guylines and anchors after several turns and when under the first heavy loads, on a daily basis, looking for signs of movement in stumps, mobile anchors, or buried deadman anchors.

Workers must remain far enough in the clear to avoid being struck by anything if an anchor does fail. Beware of any falling or thrown rigging components and flying debris such as rocks, dirt, and wood. Beware of the possibility that the tower could collapse.

Machine stability

The hooktender or other competent person supervising the yarder setup must know the manufacturer's specifications for the yarder and know the appropriate rigging and procedures for the particular conditions at the site.

Basic decisions will be guided by the manufacturer's design specification plate located on the yarder, which displays critical information about capacity, including maximum and minimum inclination, number, size, and breaking strength of the lines.

Guylines should be placed to allow machines to swing while landing heavy turns without tipping over.

Stability of the yarder is essential. Consider the following critical factors during the setup:

Place the yarder on solid, level ground

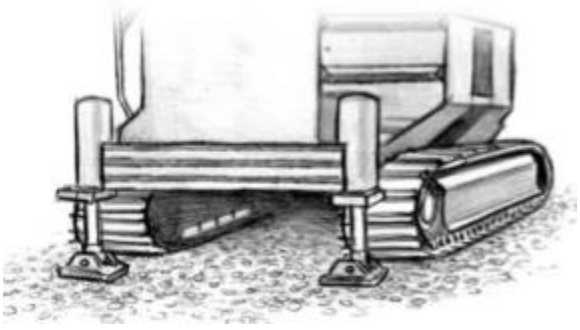
When working with heavy loads, changing the angle of force can make a huge difference to stability. Make the yarder as level as possible and make sure the ground is firm enough to avoid settling during operations. It may be necessary to crib a track with short log lengths set perpendicular to achieve a firm, level surface.

Ensure good drainage

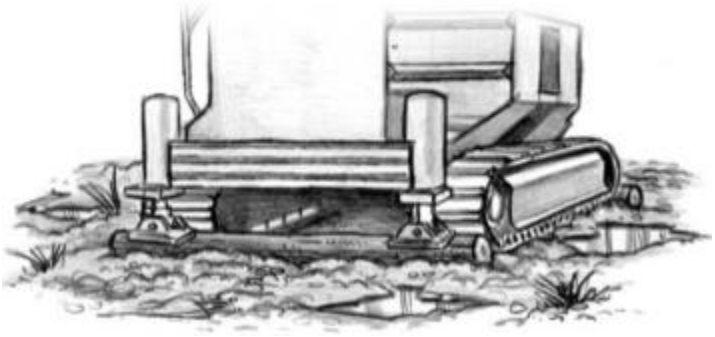
The solid surface for the yarder should be protected by assuring rainwater drains away rather than settling in pools under the yarder. Use slopes and channels directed away from the yarder. Laying down gravel can greatly improve drainage and prevent mud holes.

Install cribbing

A rock base for the yarder is ideal, but may not be possible. With softer ground, solid cribbing can be created with short log lengths positioned side by side. Log cribbing is commonly used to prevent the spar pad from settling. On uneven ground, it may be necessary to use cribs to bring the yarder level. Stack logs or short blocks of wood to achieve the height needed, and add layers crosswise. Make sure the materials are large enough that they will not crush or fail during the yarding process.



Install the yarder on level ground with good drainage



Cribbing is commonly used under the spar pad

Equipment location

Machines must be in a safe position ready to process and deck the logs at once to keep the landing clear. Always operate on stable and level ground. Use caution when lifting heavy loads, which can tip a machine.

Whenever possible, position the loader and processor so the operators have a full, unobstructed view of landing operations. Avoid placing the loader too close to yarding lines and guylines where the swinging boom could strike a line and cause damage to the equipment and endanger workers on the ground. Also, avoid locating the loader between the yarder and the incoming turn where the operator is exposed to moving logs and swinging chokers. If machines must be located in a hazard area near the turn, the operator must move away while turns are landed and the chokers are pulled free (unless the operator needs to be present to assist with landing the turn). Machine operators must watch the approaching turn for any unexpected log movement. Try to swing equipment so the entrance side of the cab is not exposed to the turn.

The rotating superstructure of any machine must maintain at least 2 feet of clearance in all directions. Landings are very active work areas and adequate clearance can be lost without realizing it. The loader operator and ground personnel who can alert the loader operator must regularly check that 2 feet of clearance is maintained. Lives can depend on it.

If clearance cannot be maintained, control access to the pinch point with barriers, cones, rope, or other warning devices. Guylines should be placed to allow machine to swing landing heavy turns without tipping over.

Log hazards

Log hazards include the following:

- Runaway logs
- Log piles
- Unstable topography

Runaway logs

Straight downhill yarding on steep slopes is prohibited. Straight uphill yarding should be limited to slopes upon which there is no significant hazard to the rigging crews. On blocks where it is feasible, given the prescription, angle the corridors cross-slope so that the rigging crew is up- slope of the turn. Where no practical alternative exists to straight uphill yarding corridors on steep ground, the crew must walk a sufficient distance, cross-slope, to be clear of the runaway log hazard. Activities in the landing that may dislodge materials must be stopped when the downslope crew is in the hazard area.

Log piles

Landings of inadequate size make landing of logs difficult and dangerous. In tight landings, logs must still be swung and manipulated, but it may be difficult to maintain the minimum counterweight clearance. All log piles must be maintained in a stable condition.

Unstable topography

Unstable topography includes things such as steep terrain, loose soil or rocks, logs, stumps and other debris.

Hazard and safe zones

Be in the Clear!

“In the Clear” is a continual risk assessment performed by each member of the rigging crew on the hillside. Every time a log and/or a line are moved in the setting or the rigging changes direction, a risk assessment must be completed to recognize and evaluate the hazards related to each situation.

Rigging crew

The rigging crew must move away from the log(s) that are grappled or choked a minimum distance of the length of the longest log plus 40’. The rigging crew must be a minimum of 40’ beyond the arc of an upending log and away from all running lines. Rigging crews must attempt to determine the location of log ends that will be affected when going ahead on a turn. If all the ends cannot be located, crews must move further away from the turn. The Hazard Zone size or distance identified may increase due to:

- Operating slope
- Ground conditions
- Yarding methods / direction
- Tailhold placement / configuration
- Weather conditions
- Leave patches

When going ahead on the turn, the rigging crew must be in a safe location above and behind the turn. Also, they must be standing up and facing the turn until it is clear. Once the turn is clear, workers

must continually watch for hazards that may develop during the yarding phase – such as runaway logs, debris on the haulback, side binds, and so on.

The rigging crew needs to be in a position where there is no chance of being struck by a side bind or hit by any debris thrown by the running lines. The rigging crew should be on the watch for the "domino effect," when one log hits another which then hits another and so on. The rigging crew must be aware of the implications when the turn is being "skinned back." In this situation, they are considered to be in front of the turn as the log travels back and potentially in the bight. The same hazards may exist when the rigging is coming back empty, primarily when deflection is limited or at a defined terrain break.

Remember to never stand directly in front of, beside, or behind the following:

- Haulback tailhold – danger of tailhold pulling / block failure / strap breaking
- Backspar tree – danger of backspar tree pulling over / block failure / cat choker breaking
- Backspar guyline – danger of guyline breaking / guyline tailhold pulling
- Twister tailhold – danger of strawline breaking / twister tailhold pulling, doing up and removing twister

The rigging crew must be located out of reach of any support or backspar tree in case it is pulled over. The rigging crew must always watch for limbs, chunks, root wads and other debris sliding down the haulback while close to the lines.

Landing crew

The duties of the landing crew (landing/utility person, chasers, second loaders, and buckers) include tasks that place them in close proximity to machines.

For example, a landing worker bucking logs for the loader operator may also have to unhook chokers for the grapple yarder.

All landing crew must perform their duties without putting themselves at risk. Workers who go in to undo chokers or to hook up the strawline must make their intentions known to both the loader and grapple yarder operators. They must not go into the hazardous area until the operator give the preset signals it is safe to do so.

Be aware of the following unsafe locations on the landing:

Underneath or near the mainline during the yarding

The mainline and haulback could break and drop, or the mainline could be slackened accidentally without warning.

Underneath the guylines opposing the pull of the turn

Stay clear of active guylines in case of anchor or line failure. Stay aware of the yarding process while moving about the landing as a turn in a new position can shift the load to different anchors. Be aware of any known weak anchors.

Within reach of the turn being landed

The area within reach of the incoming turn is directly hazardous, and a farther area is indirectly hazardous. Beware of other logs already on the landing within reach of the turn. Logs entering the landing can jill-poke other logs and upend, swing, or push them. Choked logs with a long end increase the hazard. Chaser and operators need to be in communication so the operators know where the chaser is located at all times. Stand where the operator can see you easily.

Working in the blind spot of machinery operators

The chaser needs to ensure that the machinery operators know when he needs to enter a blind spot to perform any task.

Within the swing of the loader, processor, or swing yarder

Never approach the loader or a swing yarder without the operator's acknowledgement. To approach within 2 feet, the machine must stop. These machines are particularly hazardous because of the swinging counterweight on the rear that often takes workers by surprise, and also, the broad sweep required to swing logs onto decks and trucks. A rotating machine must maintain a minimum clearance of 2 feet for the counterweight in all directions.

Phase congestion

Multi-phase logging is common in the industry and describes multiple logging activities being carried out in the same worksite. Multi-phase logging is usually not hazardous if planned and organized properly. The term "phase congestion" means a situation where different logging phases operating simultaneously in a single worksite become bunched up, overcrowded or jammed (congested) in a manner which compromises the safe and efficient operation of the work being performed.

Phase congestion can happen when you have multiple phases working in an area at the same time. You may have fallers, road builders, and logging crews all working close to each other. This is dangerous because all the work that is being done creates even more hazards as each crew has to maneuver carefully around each other.

To prevent accidents the work should be well planned out, with all crews aware of the activities that are occurring and when. It is important for all crews to communicate effectively with each other. Be

sure to communicate to all if the plan needs to change and how it will change.

Watch the Phase Congestion video to learn more about it.

https://www.youtube.com/watch?v=1Ux13XTRSKU

Communication failure

Communication in yarding is vital to safe production. Use set and standard control phrases and be sure to have a method of telling crew and/or operator if radios are not working. Radios must transmit and receive clearly. When talking into the microphone, be sure that the voice volume is constant. Words must be clearly spoken. Use as few words as possible. Radio equipment must be tested and kept clean and dry. It must be recharged at the end of each shift. Radios used on grapple yarders must have the frequency coordinated and be within power limits. Verbal signals acceptable to WorkSafeBC must be used on all grapple yarders.

Communication between the Rigging Crew and the Machine Operator(s) is essential to ensure the operating plan is known and agreed upon. Communication of potential hazards at the worksite is the responsibility of all workers. When spotting or setting chokers in blind locations, which are out of the Operator's vision, the Operator must confirm the Rigging Crew is in a safe location and "In the Clear" before moving anything. Rigging Crew members must make sure they are "In the Clear" and notify the Operator to immediately stop if there is any doubt of their safe location. Machine Operators must never assume the Rigging Crew is in a safe location; obtain radio and/or visual confirmation.

IMPORTANT

Any time a worker in any of the landing processes steps out of the normal routine and into another operating zone (such as the chaser deciding to run into the landing to cut a limb), it is imperative that the worker communicate his intention to nearby machine operators before acting. Organize an efficient landing to minimize the need to step out of normal routine.

Wind throw

Wind throw refers to trees that have been blown over by the wind.

There is a significant increase in wind throw hazards in the following areas:

- Partial cuts in which a sufficient number of stems per hectare have been removed, reducing inter-crown damping
- Riparian and Gully Management areas in which the edges have not been feathered or the crowns reduced

- Side and back lines laid out without sufficient consideration of predominant wind in relation to elevation and topographic features

In many of the wind-thrown edges, retaining standing trees to function as a wind break may be desirable to prevent further blowdown. The logging plan for the wind throw amendment must reflect:

- The location of the yarding corridors
- The lay of the wind-thrown trees in relation to the direction of yarding
- The specific type of yarding equipment to be used; this is important because a grapple yarder system cannot fulfill the performance requirements of a dropline system
- Faller substitution of residual trees to allow for hazardous tree removal and establishment of corridors
- Widening of the corridor at the roadside
- Availability of backspars and/or tailhold stumps
- Appropriate deflection for the yarding system

Be aware that the roots of wind thrown trees will often sit back when a tree is bucked off or yarded free, particularly if it is bucked short. There is potential for this to happen several days or months after it has been bucked. Bucking windfall can be extremely hazardous and should only be done by certified fallers or very experienced buckers. Holding the tree with the grapple can help to reduce log movement. Heavy rains can disturb the ground and this may cause the root to tip more easily.

Night operations

Powerful lighting systems used for night operations produce strong contrasts of light and dark, making walking in the felled and bucked area very hazardous. In order for the operator to see ground crews, they must wear hi-vis clothing with reflective strips. The machine must be equipped with side lights. Hand signals must not be used during night operations; only audible or verbal radio signals must be used. All night yarding operations must have written supplementary instructions to adequately deal with additional hazards and procedures, including man-check, backspar operation, and maintenance of lighting systems.

When night yarding is done:

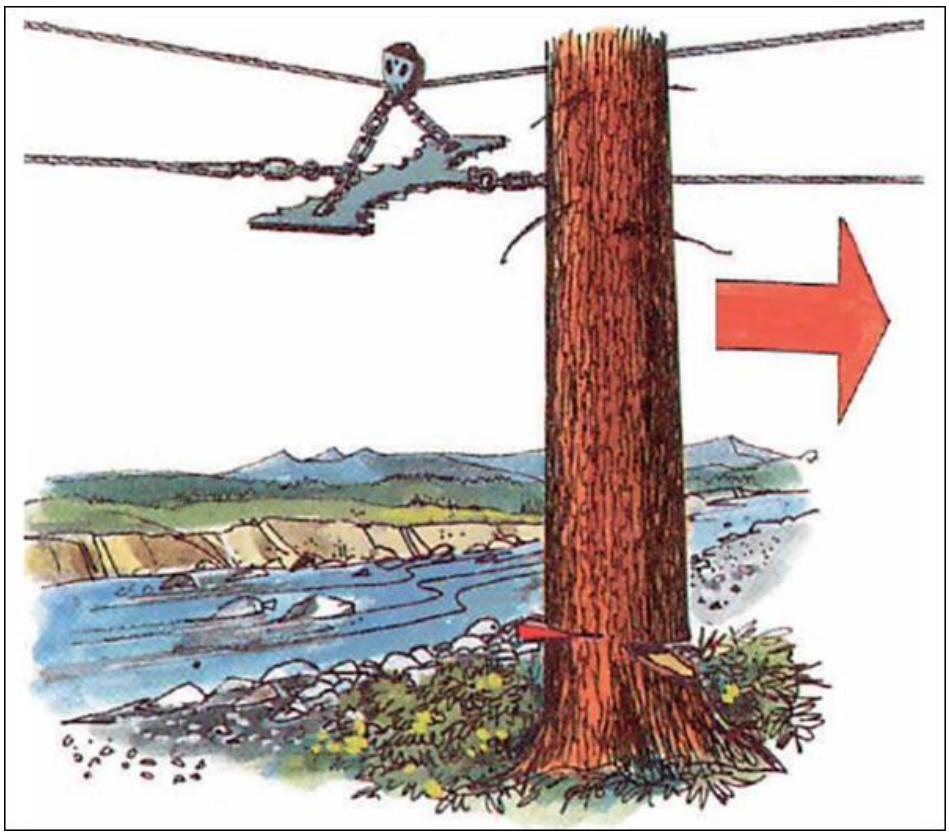
- Use a personal light attached to your chest or hard hat to leave your hands free.
- Wear a hi-vis vest and put hi-vis tape on the hardhat.
- Remain in one position when yarding lights swing away to land logs.
- Always have an extra flashlight and batteries.

Windows

Cab windows are intended to protect the operator from the natural elements and must be replaced if missing. Visibility is affected by dirty glazing and by glare caused by sunlight on “spider webbing” in cracked or broken glazing. Windows must be kept clean and must be replaced if cracked. Blinds may be installed to reduce the sun’s glare.

Line pulling of trees

Line pulling of trees requires written supplementary instructions. Because of the hazards involved, all workers must have the procedures reviewed with them before pulling trees over. An effective method of pulling trees over is the use of a “bat wing” or equivalent. The apparatus is placed behind the tree to be pulled. A faller places appropriate falling cuts, then the tree is pulled over.



Batwing

Spooling and cutting lines

The operator must not operate the machine and spool lines simultaneously. Proper spooling tools are to be used. Makeshift spooling tools such as a hammer or axe must not be used.

Spooling lines

All lines need to be spooled at one time or another. Guylines and the skyline are the most common lines to need attention.

Lines should be spooled and tightened properly onto the drums when they are first installed and be kept properly spooled for line life. Upend the lines regularly to reduce excessive wear and increase the life of the line. Poorly spooled lines can damage the lines, increase the chance of a break, and cause uneven slack during heavy loading. All lines should be run in at a very slow speed when workers spool the lines. Workers wearing caulked boots are not allowed to stand on metal covers or hoods while they spool lines, unless the metal is covered with a nonslip material.

Cutting lines

If a hammer is to be used to cut or splice a line, it must be a soft hammer identified by a small “S” stamped on one of the side faces. With use, these hammers become mushroomed and pieces may chip off. Such chips have been known to cause eye injury to workers up to 6 m (20 ft.) away. Hammers with mushroomed heads must be replaced. Cutting tools, such as line saws, should be sharp and of proper hardness. Eye protection must be worn during any cutting procedure. Maintain the proper tip profile on Marlin spikes.

Be aware of the following precautions:

- Always wear eye protection
- When holding a line for another worker to cut, keep face turned away during the cut
- Make sure all tools are in good condition and the hammer head is secure on the handle
- Use only a soft-headed hammer when cutting line with a wire axe
- Ensure you have a firm grip
- Use only acceptable wire cutters
- When using a guillotine or piston style cutter, place the cutting blade over the same point on the wire for every hammer blow to prevent flying chips
- Avoid placing the cutter on a hard surface, like a rock, which makes it bounce around; use a stump when possible
- Be aware of sparks during fire season
- Stand on the closed side of a piston or guillotine-type cutter. Use caution for all cutters. Even a hydraulic cutter can throw chips

General Hazards Related to Yarding and the Means to Control Them—Self-Quiz

1. Good deflection improves yarding efficiency and safety.

   ☐ True

   ☐ False

2. Straight uphill yarding on steep slopes is prohibited.

   ☐ True

   ☐ False

3. What is the minimum amount of clearance that must be maintained around the swinging superstructure of any machine?

   ☐ 2 feet

   ☐ 3 feet

   ☐ 4 feet

   ☐ 5 feet

4. When going ahead on the turn, where is the safe location, relative to the turn, that the rigging crew must be in?

   ☐ Above and in front

   ☐ Above and behind

   ☐ Below and behind

Now check your answers on the next page.

General Hazards Related to Yarding and the Means to Control Them—Quiz Answers

1. Good deflection improves yarding efficiency and safety.

   Answer: **True**

2. Straight uphill yarding on steep slopes is prohibited.

   Answer: **False. Straight downhill yarding is prohibited while straight uphill yarding is limited to slopes with no significant hazard to rigging crew.**

3. What is the minimum amount of clearance that must be maintained around the swinging superstructure of any machine?

   Answer: **2 feet**

4. When going ahead on the turn, where is the safe location, relative to the turn, that the rigging crew must be in?

   Answer: **Above and behind**

Section 1009-02: Road Change Hazards and Controls

What you need to know about this section

By the end of this section, you will be able to demonstrate knowledge of the following key point:

2.1 Road change hazards and the means to control them

Key Point 2.1: Road Change Hazards and the Means to Control Them

Road change hazards

Below is a list of hazards to be cautious of when you are helping with a road change. Be aware that these are not the only hazards that you may encounter. You need to be able to demonstrate knowledge of these hazards, and the means to control them.

- Carrying heavy loads
- Handling wire rope
- Unhooking lines off anchors
- Chainsaw use
- Wire rope failure
- Strap and anchor failure
- Tail hold failure
- Binds of bights
- Unplanned rope or rigging movement

Remember that the majority of injuries occur when workers are not standing in the clear. It is your responsibility to be alert to your surroundings! Always know your escape route. Always stand in the clear.

All workers must be trained how to lift heavy objects properly to avoid back injuries. Rely on machinery as much as possible to lift heavy objects. Know your limits and test the object before lifting. Be sure to clear your chosen path of any obstructions. You should take lighter loads first and make foot and hand holds as required. Always plan your move.

Handling wire rope

You should always take care when handling lines and keep a firm grip on the wire strands for full control. Be sure to never slide your hand on a line, instead place hand over hand. Jaggers on wire rope can pierce your hand, if you were to grab them with full strength or slide your hand along the line. Cotton gloves should be used versus leather gloves when you are handling wire rope as the cloth gloves will tear if they get hung up on a moving line. With leather gloves, it's possible that a jagger could hang in the glove and drag you along with the line.

Always be careful of your fellow workers when you are handling wire. It is often heavy, and wire pieces can be incredibly sharp; it is easy to injure yourself and others.

Unhooking lines off anchors

Releasing a line off a stump anchor can be very hazardous, due to tension in the line. Use caution and always stand on the inside of the point of attachment during release, particularly when there is tension in the line. You may need to bring a soft hammer to pound out pins, and it is possible that you may require strawline to pull slack as well.

Guy lines on stumps are either attached with a shackle through an eye or a knob and bell (screwy hook). Guylines on backspars are usually tied off with a timber hitch or wrapped three times, and cable clipped or spiked. With single-wrapped stumps, it may be safe enough to unhook the end of the line and let it run. If the line needs to be held on the hillside, use a rigging chain and a short strap, or use a catching shackle and strap.

With multi-wrapped stumps, it may be necessary to use a rigging chain and use the strawline or come-a-long to pull the tension out of the line in order to release the guyline. If the tension is great, use a back wrap to ensure the line is all out in the direction of pull, and use the strawline or come-a-long to lower the line.

Always stand on the inside of the point of attachment and in the clear when releasing a line from an anchor

Chainsaw use

Only use a chainsaw if adequately instructed, trained, or experienced in its use. Injuries from saw kickbacks may be severe and may lead to permanent disability. Train before you cut, wear personal protective equipment, know the saw, and be sure it is in serviceable condition. You should also be sure to always follow these safety precautions:

- Always check that the chain brake is operational before using the saw
- Adjust the carburetor so the chain stops when the saw idles
- Make sure the chain is properly adjusted for tension

- Carry the saw with the bar to the rear to avoid tripping forward onto the chain
- Shut off the engine or apply the brake when carrying the saw more than a few steps
- Learn to use the saw equally well, right or left handed to avoid awkward positions
- Always work to one side of the saw to avoid injury from kickback. Never stand directly behind or straddle the saw
- The top of the bar tip causes most kickbacks. When working with a chainsaw, be mindful of where the bar tip is. Touching the upper 90 degrees of the nose tip against anything without the rest of the top of the bar engaged can cause a kickback toward the operator
- Be careful of the chain and hot exhaust when servicing or filling
- After refueling, make sure the gas cap is tight, so fuel will not leak (onto clothing, etc.). Fix fuel caps with leaky vents

Be aware of these common causes of chainsaw accidents:

- Working in an awkward position, off balance, or with poor footing
- The chain tip touches branches, an obstruction, or other materials
- The saw has mechanical problems, such as an improperly filed chain, loose handle bars, clutch drag or improperly adjusted idle speed
- The saw chain binds in the cut
- The end of the bar strikes uncut wood in the cut
- Running a hand across teeth during saw sharpening

Note: Safe chainsaw usage is described in greater detail in another unit. Refer to Unit 1028 for more information.

Wire rope failure

Wire rope most often fails because it is worn out or overloaded. Planning, equipment inspection, and safe operating procedures are the best way to prevent cable failure.

Workers must remain far enough in the clear to avoid being struck if lines do break and fall. Beware of thrown objects that may come with a broken line, such as parts of blocks or shackles; and beware of the possibility that the tower could collapse.

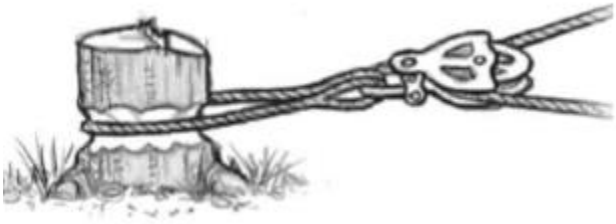
Always plan your escape routes in advance to know immediately where to go if lines fail and come crashing down.

Strap and anchor failure

An anchor fails when the force being applied to it is greater than what it can support. Planning, equipment inspection, and safe operating procedures are the best way to prevent anchor failure. Always take the extra time to tie back your anchor if there is any possibility that it might fail.

Yarding can reduce the strength of an anchor stump. It is important to make sure loads have been calculated properly. High dynamic loads increase the risk of progressive failure. Check all guylines and anchors after several turns and on a daily basis, looking for signs of movement in stumps, mobile anchors, or buried deadman anchors. Any unstable guyline anchor must be immediately corrected.

All straps must be inspected regularly, and replaced if they are showing signs of wear or damage. The line attachment for a block is stronger when hung in both eyes of a strap. Always hang straps in lead with the load. Never choke a stump with a strap by threading one eye through the other (except for strawline or other light loads); the line could cut through itself and fail. The load capacity of a strap is based on the line being doubled. Straps must be long enough to allow the block to align with the angle of the haulback; this will increase the load capacity and prevent the line from burning on the shell of the block. Clear any debris that could cause wear on block or strap, or stop block from turning.



Workers must remain far enough in the clear to avoid being struck by anything if an anchor does fail. Beware of any falling or thrown rigging components, and flying debris such as rocks, dirt, and wood; and beware of the possibility that the tower could collapse.

Never stand directly in front of, beside or behind of a haulback tailhold. There is always a danger of the tailhold pulling, block failure, or the strap breaking. A good rule of thumb is to always stay at least a strap length away. Always be aware of your surroundings, and always be in the clear.

Tail hold failure

A tail hold is the point of anchor for a block on a running line. A tail hold will fail when the force being applied to it is greater than what it can support. Much like other anchors, planning, equipment inspection, and safe operating procedures are the best way to

prevent tail hold failure. The same precautions and warnings that apply to anchors also apply to tail holds.

Tail holds should be inspected regularly for any signs of movement. It is also important to ensure that the tail hold has been rigged properly. Notches must be as low as possible so that less leverage is exerted that could pull the stump out of the ground. Always take the time to tie back any tail hold if there is any doubt of its holding power.

Workers must remain far enough in the clear to avoid being struck by anything if the tail hold does fail. Be aware that if the tail hold fails it is likely to send all of the rigging components that are attached to it crashing down into the work area. The forces involved in a tail hold failure can be extreme, and it is possible that the stump serving as the tail hold anchor may be ripped from the ground with enough force to send the stump into the work area.

Always be aware of your surroundings, and always be in the clear.

It is a requirement on a tower to have both front quarter guylines deployed to prevent the tower from going over backward in the event of tailhold or yarding line failure.

When Yarding, there is a possibility of the mainline damaging a front quarter guyline by rubbing against it, especially in a small landing where logs are landed close to the base of the tower. The landing/utility person must watch for this to ensure that it does not happen. If it does occur, the guyline must be relocated to avoid damage but still in a location that supports the tower.

Flying debris

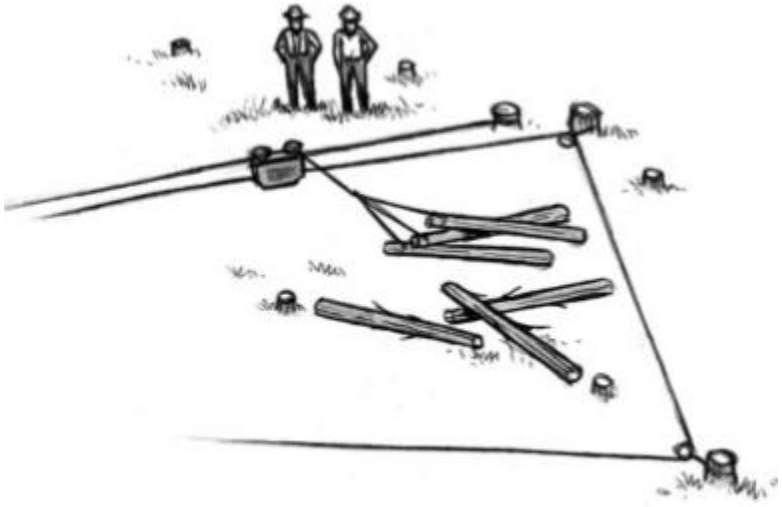
When you are doing a road change, you should always be watching for flying debris. There may be side bound lines that can launch logs and branches into the work area.

Binds or bights

There are several procedures for road changes that involve stringing strawline through blocks at the new road line, then tightlining the yarding lines to the new location. Sometimes this is a clearly quicker choice, but these kinds of “jumps” in the line can be hazardous due to potential hang ups and side binds. Even moving lines no farther than toward the corner block in the existing layout produces a very large bight area. Workers must stay well clear during line shifts that jump lines directly to the new location.

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. 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. String strawline over obstructions and use extra line if needed.

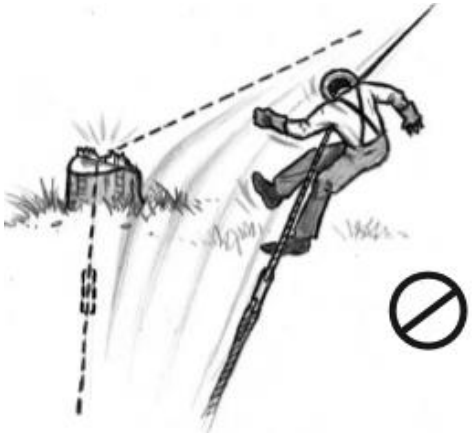


Corner blocks can create a large bight area. During setup, consider the ability of the rigging crew to get in the clear

Unplanned rope or rigging movement

Pay close attention to line movement to indicate obstructions. A haulback that saws into a stump, for example, will not move freely and may develop slack in the backline that allows rigging movement even after the yarder stops. If the rigging does not move at once when the haulback is slacked, stay clear and slowly pick up the slack, then look for a side bind.

A side bound line caught on a tree, rock, stump, or debris pile can throw materials a considerable distance, and the bight in the line can spring one direction and rebound opposite if it breaks free. Side binds also rapidly damage a line and can be a fire hazard in dry weather.



A line caught on a stump can suddenly break free

When jumping heavy lines such as the haulback on slopes or uneven ground, use a pass chain to keep the line from running away when the strawline is released. Attach the chain to the line and to a sapling or secure object. The chain is attached to the line by wrapping the chain around the cable a minimum of three times against the direction of pull. The bight of the chain is then threaded back through the hook, and the chain is tightened.

Pass chain is wrapped at least three times against the pull

You should also be watching for if the strawline jumps the shive of the block. If this happens the strawline will not be on the sheave but instead it will be running on the gooseneck and guard and there will be no way to get slack.

Road Change Hazards and the Means to Control Them—Self-Quiz

1. What type of gloves should be worn when handling wire rope?

   ☐ Leather

   ☐ Cotton

   ☐ Synthetic fiber

2. It is suggested that workers stand about how far away from any strap under tension?

   ☐ One strap length

   ☐ One and a half strap lengths

   ☐ Two strap lengths

3. Always stand on the outside point of attachment when releasing a line from an anchor.

   ☐ True

   ☐ False

4. Corner blocks can create a large bight area.

   ☐ True

   ☐ False

Now check your answers on the next page.

Road Change Hazards and the Means to Control Them—Quiz Answers

1. What types of gloves should be worn when handling wire rope?

   Answer: **Cotton**

2. It is suggested that workers stand about how far away from any strap under tension?

   Answer: **One strap length**

3. Always stand on the outside point of attachment when releasing a line from an anchor.

   Answer: **False (always stand on the inside point)**

4. Corner blocks can create a large bight area.

   Answer: **True**

Section 1009-03: Breaking Out Hazards and Controls

What you need to know about this section

By the end of this section, you will be able to demonstrate knowledge of the following key point:

3.1 Breaking out hazards and the means to control them

Key Point 3.1: Breaking out Hazards and the Means to Control Them

You need to be able to demonstrate knowledge of breaking out hazards and the means to control them.

Terrain and obstructions

Walking in felled timber

Walking in felled timber presents several hazards, even on level ground. Logs may be unstable or slick, with bucked sections, or loose bark, and falling even a short distance off a small log can result in serious injury, due to sharp branches, broken hinge wood on stumps, uneven surfaces, stubs, or other hazards.

In an area of newly felled timber, snags or wildlife trees may have been left, and loose limbs (widowmakers) may remain along the cutting line. Root wads bucked short have been known to suddenly sit back upright. Avoid walking under roots and stay alert for other hazards.

Be aware of the following precautions:

- Stay alert and cautious while walking. It is not always possible to take action to avoid or eliminate hazards in felled timber, so caution is the best advice
- Look to ensure a log is supported by a stump or other solid object that will prevent rolling
- Wear appropriate caulk boots for walking on felled timber or logs
- Look for hazard ribbon left by others, and report newly observed hazards to others in the crew. If a log is loose or unstable, consider kicking it free down the hill, particularly if leaving it would pose a hazard to the rigging crew as they work up or down the hill

Loose bark can cause a serious fall, particularly when the sap is running

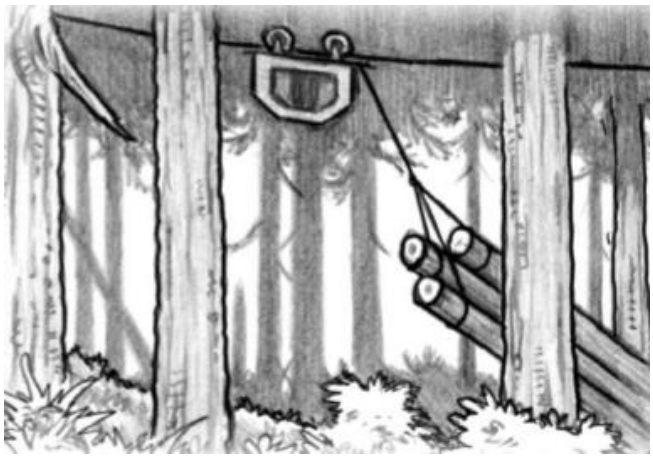
Working in standing timber

Working in a thinning operation in standing timber poses additional risks for the rigging crew not normally encountered in a clear-cut unit. Workers need to contend with leaning and hung up trees, limbs, and other overhead hazards, spring-loaded limbs and vines, logs that are out of lead, logs that will not easily turn up the corridor, and similar obstructions due to surrounding trees left standing.

Two of the biggest risks involve intermediate lift trees. Rigged trees can fail and fall in an unexpected direction, or the carriage can jump off of the jack as the carriage is returned to the rigging crew. Make sure the crew stays out of the potential failure zone of rigged support trees during outhaul as well as inhaul.

Trees or logs felled in a thinning operation may lay out of lead, making it necessary to position the carriage with some care to provide the straightest pull out to the corridor without a hang up. As the turn is pulled to the corridor, it may be necessary to reposition the carriage again to overcome a potential hang up. The rigging slinger needs stay alert to stop the inhaul of the drop line before a turn becomes hung up.

The way logs are choked can help avoid hang ups. Consider choking logs farther from the end than normal if it appears the pull will help a log clear a hang up and enter the corridor before it swings into the direction of pull. Short choked ends will clear hang ups easier and reduce hazards while yarding logs into corridor. Once the log is free, it may be necessary to stop and adjust the choker to the end before sending the turn on to the landing.



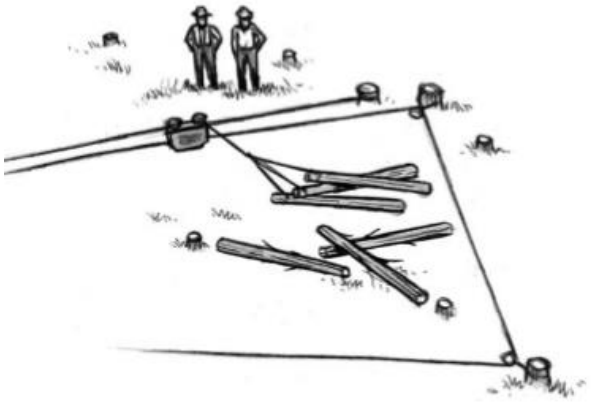
Hang ups and failure of rigged trees are more likely logging in standing timber

The bight

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

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 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

Unexpected log or deck movement

Swinging and upending logs

Once a turn starts to move, a hang up can cause a log in the turn to swing or upend, even when the logs are properly choked and there is good deflection in the line. The risk of a swinging log increases when logs are choked with long ends or guthooked, and with a ground lead.

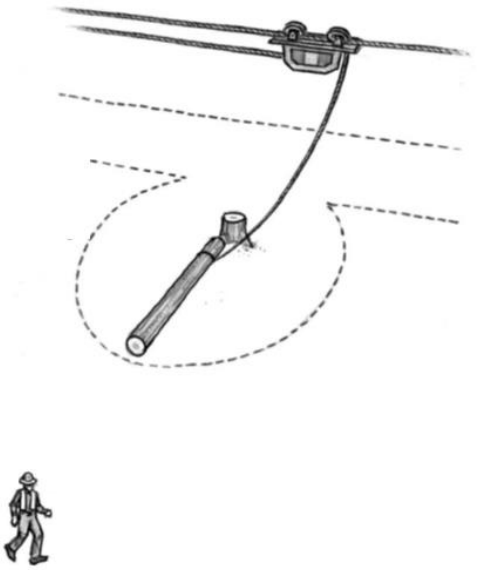
Long ends give a log greater potential to upend or swing violently if it comes in contact with a stump or hang up. This is most dangerous with long logs or tree-length logs, which have a greater swing radius.

Be aware of the following precautions:

- The rigging slinger must ensure the rigging crew is well in the clear and out of the danger area of the longest log yarded before giving the go-ahead signal for the turn
- The safest position in the clear is above and behind the turn and out of the bight of the haulback
- Choke logs with short ends whenever possible
- Get well clear when purposely upending or swinging a log. Do not depend on the log to swing in the expected direction
- Never guthook a log, unless a log end cannot be safely reached, or if you need to do it to clear a hang up. Once pulled free, it is better to reposition the choker on the log before sending the turn to the landing

Choked logs moving when haulback is slacked

On a steep hillside, if the haulback is slacked too much or runs unexpectedly when setting the turn, logs already hooked up can be pulled downhill by the weight of the mainline. Make sure not to slack the haulback if some of the chokers are already hooked up to light or unstable logs.



Logs in a turn can swing wildly. Stay well clear

Danger trees and loose limbs

Remove snags and danger trees in the area before work begins, or arrange work to limit exposure. Stay vigilant as work progresses and report hazards to the hook tender.

Danger trees from farther away can also be hazardous if caught in the path of a tightening line. A side bound line caught on a tree, rock, stump, or debris pile can throw materials a considerable distance, and the bight in the line can spring one direction and rebound opposite if it breaks free. Side binds also rapidly damage a line and can be a fire hazard in dry weather.

Pay close attention to line movement to indicate obstructions. A haulback that saws into a stump, for example, will not move freely and may develop slack in the backline that allows rigging movement even after the yarder stops. If the rigging does not move at once when the haulback is slacked, stay clear and slowly pick up the slack, then look for a side bind.

Be aware of the following precautions:

- Stay alert for danger trees, snags, and loose limbs in the work area, especially on the back-end boundaries. Report and remove hazards, or attach safety ribbon and stay clear. Loose branches are common and often hard to see

- Always get in the clear of moving lines and keep well out of the bight of the line.
- Stay alert for side binds and clear any hang ups immediately
- String lines as straight as possible and stay above intervening obstacles
- Always use extra caution when working with strawline

Unplanned rope or wire rigging movement

Strawline side binds

Strawline hazards are commonly underestimated. The small line is actually more dangerous than other lines, because it more easily runs through and catches on obstructions, and more easily breaks free under tension. Strawline can fail and throw pieces. Always stay clear of the strawline just like other moving lines, and watch carefully for side binds.

Heavy undergrowth

When shrubs, small trees, and other plants that are part of the undergrowth become very thick, or heavy, it becomes hazardous.

A thick undergrowth makes the yarding process difficult because it can catch and snag the logs as they are being pulled to the landing, which then requires the attention of the rigging crew in order to get the logs moving again. It is also challenging to walk in, and workers are likely to fatigue much quicker if they have to fight their way through heavy undergrowth.

A heavy undergrowth, much like a covering of thick snow, is able to hide other hazards on the ground such as logs, branches, and so on.

Wire rope and rigging

Swinging chokers

Avoid chokers when the line is moving. Foremost, stay clear of swinging chokers when the rigging is suspended. Chokers dragging on the ground with line movement can also be dangerous if they catch on an obstacle and spring free.

When grabbing the chokers directly under the carriage, either run the carriage ahead or get in and get out, particularly when the carriage is low to the ground.

Be aware of the following precautions:

- As chokers come back to toward the rigging crew, watch for the chokers pulling debris, which can be thrown toward the crew. The chaser or operator on some carriages lets out the drop line as the carriage comes back; make sure the chokers are not low enough to run into obstructions or pick up debris

- Stay in the clear, at least two choker lengths away, until the rigging is spotted. For carriages with a dropline, this distance may need to be increased. Stay clear of the potential swing of the choker
- When chokers are swinging, bells and knobs must be slacked onto the ground to stop the choker movement before the crew approaches
- Be careful of hang ups when pulling on a choker. If a choker is badly hung up over a log or in brush, don't jerk it free. Walk over and clear it
- Only approach the rigging once the chokers come to rest

Suspended and hung up rigging

Use caution when working directly under the rigging. There is always a chance a line will be unintentionally released and rigging will drop faster than expected when being slacked down.

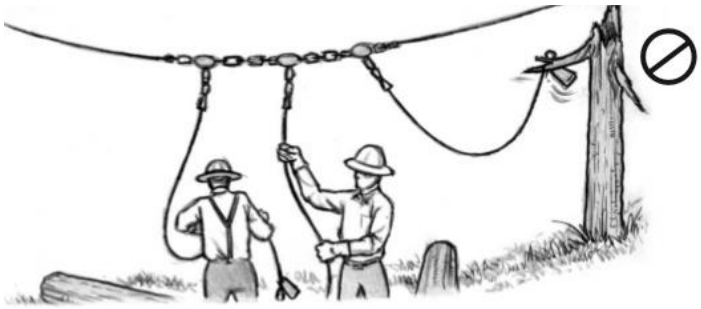
Suspended rigging can be dangerous. Drum brakes, brake bands, anchors, and adjusting rods can all fail. A sudden loss of air pressure can cause the rigging to drop some distance before the spring brake or dogs engage. When the rigging is slacked down, any part of the lines can hang up on saplings or windfall roots and dangle dangerously or crash down unexpectedly. The skyline can incur bounce when the rigging is stopped fast. Always clear hang ups before choking logs.

Be aware of the following precautions:

- Never stand directly under the rigging! Stay to the side. If it is necessary to cross beneath lines, do it swiftly, and only when there is no load on the lines
- The yarder operator must keep the braking system well-maintained, including safety brake or dogs
- The yarder operator must stay at the controls when the crew is setting a turn, with brakes applied
- With a dropline carriage, clear a hang up by re-positioning the carriage to drop the chokers in a clear area
- Hand-clear a hang up only when the rigging is slacked down

To clear a hang up with a shotgun carriage or buttrigging:

1. Tightline.
2. Remove the sapling or other obstruction.
3. Slack the mainline to add weight to break the hang up.
4. Slack the mainline and skin the rigging to clear the lines, or skin the rigging back and pick up a light turn to clear the lines.



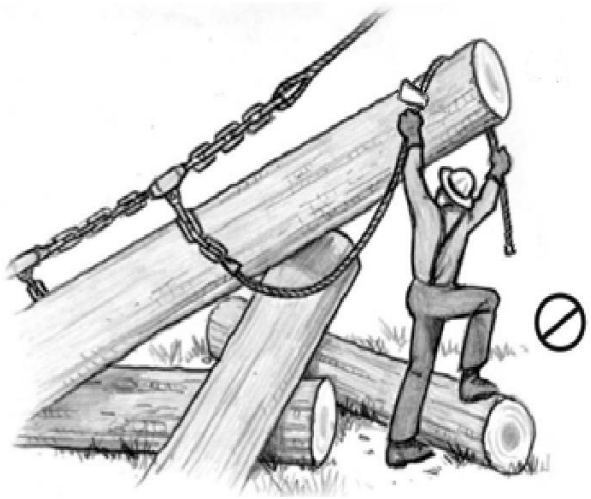
Clear hung up rigging before working with chokers

Hooking up the turn

Hooking up the turn and starting it to the landing can be hazardous work. Adequate training and safe work procedures are vital.

Be aware of the following precautions:

- Stay in the clear until the rigging is slacked and chokers stop swinging
- When logs are layered, hook up those on top and closest to yarder first to reduce applied tensions and damage
- Avoid crawling under logs that could slip or drop, and watch for logs that could be dislodged by movement from other logs
- When tension is applied to the mainline or dropline, beware if it does not rise into position. The line may be fouled and could break free and throw heavy debris



Avoid crawling underneath logs that could slip or drop

Adding tag lines to chokers

Adding a tag line to a choker or leaving a long dropline can be useful to reach a distant log or direct a log around an obstacle. Tag lines should be removed and droplines shortened before the turn is yarded to the landing. Strung-out logs foul more readily and are more difficult to control and tightline clear. Strung-out logs are also more difficult to

land and may run outside the turn and jill-poke other logs ahead on a pile.

Be aware of the following precautions:

- On a shotgun carriage or buttrigging, use a front choker for tagging logs whenever possible
- Shorten up the tag line choker or shorten the dropline before sending the turn to the landing

Overhead hazards (elevated ropes, rigging, turn)

Choker breaking on turn through felled lumber

Beware of the increased risk of a choker breaking when yarding across a hill where the turn cannot be held from running through felled and bucked timber. Tightlining the rigging to clear the obstruction increases the danger of rigging flying uphill toward a crew “in the clear” if a choker or other rigging fails. Avoid heavy turns that are too heavy or hooked up improperly which increase the chance for hang ups. Jerking and excessive heavy pulling strain the rigging and tower, and may result in catastrophic failure. Select turns light enough to yard without excessive heavy pulling.

Be aware of the following precautions:

- Make sure the crew position “in the clear” is located above and to the side of the moving turn, and also beyond the bight of the line, in case rigging fails
- Try to hook up turns light enough to clear felled and bucked timber
- Hook up a bridle to support chokers on large logs

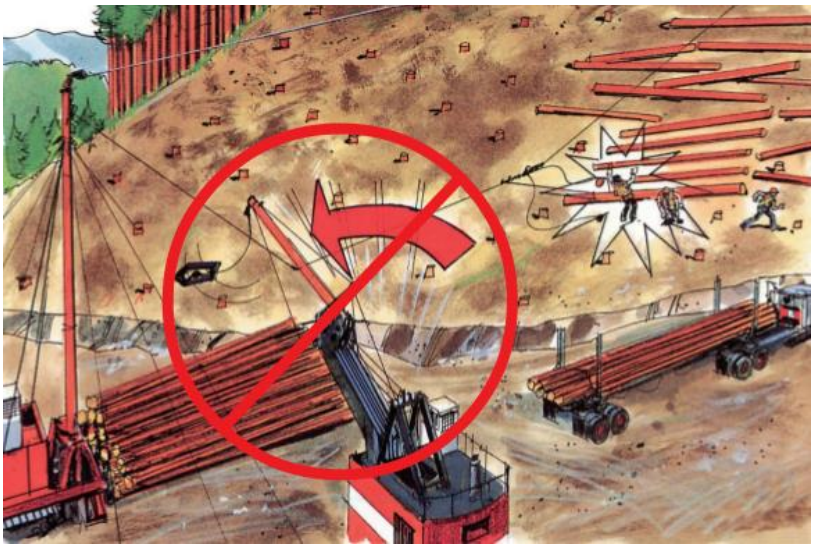
Other machinery and operations

Hazards caused by machinery and operations include the following:

- Machine hitting running lines
- Anchor failure
- Incorrect signals
- Runaway logs, slash, or butt ends from landing
- A hung up drag or turn
- Dislodged rocks, logs, or debris
- Windfall trees and root wads
- Too close to moving lines

Machine hitting running lines

When the rigging is out in the setting, log loaders should ensure they do not work where they may strike the yarding lines with logs or snorkels. It is also possible for logging trucks to hook guylines with bunks or load.



Snorkel boom hits yarding lines

Anchor failure

An anchor fails when the force being applied to it is greater than what it can support. Planning, equipment inspection, and safe operating procedures are the best way to prevent anchor failure. Always take the extra time to tie back your anchor if there is any possibility that it might fail.

Yarding can reduce the strength of an anchor stump. Hard pulls increase the risk of progressive failure. Repeated hard pulls or heavy loads increase the risk of progressive failure. Check all guylines and anchors after several turns and when under the first heavy loads, on a daily basis, looking for signs of movement in stumps, mobile anchors, or buried deadman anchors.

Workers must remain far enough in the clear to avoid being struck by anything if an anchor does fail. Beware of any falling or thrown rigging components and flying debris such as rocks, dirt, and wood. Beware of the possibility that the tower could collapse.

Incorrect signals

Unexpected line movement can result if a radio signal malfunctions or is used wrongly. Check equipment and operator knowledge of signals in advance. Always use standard signals found in the Occupational Health and Safety Regulation (OHSR).

Always have two radio transmitters where chokers are being set. If there are other people working near the lines and out of view of the operator, ensure they are all in the clear before signaling for the lines to be moved.

Be aware of the following precautions:

- Set up the radio whistle on an assigned frequency for the operating location to prevent interference

- Handle radio units carefully to ensure reliable operation
- Replace malfunctioning units at once
- Be sure to keep battery charged as required
- Guard against accidental activation of spare transmitters
- Avoid sounding a stop from both radios at the same time, which could be misunderstood
- The operator and rigging crew must be able to distinctly hear the whistle signals
- The yarder engineer must receive clear distinct whistles before any line movement. If the yarder engineer is not sure, he must repeat the whistle and wait for a reply or call on the voice channel to verify
- All motorized carriages must be equipped with a working horn

Runaway logs, slash, or butt ends from landing

The landing must be planned to minimize the risk of logs or other debris kicked loose at the landing from running downhill toward the rigging crew. On a small landing, the cramped operating area for the loader can become hazardous. A log in the grapple can strike the mainline and cause the rigging to jump as the rigging crew sets a turn below, or logs may be decked too close to an edge and get disrupted as logs are added.

Be aware of the following precautions:

- Discuss the organization of the landing and work zones with the entire crew beforehand. Communication and planning with multiple perspectives improve effectiveness and attention to safety
- The landing should be adequate for the turn to be landed and unhooked without using the loader to prevent the turn from running back down the hill
- Plan the areas of operation of the yarder, processor, and loader, and maintain safe distances. Identify areas where equipment operations overlap
- Make sure the loader boom or log in the grapple does not strike the mainline, skyline, running lines, or guylines when the rigging crew is setting chokers. Avoid throwing debris over the bank
- Blow one long continuous whistle to warn the rigging crew if materials slide off the landing that may endanger them
- Try to organize the setting to be yarded partially side hill, so that the rigging crew doesn’t work in the cone of danger below the landing

Watch the “On The Hillside – In The Clear video to learn more about "being at the right place at the right time, every time, on the hillside".

https://www.youtube.com/watch?v=bSziuGEI31Q

A short landing is sometimes inevitable, and it may be necessary for the loader or processor to grab and hold the turn while the chaser unhooks the logs. Make sure the rigging crew below is in the clear, in case a log slips out of the grapples. A short landing might require long ends on choked logs.

Runaway logs are not the only danger present to workers below the landing. You should always be watching for any slash or other debris knocked loose by a turn or rolling off the landing. Be aware and always know your escape route.

Hang up logs

Always inspect a hang up closely for hazards.

Hang ups are always hazardous. If the rigging is under tension it may spring or pull loose, or it may drop unexpectedly. A log can possibly swing or upend even after the stop signal is given. Material disturbed by the hang up could spring or move unexpectedly, even after the turn is cleared. Good planning for the landing, yarding system, road lines, and payload should minimize problems with obstructions. Every hang up is going to be different. On some it may work to dislodge the hang up by repositioning the carriage and pulling in the opposite direction. On some, it may work to unhook the logs and repositioning the chokers, and in other cases, to pull out one log at a time. Avoid letting hang ups become routine, which may encourage the crew to gradually stand closer to the turn and forget the risk.

Be aware of the following precautions:

- On steep hillsides, always approach hang ups from the upper side
- Never approach from below the turn when yarding uphill if there is a risk of logs shifting or rolling
- Slack the rigging down before entering the area
- Watch for saplings snagged by the turn and bent under pressure

- Watch for loose rocks and other objects moving with the turn, especially on a hillside. Always assume the turn could roll or shift, and avoid getting caught in a pinch point
- Use caution when standing or working under elevated rigging, which could fall unexpectedly
- Ensure communication with the yarder operator is working properly
- Get clear before signaling to go ahead on the rigging. Make sure others are clear, too
- Designate a safe location for workers who must fight repeated hang ups
- If repeated hang ups occur, consider options to remove or minimize the problem

Dislodged rocks, logs, or debris

Gravity is the primary source of hazardous energy when working on a slope. Logs, rocks, or other objects can be disturbed by rigging activities and roll or slide downhill toward the crew. The risk is greater working around newly felled timber, where logs can shift and dislodge other logs or material that appeared stable.

Be prepared and always know your escape route.

Be aware of the following precautions:

- Yard a slope from the highest point down
- Never work below unstable logs, rocks, or other material. If it is unclear what is holding a log, then assume it can move at any time
- When getting in the clear above and behind the turn before the go-ahead signal, identify the logs that will move and check that no unbucked logs or tree lengths could intrude on the safe area chosen. When there is no logged-off area available, retreat farther and use extra caution. Never remain below anything that could be dislodged when the turn is yarded free
- In an area with bucked timber, never stand on the second cut of a tree that is hooked up
- If there is any doubt about the action of logs in a turn, give the “go ahead slow” signal
- Stay alert to the moving turn and be ready to signal stop if a hazard develops. Chokers can break on the way to the landing or logs break in two, sending material back down on the rigging crew

Beware of unstable logs or other objects beyond the work area that could roll or slide and impact nearby logs

Windfall trees and root wads

Windfall roots will often sit back when a tree is bucked off or yarded free, particularly if it is bucked short. Heavy rains can disturb the ground and this may cause the root to tip more easily.

Unstable rootwads, when kicked loose, can move unpredictably and cover a wide swath. Any unstable rootwad identified as a hazard in a work area needs to be moved or made secure. You should always consider root wads dangerous; avoid getting below or behind root wads. Always approach from the upper side. Always pull a root wad clear with rigging when it appears unstable.

Too close to moving lines

Always keep a safe distance away from any moving line. You should never assume that a line is completely free of any side binds, and if a moving line suddenly breaks free of a side bind you can be seriously injured by any flying debris or by the line itself if you are not standing in a safe location. Never touch a moving line with any part of the body. Do not ride moving hooks, lines, or logs, or use a moving cable as an assist when walking uphill. Lines can swing with yarder. Be aware of any side to side movement that could pick up and throw objects.

Breaking Out Hazards and the Means to Control Them—Self-Quiz

1. Workers should yard a slope from the highest point.
   - ☐ True
   - ☐ False
2. Side binds can be a fire hazard during the summer.
   - ☐ True
   - ☐ False
3. Workers should choke logs with long ends whenever possible.
   - ☐ True
   - ☐ False
4. Turns that are too heavy can increase the chances of a hang up.
   - ☐ True
   - ☐ False

Now check your answers on the next page.

Breaking Out Hazards and the Means to Control Them—Quiz Answers

1. Workers should yard a slope from the highest point.
   Answer: **True**
2. Side binds can be a fire hazard during the summer.
   Answer: **True**
3. Workers should choke logs with long ends whenever possible.
   Answer: **False (choke logs with short ends whenever possible)**
4. Turns that are too heavy can increase the chances of a hang up.
   Answer: **True**