



Unit	1018
Title	Set Up Tower
Document type	Learning resource



BC Forest Safety

*Funding provided through the Canada-British Columbia
Labour Market Development Agreement.*

In consultation with industry subject matter experts, the BC Forest Safety Council (BCFSC) facilitated the production of this material. Funding was provided by the Government of Canada, the Province of British Columbia, and industry in-kind contributions.

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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 your knowledge of:

- Maintaining the tower
- Planning the landing
- Setting up the guylines
- Raising the tower
- Communicating with crew

Why it's important for you to learn this unit

It is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulations related to the work being conducted. A full list of OHSR related to this unit can be found in the relevant package.

Are you ready to take this unit?

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

- 1002 – Describe Forest Industry
- 1003 – Use Safe Work Practices
- 1004 – Communication in the Workplace
- 1005 – Recognize, Evaluate, and Control Hazards Related to General Forestry
- 1006 – Describe Workplace Documentation
- 1007 – Describe Emergency Preparedness
- 1008 – Describe and Apply Workplace Attributes
- 1009 – Recognize, Evaluate, and Control Hazards Related to Yarding
- 1010 – Describe Basic Regulations and Standards
- 1011 – Describe and Access Intermediate Regulations and Standards
- 1012 – Describe, Access, and Apply Advanced Regulations and Standards
- 1013 – Describe Rigging Components and Apply Basic Rigging Practices
- 1014 – Describe and Apply Advanced Rigging Practices

Does this unit apply to you?

This unit applies to you if you are in either or both of the following occupations:

- Tower operator
- Hook tender

Section 1018-01: Maintaining Tower

What you will learn in this section

By the end of this section, you will be able to demonstrate your ability in the following key points:

1.1 Lock out equipment in accordance with manufacturer's specifications

1.2 Maintain tower in accordance with manufacturer's specifications

Note: The section on Maintaining Tower applies to both the set up and take down of a yarding tower. For this reason, this section is presented here and repeated in 1019-01.

Key Point 1.1: Lock out Equipment in Accordance with Manufacturer's Specifications

WCB regulations require using lock or locks during repair and maintenance work to render machinery or equipment inoperable or to isolate an energy source.

Guidelines on locking equipment

- When using a start/stop switch for checking that the equipment has all power sources disconnected, ensure that the switch is left in the stop or off position
- Personal padlocks and one key will be supplied to all workers required to lock out. Only padlocks supplied by the company can be used. Each personal lock will be identified to the person to whom it is issued
- Each worker is responsible for attaching his lock and for removing his lock
- When a job continues over a shift change, workers coming on shift must place their personal locks on all control devices before the workers going off shift remove their locks
- All locks placed on control devices may only be removed by the person who applied the lock
- In the event a personal lock is left on after a job is completed, or the worker has left the site, it may be removed in an emergency

A thorough investigation is required by the foreman and safety representative to ensure that no workers will be endangered by the removal of the personal lock. Any breaking of the lockout procedures must be recorded and the worker whose lock was removed notified.

Many yarders do not have lock out tags. When there is a shift change or when maintenance is required, they MAY be used, but not in all situations. Flagging ribbon is also used to mark/indicate what is broken, needs welding or any other maintenance.

Yarders frequently have a sheet on the dash where messages can be left when there is a need for maintenance. Verbal communication over radio or otherwise are also common when maintenance is required.

Why is it important to shut down the machine properly?

Hazards for machine operators are highest when entering or exiting the machine. Some machines may require the operator to start the machine from beside the motor.



CAUTION!

Operate only from a safe area recommended by the manufacturer.

If required, you may need to hold the low oil pressure over-ride switch on until the motor gets enough oil pressure to negate the use of the switch. Also, never exit the machine without shutting down and securing all hazardous energy completely.

Machine shutdown

Observe the following safety procedures:

1. Lower blades, grapples, masts, or attachments to the ground or other stable surface. All moving parts must come to a complete stop.
2. Disengage winches or place transmission in neutral.
 - This helps to safely start the engine the next day. Sometimes the winches will engage when started by operator standing at the engine.
3. Shut down the engine.
4. Engage brakes to prevent movement.



Guidelines for what to do before maintenance is conducted

- Secure all parts and attachments against inadvertent movement
- Make sure the pressure or stored energy in pneumatic and hydraulic storage devices that move machine elements is discharged
- Remove ignition keys and place them in your pocket
- Put lockout tags over control devices, clearly saying “DO NOT OPERATE” or “DO NOT START” or another appropriate warning



CAUTION!

Check the work area before lockout tags are removed to be sure all tools have been removed; guards are in place, and workers in the clear.



Now try the quiz on the next page.

Lock Out Equipment—Self-Quiz

1. Lockout tags are always used on yarder towers.
☐ True
☐ False
 2. We need to check the work area after the lockout tags are removed.
☐ True
☐ False
 3. When are hazards highest for machine operators (as mentioned above)?
☐ When starting the machine
☐ When entering or exiting the machine
☐ When shutting the machine down
☐ When removing lockout tags
 4. It is permitted at any time to remove locks for other operators should they not be available to do so.
☐ True
☐ False
-



Now check your answers on the next page.

Lock Out Equipment—Quiz Answers

1. Lockout tags are always used on yarder towers.

Answer: **False**

2. We need to check the work area after the lockout tags are removed.

Answer: **False**

3. When are hazards highest for machine operators (as mentioned above)?

Answer: **When entering or exiting the machine**

4. It is permitted at any time to remove locks for other operators should they not be available to do so.

Answer: **False**

Key Point 1.2: Maintain Tower in Accordance with Manufacturer's Specifications

This key point covers maintaining tower in accordance with manufacturer's specifications.

What do we need to know before we set it up or take it down?

Before setting up the yarder at the landing site, a competent person must inspect the following and make repairs or replace defective equipment before to use:

- Machinery
- Tools
- Lines
- Blocks
- Shackles
- Other rigging

Check the fairleads at the top of the tower to make sure there is no debris stuck in them from the move that could fall on workers.

Grease the fairleads. Once the tower is stood up, workers won't be able to get to it until the setting is finished and it towers down.

Machine operators must know the manufacturer's recommendations for safe machine operation, maintenance, and safe work practices.

Operators must inspect their machines each day before starting work, and make all necessary repairs and adjustments for safe operation before any strain or load is placed upon the machine.

Notes for inspections

Before performing any inspection or repairs, make sure the engine is off, except when running the engine is necessary for adjustment or checking fluids.

Use only approved and provided access points when applying open gear lube to rotating gears. The rotating gears on the yarders need to be lubricated when they are in motion. Operators need to use extreme caution and only use the small access doors specifically designed for the safe application of the open gear lube.

Before operating the machine, make sure:

- Guards are reinstalled
- Safety devices reactivated
- Tools removed

Regular maintenance guidelines—general

Check machinery on a regular basis for cracks appearing in welds or in the steel plating. Repair defects before operation. A daily inspection to ensure safe operation must include the following items:

- Steering and brakes must operate properly. Test all drum brakes before taking a load
- Multiple throttle controls operate properly
- Hydraulics operates properly, motors rotate both ways, and all hydraulic lines are clear
- Check hydraulic hoses for signs of chafing, damage, or leaking. Defective hoses, lines, or fittings must be replaced immediately
- All fuel and oil levels must be adequate
- Check for any obvious fluid leaks
- Power take-off equipment to the hydraulic system, and the leveling and raising jacks must operate properly. Boom-type machines must have a boom stop

Now try the quiz on the next page.

Maintain Tower in Accordance with Manufacturer's Specifications—Self-Quiz

1. How often should operators inspect their machines before starting work?
 - ☐ Hourly
 - ☐ Weekly
 - ☐ Monthly
 - ☐ Daily
2. What two things do we need to inspect for cracks regularly?
 - ☐ Hydraulic hoses and welds
 - ☐ Welds and steel plating
 - ☐ Drum brakes and hydraulic hoses
 - ☐ Steering columns and drum brakes
3. Which of the following should be inspected **before** the yarder is set up?
 - ☐ Machinery
 - ☐ Other rigging
 - ☐ Blocks
 - ☐ Lines
 - ☐ Shackles
 - ☐ Tools
 - ☐ All of the above



Now check your answers on the next page.

Maintain Tower in Accordance with Manufacturer's Specifications—Quiz Answers

1. How often should operators inspect their machines before starting work?

Answer: **Daily**

2. What two things do we need to inspect for cracks regularly?

Answer: **Welds and steel plating**

3. Which of the following should be inspected **before** the yarder is set up?

Answer: **All of the above**

Regular maintenance guidelines—yarder

Metal towers must be inspected by a competent person each time the tower is lowered, and at any time it's safe condition is in doubt.

Use the following list to check specific components on the yarder.

Visually check the entire tower and gantry frame, the transport frame, and raising frame for the following:

- Cracks
- Bends
- Dents
- Wear
- Loose or worn bearings
- Missing or loose retainer clips, bolts, and washers

Check the tower raising system:

- For leaks on telescoping hydraulic raising arm
- Condition of rolled up hydraulic hose, and make sure it spools freely
- Condition of top of ram is in the “pocket” on the back of the tower
- For pin and molly at bottom of raising ram

Check the following for cracks, wear, and damage:

- Drive chains
- Locking dogs
- Dog actuator
- Ratchet wheel on the guyline drums

Ensure guyline drums and drives are properly secured.

Ensure all lever mechanisms are in good condition.

Guyline drum controls and outrigger controls must be separated and clearly identified to prevent engaging the wrong control.



CAUTION!

Yarder guyline control handles are commonly color-coded to match the color of the lead blocks and guyline drums they control to avoid confusion during use.

Check air pressure on the skyline brake and all components on the yarder drum brakes.

Note: Making adjustments on bolts and anchor pins will cause wear over time and require replacement.

Ensure the ram has a safety valve to stop the tower from coming down if a hydraulic hose blows.

Check the raising lines for damage and signs of aging.

Check the age of the guylines and guyline extensions. Consider age, use, care, and visual inspection when deciding to replace the guylines. Age of lines can be checked in line log book.

Check condition and presence of all nuts and bolts that hold the two sections of the yarder pipe together

Regular maintenance guidelines—tower

- Check the tower closely for dents or deformation whenever it is raised or lowered, or if it has been struck
- Check bolts and nuts are present between two sections of steel tower pipes
- Check that telescoping raising ram is in the pocket and didn't bounce out on last move
- Lighter vertical tube towers are made from spiral rolled material and the slightest deformation will greatly reduce the strength
- Newer towers with lattice boom construction are also greatly weakened by deformations or dents

If there is any doubt concerning damage to the tower, consult the manufacturer or a professional engineer before using the equipment.

IMPORTANT!



Yarder towers are subjected to extreme forces, and over time, the metal will develop stress-related fatigue. Even if dents or deformations are not observed in the tower, it is extremely important to have it thoroughly inspected on an annual basis by the manufacturer or a professional engineer to prevent catastrophic failure.

Check the following components on the tower:

- On telescoping towers, check the locking dogs (or locking pawl) for damage, excessive wear, or cracks.
- Check all attachment points for excessive wear or cracking.
- Check the guy ring and guy lugs where they attach to the tower
- Check the safety strap at the top of the tower to ensure that it is properly connected and is in serviceable condition. The strap must be equal in strength to the individual guyline in use
- Check sheaves for cracks, deformations, evidence of line wear, and loose or worn bearings

Regular maintenance guidelines—carriages and rigging

Make sure to regularly inspect carriages. Carriages typically see the highest amount of wear and tear. Ensure all hooks and shackles are the correct size for the lines.

Also, check components according to the type of carriage and replace worn parts, as follows:

Buttrigging and shotgun carriages

- Sheaves, bearings, and barrels
- Attachment points
- Shackles used to attach lines to carriage
- Butt hooks

Mechanical slack pullers and grapples

All of the above, plus:

- Dropline wear
- Skyline clamps
- Grease sheaves, chains
- “Bullet” on the end of the tong line and the bitch hook
-

Motorized carriage

All of the above, plus:

- Radios and horns
- Clear of oil and debris
- Fire extinguisher
- Spark arrester (if not turbo charged)
- Hydraulic hoses and fittings
- Fluid level



CAUTION!

Stabilize heavy carriages when inspecting or working on them to prevent the carriage from falling on workers.

Now try the quiz on the next page.

Maintenance of Yarder, Tower and Carriages and Rigging—Self-Quiz

1. What does the ram need to have to prevent the tower from coming down?
 - ☐ Bolts and anchor pins
 - ☐ Safety valve
 - ☐ Hydraulic hose
 - ☐ Outrigger controls
2. Why is it useful for the yarder guyline control handles to be color-coded?
 - ☐ To make it easier to communicate problems to others
 - ☐ So we know when they are secured
 - ☐ To help identify when they need to be repaired
 - ☐ To make it easier to pair up with the proper lead blocks and guyline drums
3. How often should a tower be thoroughly inspected, even if it doesn't show evidence of dents or deformations?
 - ☐ Monthly
 - ☐ Yearly
 - ☐ Every two years
 - ☐ Weekly
4. What must we make sure fit correctly to the carriage lines?
 - ☐ Skyline clamps
 - ☐ Sheaves, bearings, and barrels
 - ☐ Shackles and hooks
 - ☐ Hydraulic hoses



Now check your answers on the next page.

Maintenance of Yarder, Tower and Carriages and Rigging— Quiz Answers

1. What does the ram need to have to prevent the tower from coming down?

Answer: **Safety valve**

2. Why is it useful for the yarder control handles to be color-coded?

Answer: **To make it easier to pair up with the proper lead blocks and guyline drums**

3. How often should a tower be thoroughly inspected, even if it doesn't show evidence of dents or deformations?

Answer: **Yearly**

4. What must we make sure fit correctly to the carriage lines?

Answer: **Shackles and hooks**

Section 1018-02: Plan Landing

What you will learn in this section

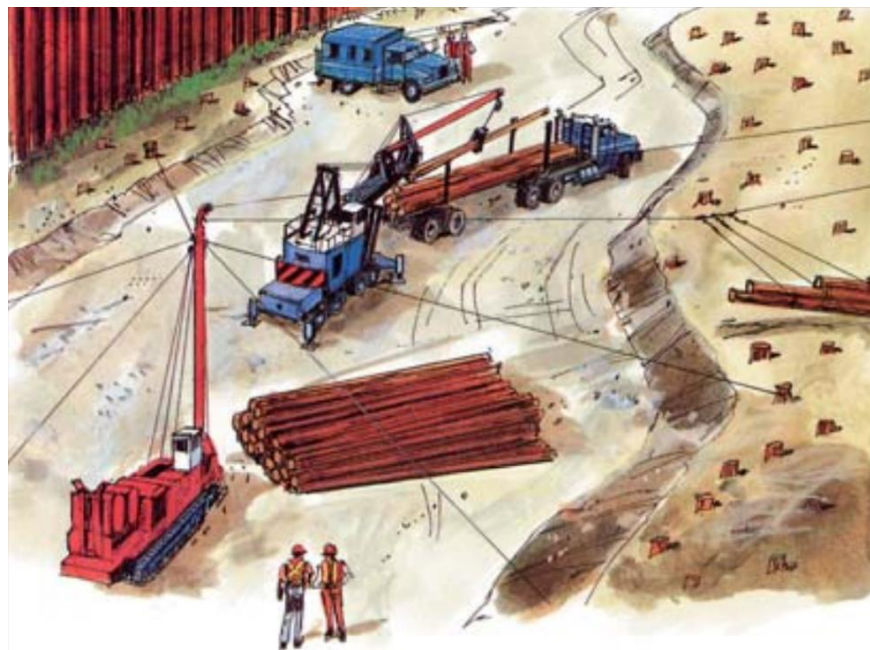
By the end of this section, you will be able to demonstrate your ability in the following key point:

2.1 Plan landing in accordance with block map and company policy and procedure

Key Point 2.1: Plan Landing

Log landing areas should provide the following:

- Sufficient room for two-thirds of the length of the log to be landed
- A flat surface that ensures the logs will not slide back down the hill. Workers must be able to unhook the chokers without the aid of a loader or skidder
- Enough room for swing yarder and loader operators to maintain 60 cm (2 ft.) of counterweight clearance
- Room for through traffic or other mobile equipment, if it is being used in the area



Good landing layout

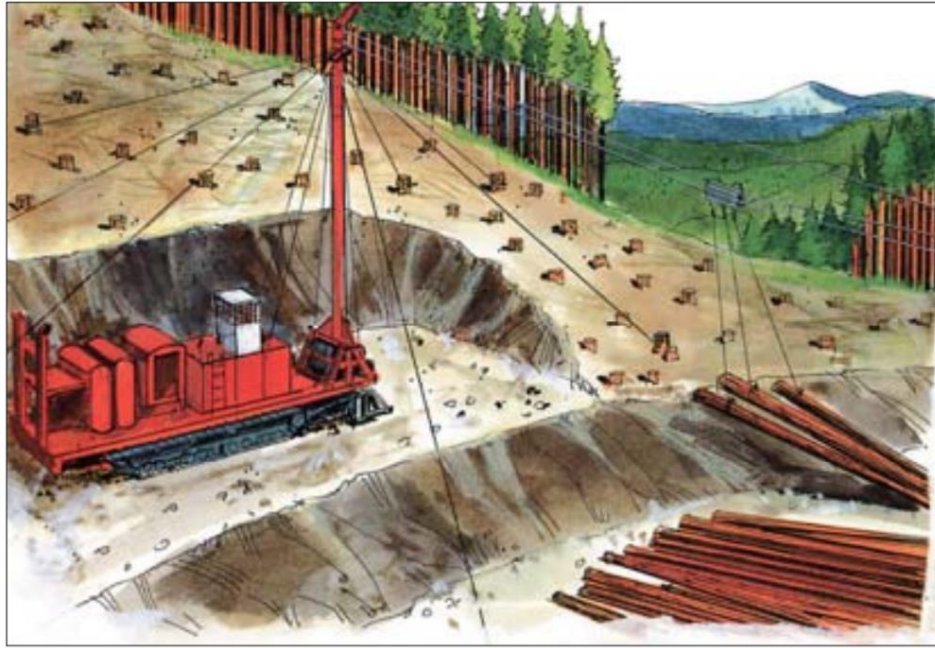
Other types of landings

Other types of landings include:

- Jump-up landing
- Downhill yarding landing
- Small wood log landing areas in steep ground

Jump-up landing

On steep ground, jump-up landings may be the best solution for creating a safe log landing area. In creating a jump-up landing, a short spur is built above the haul road.



The yarder is placed on the level at the top of the spur, and logs are landed on the haul road below

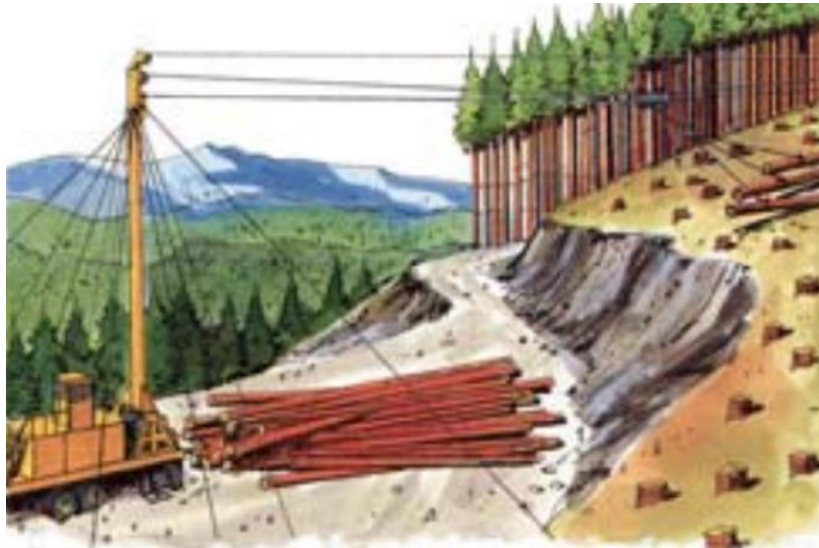
Downhill yarding landing

Log landing areas for downhill yarding should provide sufficient room for the log to clear the cut bank and be landed in a controlled manner.

The machine should be far enough back that the logs will not roll or swing into the machine. Yarders should never be placed in “chutes” or blind spots.



Inadequate landing



Adequate landing

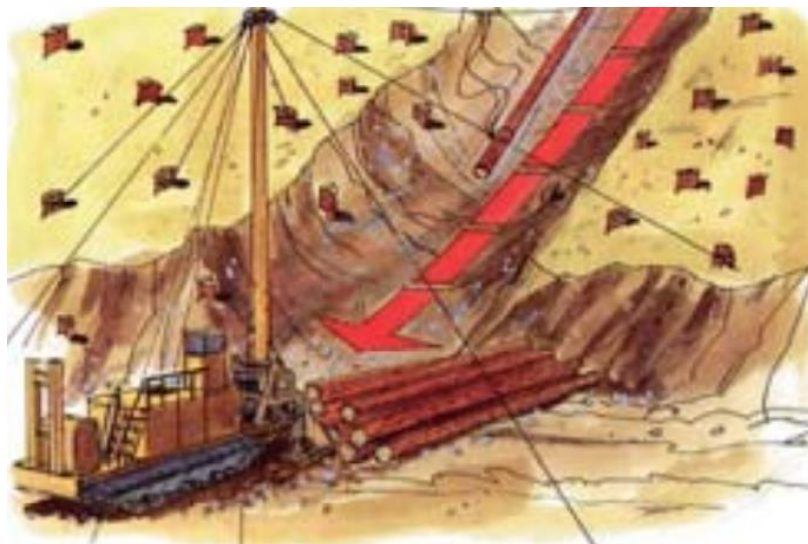
Small wood log landing areas in steep ground

The three common log landing arrangements for steep ground small wood logging are:

- Chutes (natural draws)
- Browlogs
- Logbrakes

Chutes

Chutes are natural, V-shaped draws that allow the operator to land logs on steep slopes. The unchoked ends of the logs are held by the side slope of the draws. The choked ends of the logs are laid on the fill from the road cut. Usually, no more than one or two turns can be piled before the logs have to be skidded away. Proper planning takes advantage of these natural chutes and locates the corridor within them.

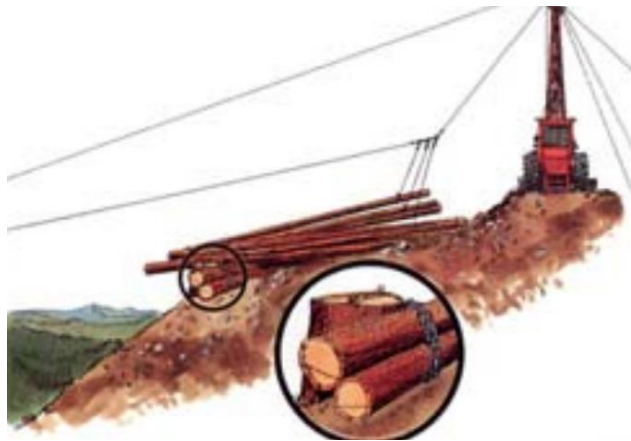


Note: Yarders need to stay out of chutes that runaway logs will slide down, but if they are set up just to the top side of one edge of a chute they can still use the deflection to their advantage. Working from the edge of a chute to the downhill side is common practice.

Brow logs

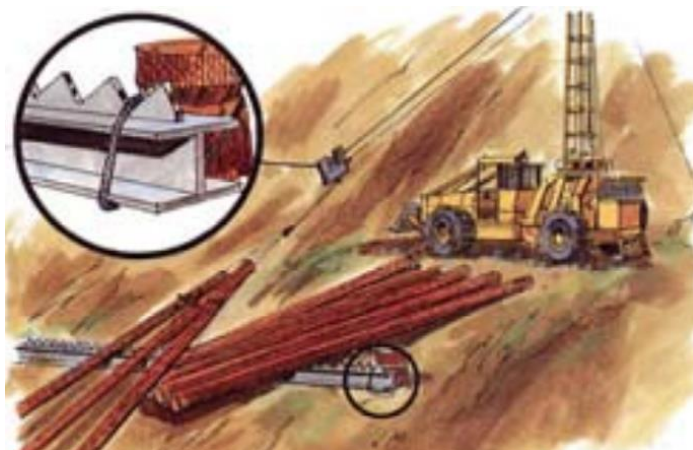
Brow logs may be used where no natural chute exists to prevent logs from sliding back down the hill. Brow logs are one or more logs chained to high stumps located just below the roadway. The turn of logs is yarded past the brow logs. When the lines are slacked, the unchoked ends of the logs rest against the brow logs, preventing them from sliding back down the hill.

As with the natural chute, the wood should be progressively skidded away or swung by a loader.



Log brakes

A log brake is a mechanical device of steel spikes, upon which the turn is landed. The steel spikes hold the logs while the turn is unhooked.



Now try the quiz on the next page.

Landing Layout—Self-Quiz

1. At a minimum, how much log clearance must a landing area have?
 - ☐ A full log's length
 - ☐ Two thirds the length of a log
 - ☐ Half the length of a log
 - ☐ One third the length of a log
2. What kind of terrain is a jump-up landing typically set up in?
 - ☐ One with a V-shaped draw
 - ☐ One where no natural chute exists
 - ☐ One with very steep terrain around it
 - ☐ One without sufficient room for the log to clear the cut bank
3. What is a log brake?
 - ☐ A mechanical device of spikes which hold the logs while the turn is unhooked
 - ☐ A mechanical device that holds the logs while they are turned
 - ☐ A mechanical device that prevents the logs from hitting the yarder
 - ☐ A mechanical device chained to high stumps below the roadway
4. In what situation are brow logs used?
 - ☐ When the hill is steep and very dangerous
 - ☐ When there are no available stumps to chain the logs to
 - ☐ When the choked ends of the logs are stuck on the fill from the road cut
 - ☐ When no natural chute exists



Now check your answers on the next page.

Landing Layout—Quiz Answers

1. At a minimum, how much log clearance must a landing area have?

Answer: **Two thirds the length of a log**

2. What kind of terrain is a jump-up landing typically set up in?

Answer: **One with very steep terrain around it**

3. What is a log brake?

Answer: **A mechanical device of spikes which hold the logs while the turn is unhooked**

4. In what situation are brow logs used?

Answer: **When no natural chute exists**

Safety in the landing area

Remember these points when working in a landing:

- Do not stand underneath or close by the mainline or unstable logs during yarding
- Stand clear of the incoming turn. Remember that logs could jill-poke, upend, or strike logs already in the landing
- Do not stand beneath the guylines opposing the pull of the turn. Remember that the guyline could break, or the stump may slab
- Do not stand in the bight formed by the running yarding lines
- Remove unstable logs or gun-barrel logs overhanging the landing
- Rocks and loose material may run into the landing

Root wads on the edge of the bank could be dislodged into the landing area. All landing workers must use designated safe positions, outside the work circle and visible to the machine operators. Workers must also get verbal permission or make eye contact before leaving a designated safe position.

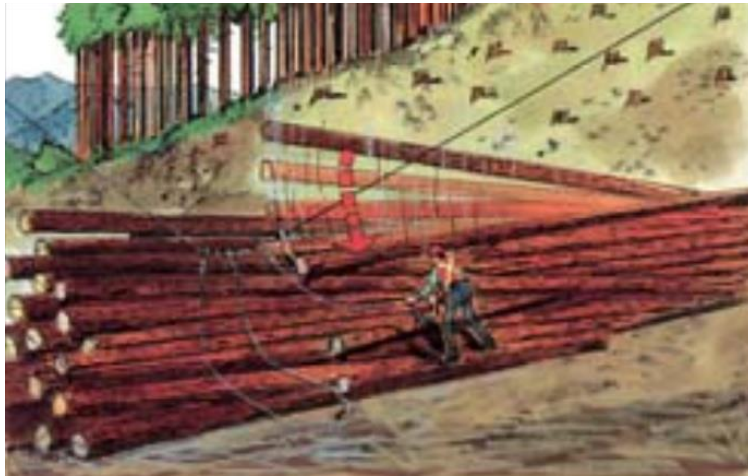


In the clear

Hitchhiker logs

Hitchhiker logs are unchoked logs that ride in with the turn.

Hitchhiker logs must be removed from the turn or be in a position where they will not roll on the chaser while the chokers are being unhooked.



Worker in the hazard area

Landing the turn

Use the following safe work procedure when landing the turn:

1. Any equipment movement that could affect the safety of the chaser must cease while the turn is being unhooked.
2. Logs must be landed straight and stable.
3. The chaser should determine that the logs are stable and properly landed before unhooking the turn.
4. Adequate slack should be provided to unhook the chokers.
5. When cold decking is required, a stable pile should be built. This is achieved by keeping all logs in lay and not allowing crossed logs in the pile.



In the clear

Now try the quiz on the next page.

Safety in the Landing Area— Self-Quiz

1. Which of the following is safe practice?
 - ☐ Standing near to the mainline
 - ☐ Standing away from the bight formed by the running yarding lines
 - ☐ Being partially hidden from view of other operators
 - ☐ Standing in the work circle
2. What are hobos?
 - ☐ Logs that are located below the guylines
 - ☐ Gun-barrel logs overhanging the landing
 - ☐ Unchoked logs that ride in with the turn
 - ☐ Stable logs that are in a pile
3. Before unhooking the turn, it is most important for the chaser to do the following:
 - ☐ Make sure the logs have landed properly
 - ☐ Make sure all logs are in lay
 - ☐ Make sure a few of the logs are crossed for stability
 - ☐ Make sure you can see all other operators involved
4. In the above information, what do they not suggest we watch for or remove to create a safe area?
 - ☐ Rocks
 - ☐ Gun-barrel logs
 - ☐ Tools and other loose equipment
 - ☐ Root wads



Now check your answers on the next page.

Safety in the Landing Area— Quiz Answers

1. Which of the following is safe practice?

Answer: **Standing away from the bight formed by the running yarding lines**

2. What are hobos?

Answer: **Unchoked logs that ride in with the turn**

3. Before unhooking the turn, it is most important for the chaser to do the following:

Answer: **Make sure the logs have landed properly**

4. In the above information, what do they not suggest we watch for or remove to create a safe area?

Answer: **Tools and other loose equipment**

Section 1018-03: Set Up Guylines

What you will learn in this section

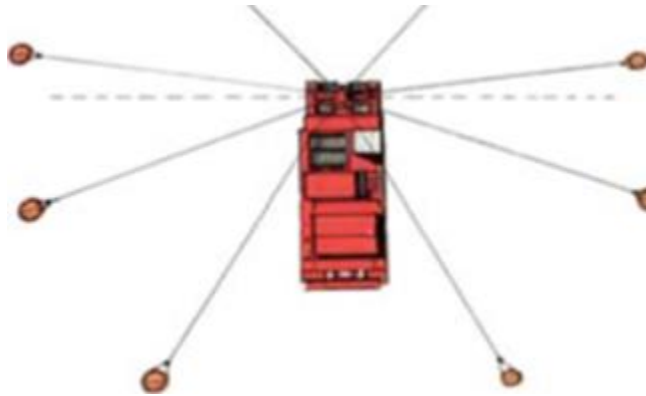
By the end of this section, you will be able to demonstrate your ability in the following key point:

3.1 Set up guylines in the correct position and in a safe manner to assist in raising the tower in accordance with WorkSafeBC guylines regulations and operator's manual.

Note: The key point on Set up Guylines applies to both the "Set up" and "Reposition" sections. For this reason, this key point is presented here in 1018-03, and repeated in 1019-02 (with variations).

Key Point 3.1: Set Up Guylines in the Correct Position and in a Safe Manner

Today's yarders are fitted with two to eight guylines. Six is most common. Guylines, guyline stubs, stump shackles, and connecting shackles are critical components for yarder stability. Guylines are commonly used until external wear or corrosion indicates they should be replaced. When damage to a line occurs, such as severe abrasion, corrosion, or kinking, the line must be removed from service.



Correct guyline placement – eight guylines



Small wood yarder – three guylines

Guyline inspection

Guylines must be periodically inspected. One method is to open the line to the core. If the core is dry or lacking lubrication, the worker inspecting the line should check for other deficiencies, such as:

- Broken wires

- Excessive wear
- Line deformation

If any of these are found, the line must be removed from service.



CAUTION!

Spool guylines and stubs properly onto a 'line horse' or place them in storage to protect them from being damaged. If they are coated with dirt and mud, damage may not be apparent.

The following practices will damage wire rope and should be avoided:

- Pulling guyline stubs behind a vehicle from one setting to another severely abrades the exterior of the line, creates heat, and forces dirt into the line, which then acts as an abrasive in the core and between strands
- Proper spooling of guyline on guyline drum prevents line from being crushed or cut off
- Running over guylines with tracked and rubber-tired mobile equipment (such as loaders, crawler tractors, and log trucks) during a rig-up or move may cut or severely kink the line

Note: Each yarder should have information about how guylines are run on a metal spec plate that is attached to the yarder within view of the cab. This spec plate must be reviewed carefully, as all yarders have different guyline systems.

Pulling guylines out to the anchors with the strawline

Once guyline stumps are selected and notched, guylines are then pulled out to the anchors. On large yarders, this is done with the aid of the yarder strawline. On small yarders, the guylines are normally pulled out by hand.

Remember the following points when pulling out guylines with the strawline:

- Hang a light strap and Tommy Moore block on the guyline stump or just behind it and string the strawline
- Connect the strawline to the guyline end with a pass chain far enough up the guyline to provide enough slack for the guyline end to go around the stump
- When wrapping the guyline with the chain, ensure the chain is wrapped opposite the direction of pull
- Place the guyline around the stump with the lead to the spar on the high side. This will make disconnecting the guyline easier
- Use a proper guyline shackle to connect guylines to the anchors
- Insert the guyline shackle pin from the bottom for easier removal
- Place the pin in the eye of the guyline and secure it



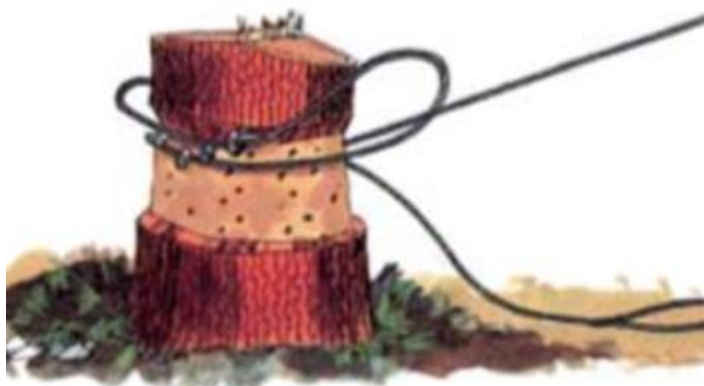
Stringing a guyline with strawline



Pass chain wrapped against the pull

Safety wrap for additional spiked guylines

When additional yarder guyline support is required, guylines may be spiked to the anchor with railway spikes. The release of a guyline spiked to a guyline anchor stump will create a hazard if a safety wrap is not used.



Safety wrap

The following safe work procedure can reduce the hazard of a spiked guyline releasing from the stump.

Note: Additional site-specific work procedures may be required.

1. Check the spikes in the guyline wraps to ensure they are solidly in the stump. There must be three wraps on the stump.

If the guyline is tightly tensioned, it may be necessary to drive additional spikes in the last wrap to stop it from slipping when the first and second wraps are released.

2. Make sure the the guyline slack and loose guyline end are out in front of the guyline anchor stump.
3. Use a spike bar and hammer to pull the track spikes from the first wrap. Remove the wrap from around the stump.
4. Pull the spikes from the second wrap.
5. Take the second wrap around the back of the stump and form a loop. Hold the loop in place by hooking the bight under a spike positioned just above the last wrap.

Note: This will hold the line down and stop it from flipping over the stump when the last wrap is released. The guyline slack and loose guyline end must be pulled out in front of the guyline stump on the lead side.

6. With the bight of the guyline held down by the single spike, remove the spikes carefully from the top side of the last wrap inside the looped bight.
7. Remove these spikes one at a time.



IMPORTANT!

The worker using the spike bar must stand on the loop side of the guyline, away from the hazardous area, which will be swept by the released guyline.

The worker using the sledgehammer to drive the spike bar must also stand on the loop side of the guyline.

What is a suitable anchor?

Many factors affect the suitability of a stump to withstand the stresses placed on it during yarding. Each species of tree has a different root system.

Factors that affect the root system are:

- Soil type
- Moisture
- Density
- Slope change



CAUTION!

Predicting the holding power of a stump is difficult. Therefore, all stumps used as anchors must be inspected daily.

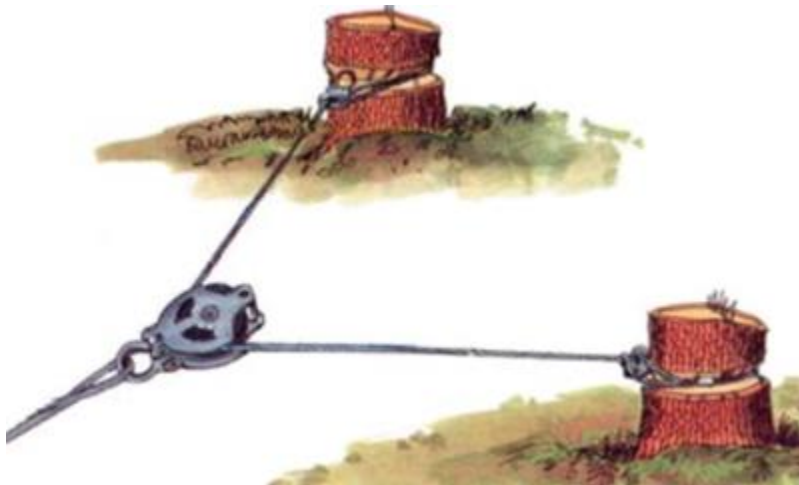
A rule of thumb is to make a stump's holding power proportional to the square of the diameter; for example, an 80 cm (32 in.) stump is four times stronger than a 40 cm (16 in.) stump.

The holding power of a stump:

- Increases with soil depth
- Increases with soil density
- Is greater on an uphill pull
- Decreases as soil moisture increases

Note: Long periods of heavy rain will allow a solid stump to loosen up over time.

In the event that a single stump is not adequate, multiple stumps must be tied together and used. This could be a two-stump configuration where a bridle block is used, or it could be several stumps tied together.



Bridle block

Now try the quiz on the next page.

Guylines—Self-Quiz

1. What is the minimum number of guylines used?
 - ☐ Three
 - ☐ Four
 - ☐ Five
 - ☐ Two
2. Which of the following practices should be avoided when caring for guylines?
 - ☐ Open the line to the core
 - ☐ Spooling them onto a 'line horse'
 - ☐ Lubricating them
 - ☐ Pulling them behind a vehicle
3. What is used to connect the guyline to the anchor?
 - ☐ A guyline shackle
 - ☐ A chain
 - ☐ A guyline shackle pin
 - ☐ A light strap
4. Where must both the person with the sledgehammer and the one with the spike bar stand in order to be safe?
 - ☐ At the loose guyline end
 - ☐ On the loop side of the guyline
 - ☐ In the area where the guyline will sweep
 - ☐ As far away from the stump as possible



Now check your answers on the next page.

Guylines—Quiz Answers

1. What is the minimum number of guylines used?

Answer: **Two**

2. Which of the following practices should be avoided when caring for guylines?

Answer: **Pulling them behind a vehicle**

3. What is used to connect the guyline to the anchor?

Answer: **A guyline shackle**

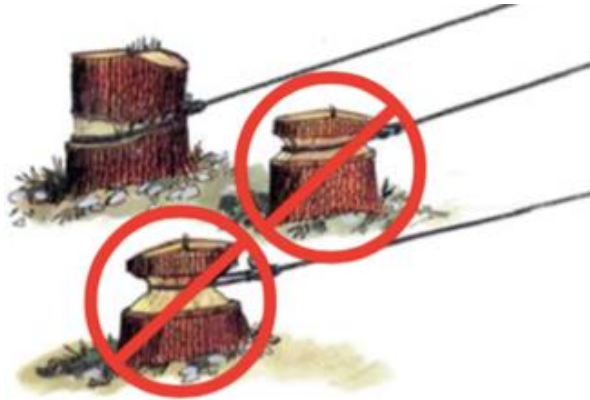
4. Where must both the person with the sledgehammer and the one with the spike bar stand in order to be safe?

Answer: **On the loop side of the guyline**

Notching of stumps

Stumps must be notched to hold the guyline. To prevent slabbing, the notch should be placed as close to the bottom of the stump as possible without cutting off the roots, and in lead with the guyline.

The picture below shows the top stump properly notched. The picture also shows the notch in the middle stump placed too high and the notch in the bottom stump, too deep.



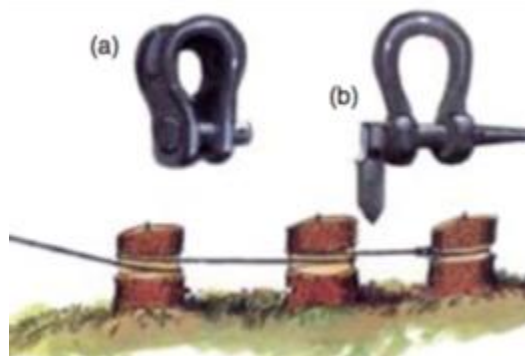
Securing of stumps

When there is doubt about a stump's dependability, use one or more of the following methods to increase stability and holding power:

- Multiple stump anchors
- Twisters
- Jill-poke supports
- Deadweight anchors

Multiple stump anchors

When a single stump is not available or is inadequate, it is acceptable to use multiple stump anchors such as a "wrap and choke." Guylines or skylines must be anchored to stumps with acceptable devices such as flat or bell shackles. Pins must be secured with Molly Hogans or other effective devices.

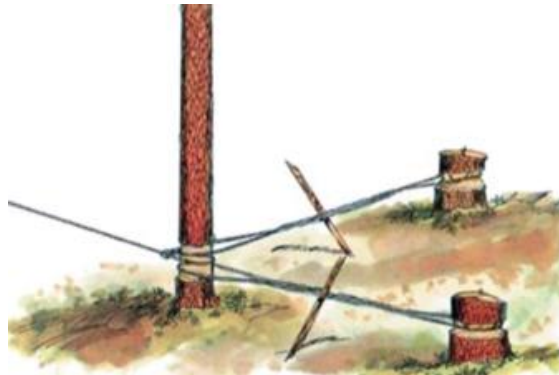


Acceptable multiple stump anchors (a) flat shackle, (b) bell shackle

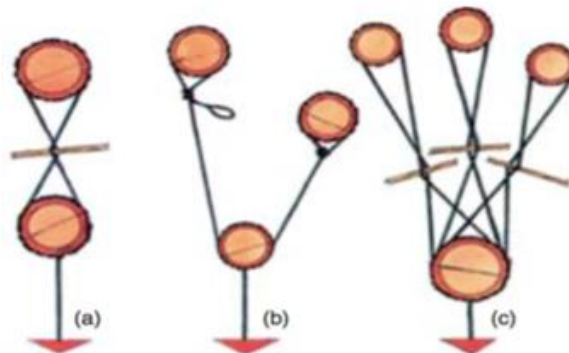
Twisters

Remember the following points when securing stumps with twisters:

- Ensure that a worker check system is used when only one worker is available to install twisters
- If two people do up twister, then two people need to undo it
- Select suitable anchors in lead with the pull
- Select suitable line for the twisters
- Notch secondary anchors to prevent line slippage
- Select a good, sturdy, green limb or sapling of sufficient length for the twister stick
- Install the twister with a minimum of two wraps with four lines connecting twister stump to original stump
- Secure with a timber hitch
- Use two poles if a long span requires more than one
- Tension lines so they will almost touch
- Place the twister pole between the lines. Twisters need to be snugged up before a load is put on the original stump
- Rotate the twister pole uphill until tight
- Secure the pole 90 degrees to the twister lines
- Unwrap a twister when removing it. Do not cut the pole to reduce tension



Twisters on a standing tailhold



Single twister, (b) two legs with cable clip, (c) multi-legged twister

Jill-poke supports

Follow these four steps when using jill-poke supports to secure stumps:

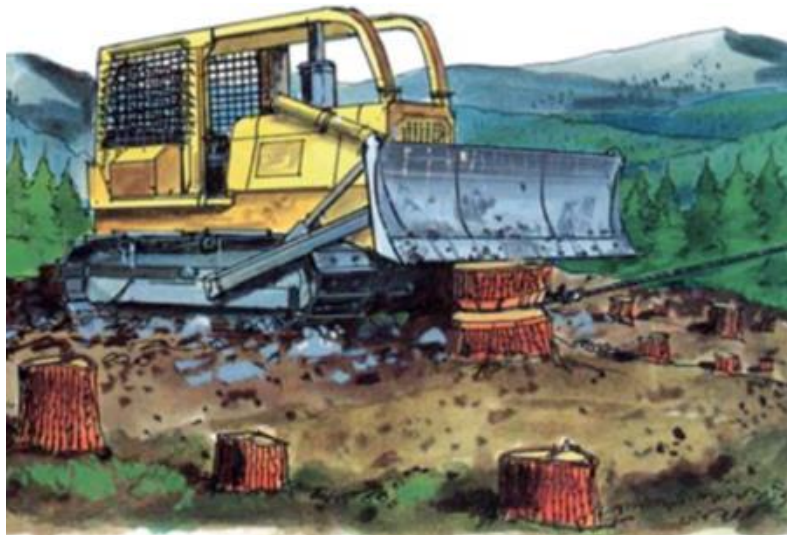
1. Select a suitable secondary anchor in front of and in lead with the anchor stump.
2. Cut a flat surface on each stump facing the other.
3. Cut a suitable log slightly longer than the distance between the two faces.
4. Drive the log into position between the anchors.



Jill-poke can replace a twister

Deadweight anchors

Mobile equipment can provide additional support for securing a stump by placing the blade or track on the stump or root system.



Bulldozer blade adds support to stump

Mobile machinery itself may be used as an anchor if it is of sufficient weight.

Skyline anchors

A skyline supplies lift for the rigging. With adequate deflection, the skyline need not be elevated at the back end. However, this method requires adequate anchor holding power and tiebacks. When deflection is minimal, skyline tailholds may be located well beyond the setting boundary. To acquire lift or deflection, backspars may be used. This method requires specialized rigging, climbing gear, and training.



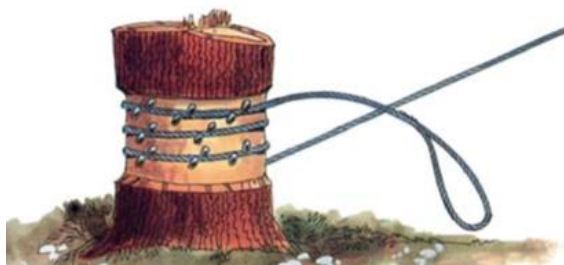
A wrap and a choke

Backspar guylines

When a backspar is required, guylines must be used. Proper rigging practices for guylines also apply to backspars. A come-along may be used to tighten a backspar guyline. Use a minimum of three spikes to secure the last wrap.

A guyline secured to a stump must be wrapped at least $2\frac{1}{2}$ 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.

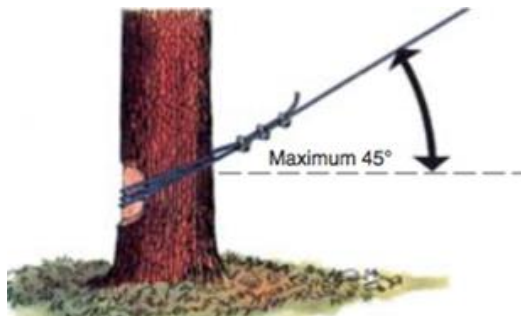
Railway spikes should only be used with large lines and large stumps.



Home spar spiked guyline

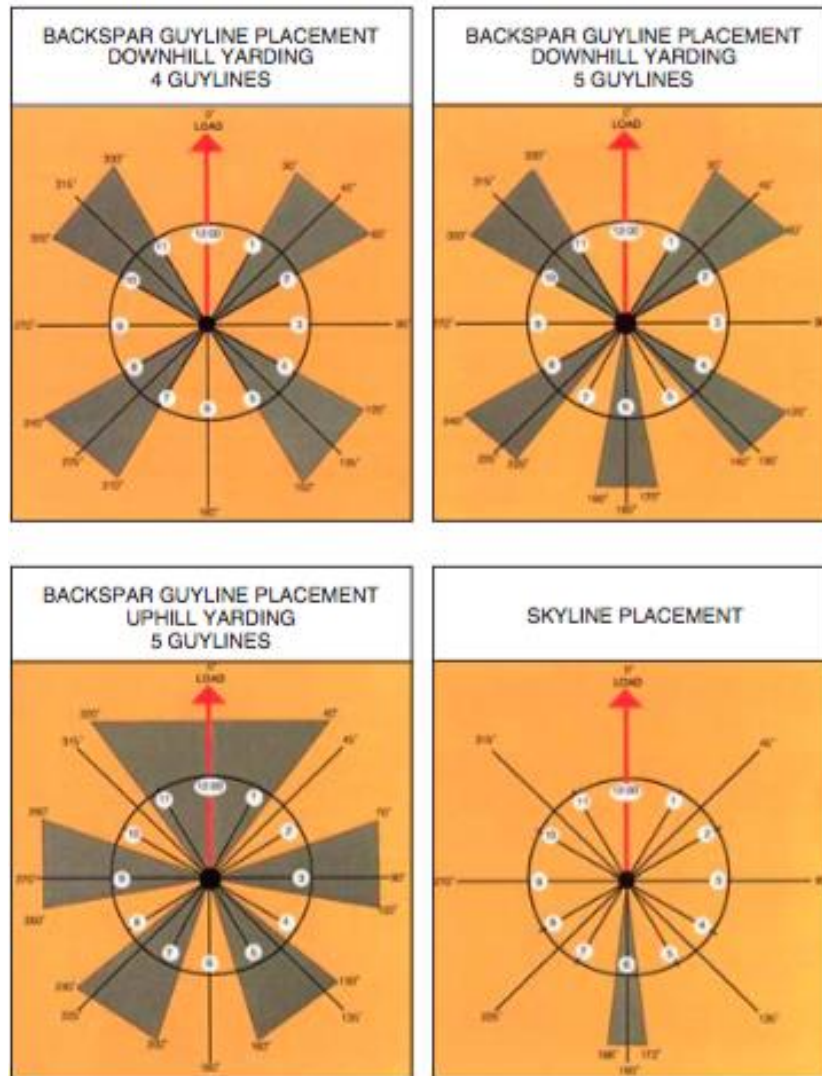
Remember this rule of thumb: 2.5 cm (1 in.) of slack in the guyline on the stump gives 30 cm (1 ft.) of slack in the belly of the guyline.

Cable clips, also known as Crosby clips, are acceptable for securing lines. The line must have at least one full wrap on the stump. Ensure that the required number of clips are properly installed and torqued.



Backspar with cable clips

Acceptable guyline and skyline placement patterns



Tightening sequence

When yarding downhill from a backspar, the two front guylines must be tightened first. When yarding uphill, the two back guylines must be tightened first. Guylines should be tensioned to support the backspar adequately, and positioned so that the inside angle is less than 45 degrees to the horizontal. When this cannot be done, additional guyline support is required.

Now try the quiz on the next page.

Anchors—Self-Quiz

1. Where is the ideal location for a notch on a stump?
 - ☐ Cutting off the roots if possible
 - ☐ As close to the top as possible
 - ☐ As close to the bottom as possible
 - ☐ As deep into the stump as possible
2. What is used to secure a shackle pin?
 - ☐ A Molly Hogan
 - ☐ A jill-poke support
 - ☐ A spike
 - ☐ A cable clip
3. How many times must a guyline be wrapped around a stump in order to be secure?
 - ☐ Two and a half times
 - ☐ Two times
 - ☐ Three and a half times
 - ☐ Five times



Now check your answers on the next page.

Anchors—Quiz Answers

1. Where is the ideal location for a notch on a stump?

Answer: **As close to the bottom as possible**

2. What is used to secure a shackle pin?

Answer: **A Molly Hogan**

3. How many times must a guyline be wrapped around a stump in order to be secure?

Answer: **Two and a half times**

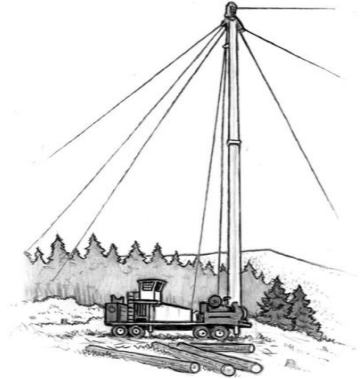
Section 1018-04: Raise Tower

What you will learn in this section

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

4.1 Raise tower in accordance with manufacturers' specification and the surrounding environment

Key Point 4.1: Raise Tower



Note: The instructions used in this key point are for a Madill Model 009 Skyline Yarder. Always follow manufacturer's instructions for the proper maintenance and handling of your particular make of yarder.

Raising and tilting tower—introduction and warning

Note: These instructions are for guidance only.

Every yarder is different in the way it is raised. Some require the use of guylines, others use hydraulics only, and others use various combinations of lines and hydraulics. Follow the manufacturer's instructions. All line movement must be accompanied by proper whistle or hand signals. Keep people in the clear.

Make sure the area around the raising cylinder is clear and nothing obstructs movement of the cylinder. The hydraulic lines to the raising cylinder, telescoping cylinder and brace cylinder must receive extra attention during the raising and lowering procedures.

Raising the tower

The following steps are guidelines on how to raise your tower safely. Make sure your machine is on level ground.

1. Check the condition of hinges and pins to make sure the pins are secure and the hinges lubricated.
2. Check the condition of hydraulic hoses and fittings.
3. Check winch lines to see that they are slack and free to move as tower comes up. Make sure there are no loose objects that would fall off the tower as it is raised.
4. Follow the starting instructions and start engine from the yarder cab.
5. Pressurize brace cylinder to hold it in extended position.

6. Extend raising cylinder slowly, watching lines to see that they do not bind. The controls for these operations are rocker switches in the overhead panel.
7. When tower reaches vertical position, tower hinge lugs will line up with the saddle on the winch frame beside the operator's cab. The large hinge pin must now be inserted and secured with the collar, retainer bolt and nut. Do not proceed further until this pin is in place. It may be necessary to lift the tower slightly to line the pin up. Never put fingers in the lug holes to check alignment.
8. With the tower vertical, extend the telescoping tower top and lock it in position.

Note: See the instructions on extending the telescoping bard following these guidelines.

9. Pull guylines out and anchor to stumps arranged for intended yarding road if not done before extending telescoping tower. Pull in slack but do not tighten guylines. Set guyline dogs.
10. Retract brace cylinder to approximately 1-1/2" from end of stroke so tower is at 7 to 8 degrees yarding angle and weight is taken by guylines.
11. Adjust guylines and reset dogs as necessary. Run out working lines and rigging.
12. When travelling with the tower up, for short moves on relatively level ground (under 5% slope), tilt the tower to the vertical position and retract the telescoping top first.
13. The winch transmission should be in neutral for this operation.

Note: Some machines have been equipped (at the user's request) with a bypass valve to allow the "brace cylinder" to float while yarding. Always close this valve while adjusting the tower position.

Extending telescoping tower

Here are instructions on how to properly extend a telescoping tower mentioned in Step 8 of [Raising the tower](#).

1. Raise and pin the tower as outlined in [Raising the tower](#) procedure.

Note: Yarding lines should be tied to the carriage or other weight on the ground and the drum brakes off so the drums free-wheel. Guylines to be anchored to stumps and left slack.

2. Close the by-pass valve at the base of the telescoping cylinder.
3. Activate the telescoping cylinder to extend the tower approximately 6".
4. Release the tower locks using the switch in the overhead panel.
5. Activate the telescoping cylinder to extend the tower slowly, checking that all lines are moving freely over the sheaves. The guylines will have to be powered out. Extend the cylinder to its maximum stroke.
6. Check that the stop collar is clear of the locks then engage the locks.
7. Visually check and confirm that all four locks are engaged, tilted in to the tower to seat on the top of the tower bottom section.

8. Allow the tower upper section to come down far enough to seat the stop collar on the tower locks.
 9. Proceed with rigging up as outlined in the [Raising the tower](#) procedure.
 10. Open the bypass ball valve to allow the telescoping cylinder to retract under its own weight.
-



CAUTION!

Never attempt to raise or lower the tower unless the upper section is completely retracted.

Now try the quiz on the next page.

Raising the Tower—Self-Quiz

1. According to the pages above, what is something that needs **extra** attention when raising the tower?
 - ☐ The raising cylinder
 - ☐ The hydraulic lines
 - ☐ The hinge pin
 - ☐ The brace cylinder
2. What must be inserted into the winch frame once the tower has been fully raised?
 - ☐ Hinge pin
 - ☐ Hinge lug
 - ☐ A guyline dog
 - ☐ A guyline
3. Before the telescoping tower is extended, guylines must be tensioned fully.
 - ☐ True
 - ☐ False
4. What needs to be clear of the locks before engaging them?
 - ☐ The rigging
 - ☐ The tower upper section
 - ☐ The telescoping cylinder
 - ☐ The stop collar



Now check your answers on the next page.

Raising the Tower—Quiz Answers

1. According to the pages above, what is something that needs **extra** attention when raising the tower?

Answer: **The hydraulic lines**

2. What must be inserted into the winch frame once the tower has been fully raised?

Answer: **Hinge pin**

3. Before the telescoping tower is extended, guylines must be tensioned fully.

Answer: **FALSE**

4. What needs to be clear of the locks before engaging them?

Answer: **The stop collar**

Other required inspections

Other required inspections include inspecting the following:

- Tower angle
- Hydraulic jacks
- Spooling lines

Tower angle

Angles are critical in load-bearing lines. Keep a vertical tower perpendicular to the base of the yarder, even if the base cannot be made absolutely level. That means install cribbing or blocks according to the position of the yarder, not the position of the ground. This will avoid damage or failure in the equipment. Any off-angle in the tower will increase stress on the top of the tower during operations, and make extra guyline support and caution necessary. A tower out of lead may also cause the lines to spool incorrectly on the drums. Some manufacturers allow for rigging a tower out of level. Follow the manufacturer's recommendations, and know your machine.

Hydraulic jacks

Inspect and maintain jacks regularly to be sure all hydraulic lines and cylinders are in good condition. During use, make sure the jack is secure. Workers have been injured by blocks kicked out sideways from under a jack or by being sprayed with high-pressure hydraulic oil from broken lines.

Spooling lines

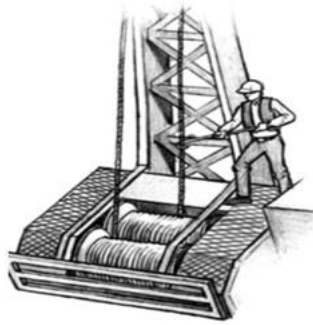
Caution is necessary when unspooling and spooling lines on the yarder drums to protect workers, the lines, and the yarder. Observe the following precautions:

Keep a minimum of three wraps on guyline drums

Some operators recommend keeping at least five wraps on the drums. Follow the manufacturer's instructions to keep guyline ends secure.

Secure line ends

Make sure the ends of lines attached to drums are secured by end attachments, and keep a minimum of three wraps on the drum at all times (as allowed by WorkSafe BC). When lines are pulled off the yarder and then respoiled onto the drum, lines can acquire a twist if the end comes free of the drum or the anchor point. Some machines have the line anchor (knob) pushed right through and the knob can swivel. Others are solid, where the knob part is actually welded at an angle in the drum wall.



Use caution when disconnecting a line pulled from the yarder

Spool lines properly

Always make sure to spool lines neatly onto the drum. A crossed line can be crushed or malformed and cause premature failure of the line. Use the proper tool to apply pressure (snub the line) and guide the line in layers onto the drum. Work carefully near moving lines and drums.

Workers helping to guide lines onto yarder drums must stay alert to the high hazard of working near both rotating machinery and moving cables. Workers helping must observe the following precautions:

- Make sure the operator turns the line slowly enough to spool properly and avoid hazards
- Always stand well-braced on a nonslip surface
- Do not stand on a drum even when stopped for maintenance, unless precautions are taken to prevent unintentional activation of the drum
- Never let a line slide through gloved hands or place any part of the body in direct contact with the line
- Use proper spooling iron

Tighten and balance the guylines

Tension lines on alternate sides to keep the tower in balance. Working one side at a time could tip the tower.



IMPORTANT!

Do not lock in the guyline dogs until final tensioning. Leaving the dogs out during the initial tightening will allow rapid relief on a guyline if a problem occurs.

Once the tower is fully rigged, pre-tension the guylines close to their final tension and raise the skyline to its safe working limit.

Before moving any line, sound the yarder whistle to make sure everyone is in the clear. Observe all anchors as the skyline is raised. Once up, check for proper deflection.

Typically, tightening the last guyline can slightly loosen the previously tightened guylines. When the skyline is in position, strike each guyline in pairs to feel if they are approximately the same tension.

This method of comparing pairs of guylines gives a close estimate of how guylines are sharing the load. More exact methods should be used when there is any doubt or when the tower will be stressed to its working capacity. If the guylines are not balanced, lower the skyline and adjust the guylines as needed.

Recheck guylines and anchors

Once all lines are in place, recheck the guylines for correct tension to ensure they still share the load. Test the setup by passing several light turns over the system first, and recheck all the anchors again. Look for any signs that stumps, mobile anchors, or buried deadman anchors have moved. Check all connectors to ensure they have not shifted or are coming unconnected.

After several initial turns (and daily), recheck all guylines and anchors.



IMPORTANT!

A full guyline drum reacts differently than an empty drum, because the torque changes as spooled line increases the working diameter of the drum. Layers of line on a drum are like gears in a transmission: the first layer like low gear, exerting high torque at a low speed, and the top layer like high gear, with low torque at high speed. Operators should use extra caution when guylines are extended far out, leaving an empty drum. The drum's extra torque can over-tension a line.

Raising the tower safety checklist

Position of workers

- ☐ Ensure workers are in position to perform assigned duties
- ☐ Make sure they are safely positioned and clear of hazards such as moving lines. Remember that siwashes are common
- ☐ Signal "Stop" and wait for a full stop before approaching to clear a hang-up
- ☐ Ensure workers are properly instructed and alert to all work activity, and ready to react to unexpected conditions
- ☐ Be sure workers are in good view, if required to give signals
- ☐ Ensure they are clear of other traffic through the landing

Guylines anchors

- ☐ Guyline anchors or stumps are selected and properly positioned

- ☐ Anchor stumps are properly notched and guylines or guyline extensions are in the notches
- ☐ Shackles and hooks are properly attached
- ☐ Guylines are not fouled under roots, logs, or other material
- ☐ Proper bight is placed on guy-line attached to stump

Level and secure yarder base

- ☐ Ensure stability of yarder base with rock, dirt, or cribbing
- ☐ Ensure that cribbing is stable and secure
- ☐ Make sure all brakes are set or machine is blocked to prevent movement
- ☐ If the yarder base cannot be fully leveled, check how the manufacturer advises to compensate
- ☐ Ensure that pad is level, blocking placed under tracks if needed
- ☐ Make sure that stabilizer jacks are positioned, locked, and blocked properly

Front quarter guys

- ☐ Make sure the guylines that assist in raising the tower are off the telescoping hydraulic ram
- ☐ Once they lift the tower off the ram, the dogs must be engaged on the raising guy-line drums to prevent the tower inadvertently slipping back down

Back quarter guys

- ☐ Give slack throughout the travel of the rising ram, but tighten guylines with sufficient and equal tension to control the tower and oppose the load if the raising system fails
- ☐ Check the manufacturer's procedures. Some systems require the guylines to be pre-attached to the anchors and used to help raise the tower

Initial raising system

- ☐ Ensure that hydraulic hose reel unspools freely
- ☐ Ensure that raising ram is clear, in proper position on tower
- ☐ Position leveling jacks slightly clear of blocking.
- ☐ Telescoping systems: lock the hydraulic system of the jacks and keep in the float position once yarding starts.

Life tower off the initial raising system

- ☐ Workers attend to lines as tower system is raised
- ☐ Spotter checks yarder stability as tower is raised
- ☐ Attach guylines as instructed by yarder manufacturer's recommendations
- ☐ Maintain as little slack as possible in the back quarter guylines as the tower approaches the upright position
- ☐ Once tower is in upright position, check for plumb and square
- ☐ Initial tensioning of the guylines should be done with the locking dogs out
- ☐ Alternate guyline tensioning so pressure is not all exerted to one side of the machine. Keep guylines tensioned as much as possible
- ☐ Ensure tower is still in plumb and square; check clearance of the leveling jacks and blocking
- ☐ Once guylines are at final tension, raise the skyline and check tension on individual guylines

Note: Skyline or any other running line should never be raised until all guylines are tightened and all guyline dogs are engaged and visually checked.

- ☐ Set dogs on back quarter guyline drums, then tension the front quarter guylines to tighten tower
- ☐ Secure all drum dogs by gently reversing the drum back onto the dogs. This is critical to prevent drum shaft or key damage
- ☐ Drop the skyline and test final tension to ensure the guylines share the load
- ☐ Square the lead guys and adjust as required
- ☐ Keep mainline and haulback slack free of lead blocks, and haulback clear of mainline sheave
- ☐ Properly spool front quarters; workers must stand clear of line on provided platforms
- ☐ Watch pad on padding to make sure it isn't slipping forward
- ☐ Watch for any anchor movement during the tower raising procedure and immediately replace or adequately tie back problem anchors

Now try the quiz on the next page.

Raising the Tower—Other Instructions and Checklist—Self-Quiz

1. What should the vertical tower always be perpendicular to?
 - ☐ The ground
 - ☐ The spooling lines
 - ☐ The base of the yarder
 - ☐ The closest guyline
2. For safety, what is the minimum amount of wraps for the guyline drums?
 - ☐ Two
 - ☐ Three
 - ☐ Four
 - ☐ Five
3. Working on one side of the tower at a time when tightening guylines is the safest way to do it.
 - ☐ True
 - ☐ False
4. Which of the follow is not appropriate to use when leveling the tower? (choose all that apply)
 - ☐ Rocks
 - ☐ Dirt
 - ☐ Cribbing
 - ☐ Roots



Now check your answers on the next page.

Raising the Tower—Other Instructions and Checklist—Quiz Answers

1. What should the vertical tower always be perpendicular to?

Answer: **The base of the yarder**

2. For safety, what is the minimum amount of wraps for the guyline drums?

Answer: **Three**

3. Working on one side of the tower at a time when tightening guylines is the safest way to do it.

Answer: **False**

4. Which of the follow is not appropriate to use when leveling the tower? (choose all that apply)

Answer: **Roots**

Section 1018-05:

Communication with Crew

What you will learn in this section

Note: Content of this section (Communication with Crew) is presented in the context of “set up tower,” and repeated in “take down of tower” (1019-04) and “move tower” (1020-05).

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

5.1 Communicate with crew to facilitate the safe set up of tower

Key Point 5.1: Communicate with Crew to Facilitate the Safe Set Up of Tower

Note: Signal systems are different from site to site. The signal systems you use on any given day will be discussed at your safety meetings. This key point provides an overview of the signal systems.



CAUTION!

Before work can commence, all frequencies being used must be approved. See WorkSafeBC regulation 26.34 (12).

The two acceptable means of controlling the movement of lines on cable yarding systems, other than hand signals are very high frequency (VHF) radio whistle signaling devices and ultra-high frequency (UHF) voice radios.

Very high frequency (VHF) radio whistle signaling devices

These are radio transmitters, usually worn around the waist, that activate a whistle on the yarder when a button is pushed. Each required movement of the line has a specific audible whistle signal, which is the same on every yarding site in the province. The unique combinations of short and long whistles ensure controlled movement of yarding lines at all times.

Ultra high frequency (UHF) voice radios

A worker tells the operator what line movement is required. The worker directing line movement must use WorkSafeBC-approved verbal commands, which describe the VHF radio whistle signals.

When a voice radio is used, any worker who may be affected by the line movement must be able to hear the verbal command. If a worker cannot hear, radio whistles must be used.

To meet this requirement, there are three alternatives:

- All workers are equipped with radios
- An amplifying speaker is mounted on the outside of the yarder; the speaker clearly broadcasts each verbal command
- The operator repeats each verbal command with a radio whistle signal

Radio signaling devices, either hand-held transmitters or equipment-mounted radios used in logging operations, must be clearly marked

with the name of the manufacturer, serial number, assigned operating frequency, and specified tone frequency.

Radio signaling devices must have the following:

- Power limits of ¼ watt for grapple yarder radios
- Power limits of ½ watt for high-lead radio whistles
- A permanently enabled tone-encoded squelch

There should be only one frequency per radio. Where multi-channel radios are used, the selection switch must be disabled so that only an authorized person can change the operating frequency.

CAUTION!



Radio signals replace audible signals for the movement of equipment in logging. Interference by other radios on the same frequency can seriously endanger workers.

Additionally, minerals in the ground can impede the operation of VHF radio whistle systems, causing missed or incorrect whistles to come out. UHF is considered “line of sight,” so being behind obstacles or in a vehicle can impede the signal as well.

Standard audible signals

The following audible whistle signals are presently in use in B.C. In addition, carriage operators often use verbal signals with large machines. Verbal signals are derived from the following whistle signals.

To start the process of raising the tower, the hooktender is with the tower operator and leans over and tells him to start.

Audible high-lead signals

Operational signals		
Start work	1 long	—
Stop any movement	1 short	•
Ahead* on mainline	3 short	• • •
Slack the mainline	5 short (minimum)	• • • • •
Ahead* on the haulback	2 short, 2 short	• • • •
Slack the haulback	2 short, several short	• • • • •
Tightline	3 short, 2 short	• • • • •
Tightline on inhaul	3 short, 2 short	• • • • •
Cancel tightline on inhaul	3 short	• • •

Ahead* on Strawline	3 short, 1 short	• • • •
Slack the strawline	3 short, 1 short, several short	• • • • • • • •
Pick up the guyline	2 short, 2 short, 2 short, 1 short	• • • • • • •
Slack the guyline	2 short, 2 short, 2 short	• • • • •
Extreme hazard present (runaway log, etc.)	1 long, sustained until hazard has stopped or hazard cleared	— — — — —
Accident	7 long	— — — — — — — — — —
Fire	1 long, several short, repeated	— • • • •

*“Ahead” means haulage line moves toward machine

Audible high-lead signals

When butt rigging is at the landing		
Check the rigging	5 short (minimum)	• • • • •
Send out strawline extension	3 short, 1 short, and 1 short for each extension	• • • • •
Send out strawline in the haulback eye	3 short, 1 long	• • • —
Chokers required	2 short and 1 short or long for each choker required	• • • • •
Put on/take off scab block	1 long	—
Calling foreman	4 long	— — — —
Calling hooktender	3 long	— — —
Calling hooktender and crew	3 long, several short	— — — • • • •
Calling for water bag	1 short, 1 long	• —
Calling for block and strap	1 long, 1 short	— •
<ul style="list-style-type: none"> Any regular signal preceded by a long signal is a “slow” signal. Any signal that the engineer is not sure of is a “stop” signal. 		

Audible slackline signals

Refer to the standard high-lead whistle signals for most line control signals. The following are additional whistle signals to be used for slackline operations.

Operational signals		
Stop outhaul and slack skyline	1 short	•
Pick up the skyline	1 short, 2 short	• • •
Slack the skyline	5 short	• • • • •
Pick up skyline on inhaul to clear obstruction	2 short	• •
Pick up skidding line after obstruction is cleared	3 short	• • •
Slack the skidding line	3 short, several short	• • • • • •
Carriage on outhaul		
<ul style="list-style-type: none"> “Slack skidding line” signal given as “skyline is slacked” means “slack both lines at the same time.” 		
Hold skidding line tight, keep coming back until stop signal is given	3 short	• • •
Hold skidding line tight, slack skyline, keep coming	2 short	• •
Slack skyline faster	2 short	• •
When carriage is at head spar		
Send strawline out in choker bell for a dead line	3 short, 1 short, 2 short, 2 short	• • • • • • •
Send out that many coils	3 short, 1 short, 1 short for each coil needed	• • • • • •
Calling second rigger	2 long, 1 short	— — •

Skyline carriage signals

All standard high-lead and slackline whistle signals apply to carriages.

Gravity/shotgun carriage
<ul style="list-style-type: none"> Standard slackline whistle signals will apply.
Dropline/accumulator carriage

Ahead* on carriage skidding line	3 short	...
Slack the carriage skidding line	3 short, several short
Mechanical slack-puller		
Ahead* on slack puller	1 long, 1 short	— •
Ahead* on dropline	2 short	..
<ul style="list-style-type: none"> When the haulback is used as a running skyline, standard high-lead signals apply. 		
Radio-controlled motorized self-contained yarding carriage		
<ul style="list-style-type: none"> This system is similar to the “radio-controlled motor-driven slack-puller, skyline lock” carriage, but does not have a skyline lock. Any signal preceded by a long signal is a “slow” signal. 		
Slack the dropline	3 short, several short
Stop the dropline	1 short	•
Ahead* on dropline	3 short	...
If fitted with engine controls:		
Stop engine	1 short, 1 long	• —
Start engine	2 short	..

*“Ahead” means haulage line moves toward machine

Radio-controlled motor-driven slack-puller, skyline lock		
<ul style="list-style-type: none"> These carriages are fitted with and controlled by an on-board computerized radio control system This radio system is operated independently through a transmitter separate from that of the yarder The yarding and carriage frequencies must be separate, registered, and coordinated through the WorkSafeBC coordination system to ensure that one does not interfere with the other or with another operation. Contact the WorkSafeBC Engineering Department for more information An audible signal must be sounded at the carriage and not at the yarder. This signal must have a tone different from that of the yarder signal Carriages with variable dropline speeds must have a special signal for the speed changes. These signals must be different from standard yarding signals 		
Lock/unlock skyline clamp	2 short	..
Slack the dropline	5 short

Stop dropline	1 short	•
Ahead* on the carriage skidding line	3 short	• • •
If fitted with engine controls:		
Stop engine	1 short, 1 long	• —
Start engine	1 long, 1 short	— •
Loading the Skyline Yarder Signal		
This signal is to be used for alerting the landing workers that the skyline is about to be loaded.		
Skyline being loaded	2 short	• •

*“Ahead” means haulage line moves toward machine

Now try the quiz on the next page.

Worker Safety—Audible Signals—Self-Quiz

5. Ultra high frequency voice radios are the best option in very loud working situations.

- ☐ True
- ☐ False

6. Audible high lead signals - Match the signal to the action.

Stop any movement	7 long
Pick up guyline	4 long
Accident	1 short
Check Rigging	5 short (minimum)
Call foreman	2 short, 2 short, 2 short, 2 short, 1 short

7. Audible slackline signals – Match the signal to the action.

Slack the skidding line	2 short
Calling second rigger	1 short, 2 short
Pick up skyline	3 short, several short
Slack the skyline	5 short
Hold skidding line tight, slack skyline, keep coming	2 long, 1 short

8. Skyline carriage signals – Match the signal to the action.

Slack carriage skidding line	1 short
Ahead on slack puller	1 short, 1 long
Slack dropline	1 long, 1 short
Stop dropline	3 short, several short (dropline carriage)
Stop engine	3 short, several short



Now check your answers on the next page.

Worker Safety—Audible Signals—Quiz Answers

1. Ultra high frequency voice radios are the best option in very loud working situations.

Answer: **False**

2. Audible high lead signals -Match the signal to the action.

Stop any movement	1 short
Pick up guyline	2 short, 2 short, 2 short, 2 short, 1 short
Accident	7 long
Check Rigging	5 short (minimum)

3. Audible slackline signals – Match the signal to the action.

Slack the skidding line	3 short, several short
Calling second rigger	2 long, 1 short
Pick up skyline	1 short, 2 short
Slack the skyline	5 short
Hold skidding line tight, slack skyline, keep coming	2 short

4. Skyline carriage signals – Match the signal to the action.

Slack carriage skidding line	3 short, several short (dropline carriage)
Ahead on slack puller	1 long, 1 short
Slack dropline	3 short, several short
Stop dropline	1 short
Stop engine	1 short, 1 long

Hand signals

Hand Signals

Cable down

Touch the top of head



Cable up

Raise hand up and down



Ahead on the dropline

Cross arms in front



**Mainline ahead
slow**

Raise both arms



**Mainline ahead
normal**

Raise one arm



Mainline ahead

Raise one arm with
hand fluttering



**Slack mainline all
off**

Extend arm at side
with wrist flipping



**Slack the mainline
easy**

Extend both hands
with hands fluttering



Slack the haulback

Hands in front of
body using chopping
motion



Slack strawline

Pat back of hand with
other hand



**Hold dog drum or
brake lever**

Clasp one hand with
the other



Tightline

Place hands over head with fingertips touching



Ahead on strawline

Touch hand to bent elbow



Now try the quiz on the next page.

Hand Signals—Self-Quiz

1. Select the correct action from the list on the right with the photo on the left.



- ☐ Cable up
- ☐ Slack the mainline easy
- ☐ Slack strawline
- ☐ Stop any moving line and hold
- ☐ Slack the mainline easy
- ☐ Mainline ahead normal
- ☐ Slack strawline
- ☐ Stop any moving line and hold
- ☐ Slack strawline
- ☐ Slack the mainline easy
- ☐ Mainline ahead normal
- ☐ Stop any moving line and hold
- ☐ Stop any moving line and hold
- ☐ Slack strawline
- ☐ Slack the mainline easy
- ☐ Mainline ahead normal



Now check your answers on the next page.

Hand Signals—Quiz Answers

1. Select the correct action from the list on the right with the photo on the left.



Cable up



Slack strawline



Stop any moving line and hold



Mainline ahead normal