

# Forest harvesting

Code of Practice 2007

This Queensland code of practice was preserved as a code of practice under section 284 of the *Work Health and Safety Act 2011*.

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# Introduction

This *Forest Harvesting Code of Practice 2007* is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the Act and the Work Health and Safety Regulation 2011 (the Regulation).

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks which may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the Act and Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

Compliance with the Act and Regulation may be achieved by following another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety than the code.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice.

## *How is the code organised*

In providing guidance, the word 'should' is used in this Code to indicate a recommended course of action, while 'may' is used to indicate an optional course of action.

This Code also includes various references to provisions of the Act and Regulation which set out the legal requirements. These references are not exhaustive. The words 'must', 'requires' or 'mandatory' indicate that a legal requirement exists and must be complied with.

## **Who has duties?**

A **person conducting a business or undertaking** has the primary duty under the Act to ensure, as far as reasonably practicable, that workers and other persons are not exposed to health and safety risks arising from the business or undertaking.

**Officers**, such as company directors, have a duty to exercise due diligence to ensure that the business or undertaking complies with the Act and Regulation. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate resources and processes to provide and maintain a safe work environment.

**Workers** have a duty to take reasonable care for their own health and safety and that they do not adversely affect the health and safety of other persons. Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to health and safety at the workplace.

## **Consulting workers**

Consultation involves sharing of information, giving workers a reasonable opportunity to express views and taking those views into account before making decisions on health and safety matters.

The Act requires that you consult, so far as is reasonably practicable, with workers who carry out work for you who are (or are likely to be) directly affected by a work health and safety matter.

If the workers are represented by a health and safety representative, the consultation must involve that representative.

You must consult your workers when proposing any changes to the work that may affect their health and safety.

### **Consulting, cooperating and coordinating activities with other duty holders**

The Act requires that you consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

Sometimes you may share responsibility for a health and safety matter with other business operators who are involved in the same activities or who share the same workplace. In these situations, you should exchange information to find out who is doing what and work together in a cooperative and coordinated way so that all risks are eliminated or minimised as far as reasonably practicable.

Further guidance on consultation is available in the *Work Health and Safety Consultation, Coordination and Cooperation Code of Practice*.

## **1. Harvesting plan**

A harvesting plan details the methods and conditions of operation for a defined harvesting area. The harvesting plan for a particular area **must cover health and safety issues** as well as the normal methods of work, environmental, logistical and commercial considerations. It is a working document that should be understood, agreed to and used by people involved in forest harvesting.

The PCBU (often known as the purchaser) who is undertaking the forest harvesting has a responsibility to prepare the harvesting plan in conjunction with the owner or representative of the owner of the forest. Harvesting work should not commence unless this document and its health and safety components have been agreed and signed. There are elements of joint and several responsibilities in the harvesting plan. The plan should be updated as other issues are identified, and the health and safety requirements and methods reviewed at least annually.

Risk management is the central focus of the harvesting plan. Information on risk management is provided in Appendix 2. Risk control methods outlined in the harvesting plan should eliminate or minimise the health and safety risks expected in the harvesting area and harvesting site. In a factory, the high risk work areas are usually in a fixed location. This is not the case in the forest, where work areas are mobile. Therefore, it is essential the harvesting plan focuses on the risks associated with the work, which usually occurs in the harvesting site.

When preparing the harvesting plan, examine all potential health and safety risks relating to people, equipment, materials, and work environment, and decide how the risks should be controlled. If available, use local knowledge and an understanding of the forest type. A map of the area and visual examination will also highlight potential risks.

The harvesting plan must describe how work should be performed to eliminate or minimise the risks faced when harvesting. It must be easily understood and followed by workers.

**Consultation** with workers is one of the easiest and most effective means of identifying risks and establishing controls at a workplace. Workers are often well aware of what can go wrong and why, based on their experience with a job. The person preparing the harvesting plan should also consult with other appropriate people, such as an occupier of the land, and any persons providing services to or being a part of the forest harvesting operation (felling, forwarding, transporting, etc).

Appendix 3 contains a sample outline of a harvesting plan, which provides guidance on the issues to be covered.

A **harvesting area** is the area generally covered by a harvesting plan. It contains one or more harvesting sites, and includes other work such as tree marking and road works. Caution signs are usually used at entry points to the area (such as on roads).

A **harvesting site** is the site in which forest harvesting is actively in progress. This area must be signposted with danger signs.

A **felling zone** is the area in all directions around the tree being felled equivalent to a radial distance of two times the height of the tallest tree within the felling zone.

## Part A: Harvesting operations safety

PCBUs must ensure that their workers are competent in all forest harvesting work activities they will be expected to undertake. PCBUs must use nationally recognised industry competency standards and assessment procedures (where available) to determine, certify and record worker competency. Certain persons (such as fellers using hand-held chainsaws) require certificates of competency, unless they are undergoing training.

The **PCBU** must ensure that:

- Safety signs complying with *AS 1319: Safety signs for the occupational environment* are displayed where forest harvesting is in progress.
- Safety signs are clearly legible and exhibited in positions which give adequate warning of the forest harvesting to anyone approaching the area.
- No person is required to work alone during felling and extraction work except where a high standard of safety is in place, for example, where an operator is carrying out work entirely within a properly equipped and guarded machine, or with an effective means of communication available.
- Any person required to work alone has and uses an established daily report-in schedule.
- Personal protective equipment is used in compliance with section 9.1 – Personal protective equipment.
- Mechanical harvesting plant is used and maintained in compliance with section 10 – Plant safety.
- Manual felling operations comply with *AS 2727: Chainsaws - Guide to safe working practices*.

**Any person entering a felling zone** (a felling zone is the area in all directions around the tree being felled equivalent to a radial distance of two times the height of the tallest tree within the felling zone):

- Must make a reasonable attempt to make the feller aware of their presence.
- Must not place themselves or others in danger when in the felling zone.



This sign is placed on access routes to the harvesting area, and remains in place for the duration of all current harvesting activities in the area.

This sign is placed at strategic points along the boundary of the harvesting site. It should be moved along with the active harvesting front. This sign should be removed if harvesting operations cease for periods exceeding one week, provided there are no imminent dangers from the harvesting.



This sign is placed in such a way as to identify the immediate danger zone of the particular hazard.



This sign is placed either side of live powerlines.

## 2. Felling

Dry stags are dead or dry standing decayed trees which are particularly dangerous as they could fall, of their own accord, at any time. This danger is increased if the dead tree is disturbed during a felling operation (e.g. brushed against by a tree being felled).

The danger from dead or dry standing decayed trees can be reduced firstly by their identification, and secondly by their removal from within the felling zone.

### 2.1 Manual felling

The **feller** must ensure that:

- Safe felling techniques are used to control the direction of fall (manual felling scarfing requirements are outlined in section 2.2).
- They are aware of the following issues before commencing, and during, harvesting work:
  - size, location and condition of the tree to be harvested
  - canopy cover
  - ground slope
  - wind speed and direction
  - ground cover and the hazards which may be encountered in the forest
  - work performed is within the capacity limits of the chainsaw.
- The area around the base of the tree is cleared to provide sufficient area to carry out the work and to allow safe escape routes from the area.
- A distance of not less than two times the height of the tree being felled is maintained between the feller(s) and other people, except for the purposes of training and supervision.
- Tree felling adjacent to energised powerlines and associated hardware is not to occur within a distance specified in the *Electrical Safety Regulation 2002* (see section 6 for guidance).
- Any tree which has been scarfed is immediately brought down.
- They do not work immediately above or below other people.
- Where a tree is hung-up, the standing or supporting tree is not felled. If safe to do so, the hung-up tree should be brought down by machine.
- Any hung-up tree is brought down or otherwise made safe.
- Access to areas containing hang-ups is restricted by displaying an appropriate sign.
- The method used to designate individual hang-ups in the field must be nominated in the harvesting plan.

## 2.2 Manual felling scarfing requirements

The **feller** must ensure that:

- Each tree that has a diameter of 200 mm or more at the height at which it is proposed to be felled, must be felled by using a scarf or undercut on the side of the tree of the direction of the intended fall, followed by a back cut.
- Each tree that has a diameter of 100 mm or more, but less than 200 mm at the height at which it is proposed to be felled, must be felled by using either:
  - a scarf or undercut on the side of the tree of the direction of the intended fall, followed by a back cut
  - a front cut on the side of the tree of the direction of the intended fall, followed by a back cut.
- Each tree that has a diameter of less than 100 mm at the height, at which it is proposed to be felled, may be felled by using a single continuous cut.
- A scarf or undercut is:
  - made with two cuts which meet to form a horizontal line at a depth of 1/4 to 1/3 of the diameter of the tree at felling height, and
  - is sufficiently deep to allow the tree to fall freely.
- A front cut is made with a horizontal cut to a depth of 1/4 to 1/3 of the diameter of the tree at felling height.
- A back cut is made with a horizontal cut which does not cut the hinge or holding wood, and:
  - for trees with a diameter at felling height of 200 mm or more, which is at least 30 mm higher than the horizontal line formed by the scarf or undercut
  - for trees with a diameter at felling height of less than 200 mm, which is at least 20 mm higher than the horizontal line formed by the scarf, undercut or front cut.

## 2.3 Mechanical felling

Where timber is to be mechanically harvested, careful planning is required to provide the safest possible workplace. Planning for safety in mechanical harvesting should include the following:

- systematic programs of instruction to attain safety and efficiency
- adequate direction and control of all personnel
- sufficient and appropriate training and instruction for operators, who should demonstrate their ability to operate the equipment safely, and
- equipment and facilities maintained in good condition.

The **PCBU** must ensure that:

- Trees in the harvesting area are assessed to determine their suitability for mechanical harvesting, and that tree shape, size, defects, weight distribution, and characteristics of the species are considered in selecting the equipment and extraction methods to be used.
- Operators consider the following issues before commencing, and during, harvesting work:
  - canopy cover
  - ground slope
  - wind speed and direction
  - ground cover and the hazards which may be encountered in the forest
  - work performed is within the capacity limits of the equipment.
- Operators have an effective means of communication available during harvesting operations.
- Operators are made aware of the abilities and limits of the equipment, and the risks involved in a particular harvesting site.
- Operators remain aware of the proximity of other personnel potentially within their area of operation.

## 3. Extraction

Extraction includes snigging, skidding, cable logging and forwarding. Risks during extraction can include falling timber, roll over of machinery, nature of the terrain, and working too close to fellers.

The **PCBU** must ensure that:

- Methods of extraction are determined before commencing extraction work. Safety considerations should be followed, and all workers involved in extraction must be appropriately trained, including instruction on local conditions and any specific requirements on the harvesting site.
- Major extraction routes are identified before commencing extraction. Planning should take into account hazardous features such as rocky outcrops and ground conditions.

This section must be read in conjunction with section 10 – Plant safety.

### 3.1 Snigging

The term 'skidder' is used throughout the code to mean both rubber tyred skidder and crawler tractor. When specific reference is made to either machine, then its correct name will be used. Appendix 6 describes methods and risks of snigging.

The **PCBU** must ensure that any **rubber tyred skidder** and **crawler tractor**:

- Is regularly serviced and maintained in good working order at all times, as specified in the skidder operator's handbook.
- Ensure rubber tyres that are in good order, with sufficient tread pattern to provide traction. Tyres can either be air inflated or inflated with a combination of water and air.
- **Note:** By filling all four tyres with water (up to valve height, valve stem located at 12 o'clock, then pressurised to 140 Kpa (20 psi) provides the skidder with additional stability and traction without significant loss of pulling power.
- The track system is in serviceable condition. The track grouser plate lugs must have sufficient height to allow the tractor to maintain stability and traction for the ground conditions and terrain on which the tractor is working.
- The winching equipment fitted to the skidder is consistent with the skidder's pulling capacity. Keep equipment in good order at all times.

The **PCBU** must ensure that any **2WD and 4WD rubber tyred agricultural tractor**:

- Is regularly serviced to manufacturer's specifications and maintained in good working order at all times.
- Has rubber tyres that are in good order, have sufficient tread pattern to provide traction, and be appropriate to terrain traversed.
- **Note:** Water in tyres - it is recommended that only the rear tyres be filled with water. If additional weight is required on the front of the tractor, use concentrated steel ballast at the front.
- If the tractor is not equipped with a suitable winch, logs can be snigged via a suitable attachment fitted to the tractor's three point linkage. The snigging cable or chains must be kept as low as possible to the ground (i.e. below the centre line of the rear axle). This is to prevent the tractor's front end from rearing up when the tractor is subjected to a pull load beyond its capacity.

#### Working with machinery

**Operator's handbook:** The operator should read the operator's handbook.

**Seat belts** must be worn at all times while operating machinery. ROPS / FOPS are most effective if a seat belt is used to keep the operator within the envelope of safety provided by the ROPS / FOPS.

**Additional person riding on a machine:** The operator must not allow another person to ride on the machine, unless it has been fitted with an additional, properly constructed seat with seat belt, which is located inside the tractor ROPS / FOPS.

**Overhead risks:** Skidder operators should be mindful of the ever present danger from overhead risks (e.g. dry limbs, widow makers). Care should be taken when dismounted from the skidder.

If a danger exists from an overhead risk at the hook-up location, then logs should be pushed to a safer location before dismounting from the skidder.

The skidder is a suitable machine for pulling down hung-up trees, provided there is little chance of pulling over the standing tree, and that it is within the machine's capacity.

**Dry stags** are dead or dry standing decayed trees which are particularly dangerous as they could fall, of their own accord, at any time. This danger is increased if the dead tree is disturbed during a snigging operation (e.g. brushed against or had a log pushed against it). A dead tree is even more dangerous if it is leaning in towards a landing. Landings should not be located near dry stags.

Danger from dead or dry standing decayed trees can be reduced by their removal, both along proposed snig tracks, and within the drop zone of a landing.

**First aid kits** must be available on site or in the snigging vehicle (see section 7.2 – First aid).

### **Working with the tree feller(s)**

**Operator's responsibility:** Skidder operators have a responsibility not to put the feller or landing man or any other person in the area of operation at risk.

**Pattern of work:** Generally, the tree feller will determine the pattern of work (i.e. the sequence in which trees are to be felled and snigged). A clear working understanding must be developed between the skidder operator and the feller.

When a skidder is snigging for multiple tree fellers, the fellers must be separated from each other by at least two tree lengths.

**Close proximity:** A skidder operator must not move into an active tree felling area before the feller has been sighted, and it is safe to move in. Until the feller is located, the skidder must be stopped and the engine switched off.

### **Working with an offsider (choker man)**

**Operator's responsibility:** Skidder operators have a responsibility not to put the offsider at risk.

**Communication:** There must be a clear understanding between the skidder operator and offsider on the system of work used to hook-up. Special care must be taken when manoeuvring the skidder to a suitable hook-up position. The offsider must be well clear of the log(s) before beginning the snig.

**Offsider riding on skidder/tractor:** The skidder operator must not allow the offsider to ride on the skidder/tractor unless it has been fitted with an additional, properly constructed seat with seat belt, which is located inside the skidder's ROPS / FOPS.

### **Working with other skidders/tractors**

It is normal practice to use a crawler tractor to build snig tracks, and to snig logs that are beyond the rubber tyred skidder's capacity.

The rubber tyred skidder is used to quickly and efficiently transfer the majority of logs from the stump to the log landing.

If two or more skidders are employed in snigging logs from one or more areas that are close together, establish a clear pattern of work, and ensure that each operator has a clear understanding of what the other skidder is doing.

### **Working with the landing man**

**Operator's responsibility:** Skidder operators have a responsibility not to put the landing man or any other person on the landing at risk. The operator must have a clear understanding of the system of work employed at the log landing.

**Work pattern:** The log landing must be laid out so as to provide a specific area for the skidder to unhook the snigged logs. Logs must be placed in a safe manner for cross-cutting.

The **skidder operator** must:

- Check to see that logs are fully dropped before unhooking. The rear of the skidder can be used to stabilise the logs if they are in danger of rolling after being dropped.
- Take care not to disturb logs already stacked or lying about the log landing as a disturbed log could endanger workers on the log landing.
- Be mindful of the operation of the log landing's loader, especially if it has limited vision, such as from an excavator.

### Working with other people on the ground

Skidder operators have a responsibility to ensure that the operation of the skidder does not put any person at risk that might be present in the operations area.

## 3.2 Skyline/Cable logging

Skyline or cable logging has potential safety risks due to the physical size and layout of this type of operation. Additionally, parts of the system may not be visible to the operator. Suitable anchor points are critical to the safe operation of this type of system, and ropes and pulleys can cause major injuries when they fail. Accordingly, following are some safety considerations for the people involved in operating these systems:

### Design and layout

- Suitable anchor points are critical to safety in skyline or cable logging operations.
- Landings must not be sited unless there are adequate anchor points. Landings may in some cases be located within the harvesting area.
- Downhill logging should not be used unless there is sufficient area for logs to come to a standstill within the log landing area.
- In final crop operations, the log merchandising area must be at least 30 metres from the tower, and never directly below it.
- The landing chute should be long enough to hold at least 2/3 of the longest log to be yarded on the ground.
- The landing chute should be at a slope of less than 15°.
- The hauler site must be planned to allow for the regular guyrope spread and a guyrope slope of 45° or less. If the slope is greater than 45°, an additional guyline must be rigged to oppose the load.
- The clearance between the ground and the skyline must be considered during the design of the layout. Inadequate clearance increases the likelihood of logs snagging on stumps, rough terrain or other obstacles. In some situations, inadequate clearance can be corrected with intermediate stays.
- Anchor ropes (guyropes or guylines) must have the same capacity as the skyline rope being used.
- The maximum expected load must not exceed 1/3 of the breaking strain of the rope, and all ropes should be a minimum grade 1770 or better.
- A standing tree should not be used as an anchor point within two tree lengths of the skyline, the skyline rack, or any work area unless additional safety precautions are taken.

### Haulers

- Immediately report badly worn, kinked or corroded rope.
- Obey signals immediately.
- If the signalling system appears defective, stop and investigate.
- **Never** move hauling ropes without being signalled.
- If a drag appears fouled or is too heavy, stop and investigate.
- Reduce the throttle for low gear pulling.
- **Do not** leave brakes on and lines tight while rigging work is done.
- **Never** let the last five laps of rope off the drum during hauling operations.
- Slow down the drag when it is approaching the landing. The skyline operator should exercise additional care when landing and lowering logs.

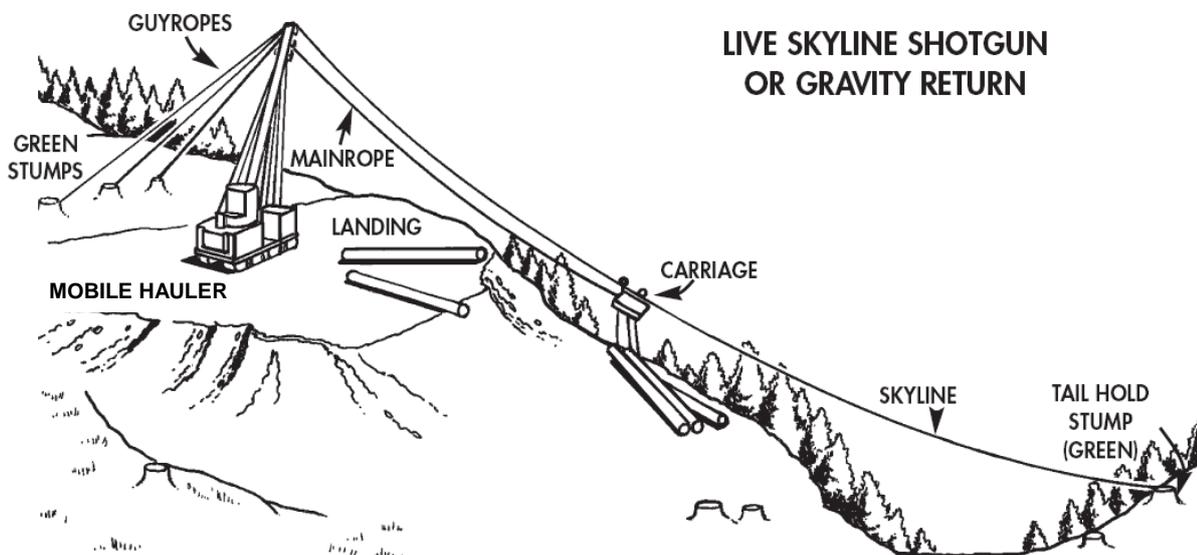
### Landings

- **Do not** stand in front of the drag being landed.
- When a load is being hauled in, **never** stand in the bight (a hazard zone within the angle of a rope passing through a block or around any obstacle) of any lead block, under any rope, or between the hauler and the spar.

- **Do not** stay around the spar while ropes are in motion, and do not work around the brow of the landing while ropes are moving.
- Wait until rope surge has stopped before un-stopping.
- When logs are landed crossed or unsafely, ask the hauler operator to re-land them.
- Check for loose shackles or pins in the moving rigging, and tighten or replace them.
- When unhooking, **do not** get between logs, or where they may roll onto you.
- Landings are a confined area with moving ropes, logs and machinery. Use extreme caution.

### Breaking out

- **Do not** work in the bight of moving ropes.
- Strops must be attached as near to the end of the tree or log as practical.
- Logs should be approached and choked from the uphill end. They may be approached from below where the risk is no greater than when approached from above.
- **Never** enter the work area below a log unless the log is restrained or unable to slip.
- **Never** stand or work too close to a rope under strain.
- Avoid working in front of skyline or tail rope anchor stumps wherever possible.
- **Do not** use standing trees for tail holds where they are within two tree lengths of the skyline, skyline rack or any work area.
- **Do not** use snags or dead stumps for tail holds.
- **Never** overload the hauler. Unhook some logs if the drag appears too heavy.
- If the drag is fouled, stop the hauler and investigate.
- Always keep beyond log length of a drag being hauled. A log hitting an obstacle may be swung around, with possibly severe consequences.



### 3.3 Forwarding

The **PCBU** must ensure that:

- All personnel involved in forwarding operations, or in the vicinity, need to be aware of expected movements.
- Site and track conditions are assessed between the load and unload points, particularly in relation to ground conditions, slope, traction, obstacles, machine stability and operating capacity limits.
- The operator understands machine capabilities and required work methods, including the centre of gravity of the machine in loaded and unloaded conditions, and load anchorage requirements.
- Loads are secured during transit, or held in a manner so they can not become dislodged.
- Effective communication is maintained with other personnel in the vicinity.

- The operator has received adequate instruction and training.
- The machine, and any load being forwarded, is kept clear of powerlines. Minimum clearance distances are specified in the *Electrical Safety Regulation 2002* (see section 6 for guidance).

## 4. Log landings

The log landing is the focus of forest harvesting and must be planned and constructed for safe log handling.

**A location** should be chosen which is reasonably flat and accessible. To minimise risks, ensure the loading area is:

- cleared of all risks such as uneven terrain, rocks, bog holes and dry stags
- kept clear of all hazardous debris
- in reasonable proximity to snig tracks and roads, and
- not located under or adjacent to energised powerlines.

**The log landing layout** should be designed so anyone arriving at the log landing will be visible to the operators. Ensure the layout of the log landing:

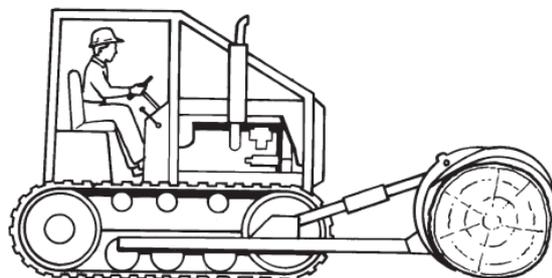
- is designed to minimise machinery movement
- allows an area for non-essential machinery and equipment, to keep the loading area as clear as possible
- is large enough to enable activities to be carried out with as little intrusion as possible between each task, and
- allows logs to be positioned so they do not roll or slide.

Log landings in skyline / cable logging operations have particular requirements. These can be found in section 3.2 Skyline / Cable logging.

Where merchandising or docking of the logs is undertaken at the landing using a hand-held chainsaw, the requirement for leg protection is to be assessed based on the site layout and volume of work to be performed. Every cut must allow sufficient space for the operator to complete the cut without contacting another log. If this is not available, leg protection must be worn.

### 4.1 Loading logs

The PCBU must ensure only trained people operate log loading machines. A communication system must be established to indicate movements of loaders and trucks in loading area. When skid-log loading-ramps are should be positioned level with the tray of the trailer bolsters. Where possible, bolsters should horizontal for loading.

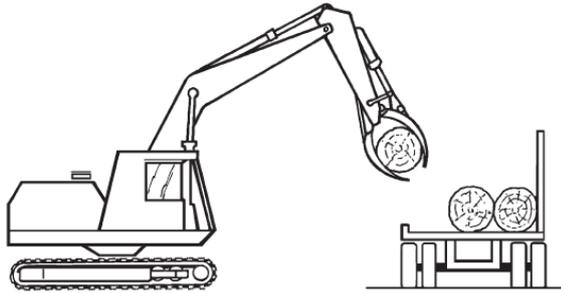


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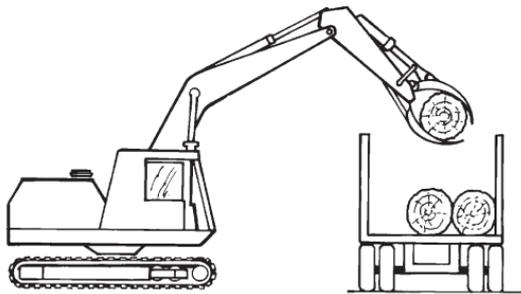
Loading from a properly constructed log ramp is permissible. Bulldozers used in blade loading operations should be fitted with a log grab or beak.

Loading of logs at night without appropriate lighting is prohibited. Using only the lights of the loading machines (designed for driving along a road at night) is not safe as they do not provide adequate illumination for loading safely. Additional lighting can be provided by fitting these to the loading machine, and/or the truck being loaded and/or on the log landing.

The lighting system should be installed before undertaking log loading at night. The lighting system should ensure the safety of people to the extent that the lighting makes hazards visible. The lighting system should make the task clearly visible, and provide a safe and comfortable visual environment.



A forwarder, grab excavator, front end loader or forklift truck may be used. When a front end loader or a forklift truck is used, the forks should be fitted with a hydraulic log grab, or an alternative method of work used to stabilise logs during loading.



The truck driver must always remain in view of the loader operator (preferably in front of the truck), unless the driver is absent during the loading operation. The loader driver must cease operations if the whereabouts of the truck driver is unknown. The truck driver or any other person is not permitted to stand on the load or the truck during loading.

The securing of the load must not begin until the loading operation is completed. The driver must secure all load binders to the load securing chains before the first load binder is tightened. It is the driver's responsibility to ensure that the load of logs complies with the relevant load restraint legislation for the transport of logs by road.

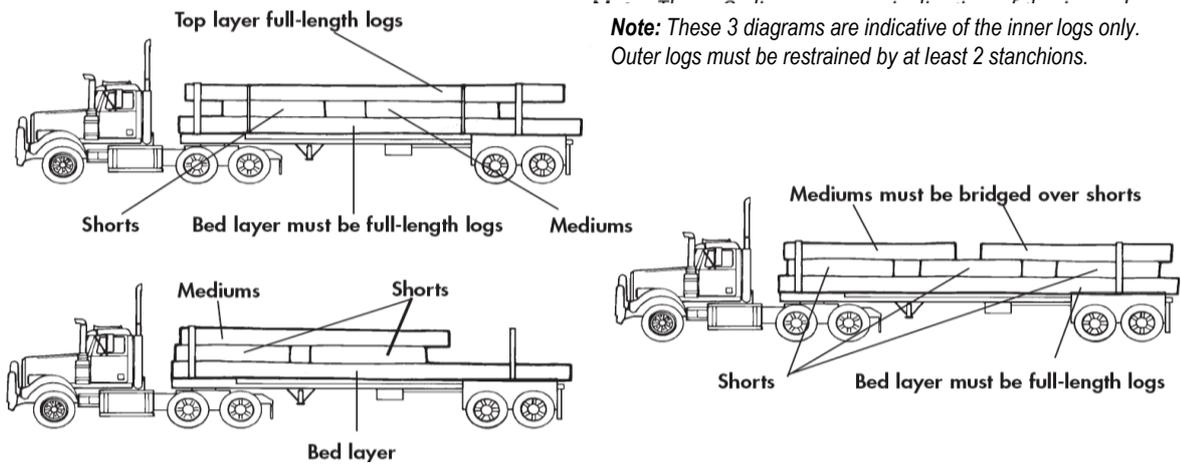
## 5. Transport

The transport of log timber is highly specialised, utilising purpose built vehicles, timber jinkers, and skeletal trailers (including pole trailers, skeletal semi-trailers and B-Doubles). These vehicles are fitted with horizontal bolsters, with chocks and vertical stanchions at each end to contain and restrain the logs. The stanchions can be fixed, removable or pivoting (facilitating easier unloading). Outer logs must be restrained by a minimum of two stanchions.

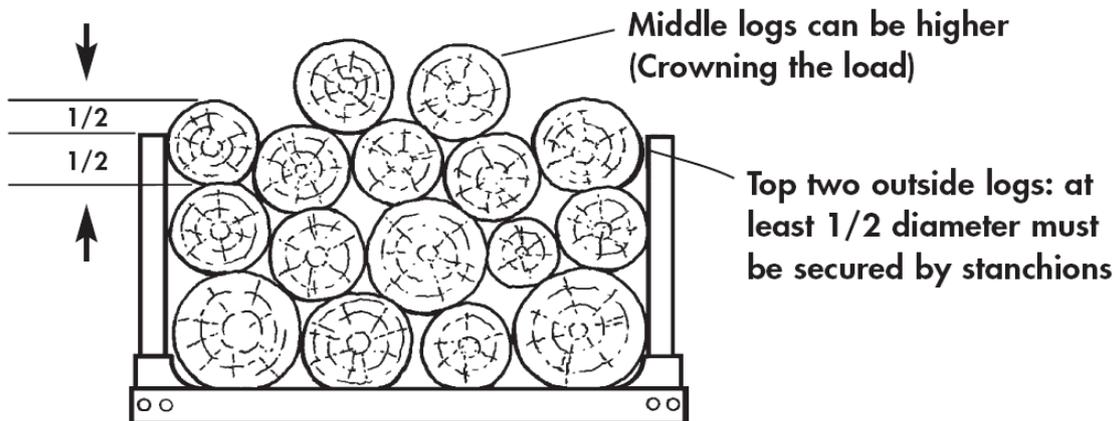
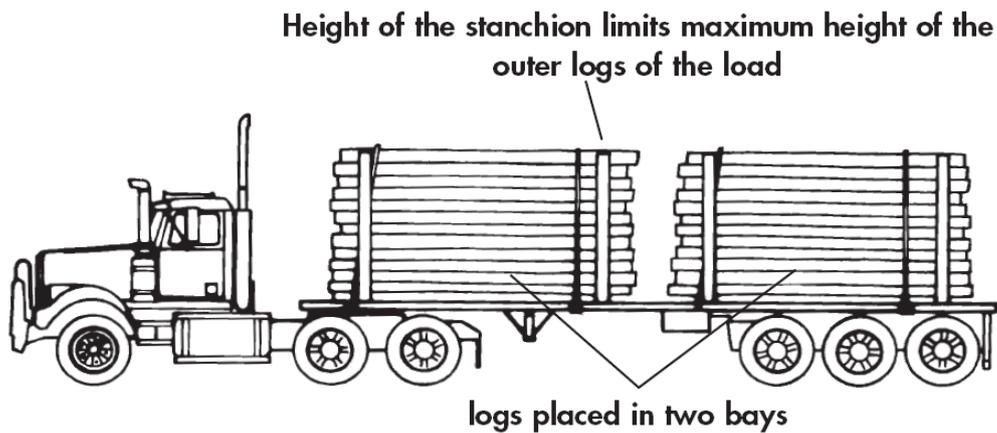
The **PCBU** must ensure that any driver of vehicles is aware of the following:

- The load of logs and its method of being secured to the vehicle to comply with the relevant federal, state and local legislation.
- Bolsters are in good condition and securely attached.
- Stanchions are secured to the trailer, are of sufficient strength, and located so as to support and contain the load during transit.
- Stanchions are not bent, cracked or loose in their mountings.
- Extension pins are a close fit.
- Release stanchions are fitted with 'opposite side safety releases'.
- Chains, straps and binders must be checked regularly for wear, damage and stretching. Replace any defective chains or straps.
- All vehicles used for transporting logs are fitted with a cabin guard of sufficient strength to protect the cabin in accordance with the *National Load Restraint Code*.
- Before restraints are released, the load is checked for risks. If risks are present, restraints are not released before the loader is positioned to prevent logs falling. Special care must be taken where short logs are involved.
- Restraints are released by the 'opposite side safety release' before unloading commences.
- During loading and unloading, the truck driver should be in front of the truck and in full view of the loader operator, and must not be in a danger area.
- Load binders are checked regularly in transit to maintain tension.

Possible load distribution:

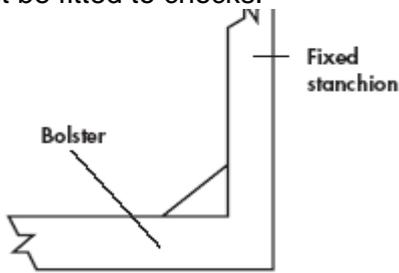


Placement of logs on haulage trucks:

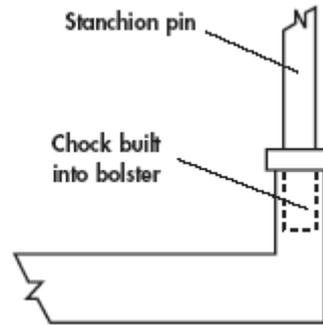


## 5.1 Securing logs

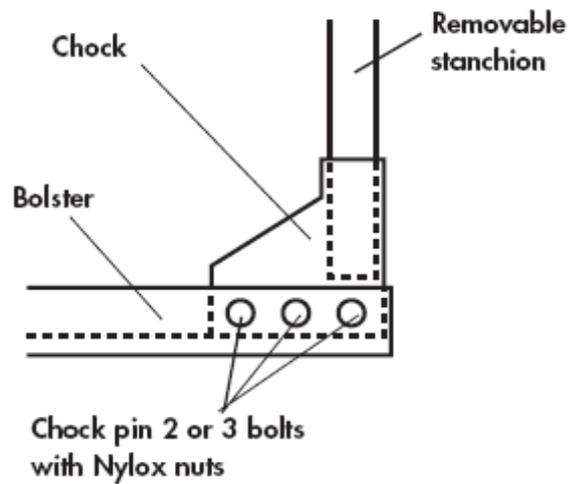
Full length stanchions must be positively secured to both sides of all bolsters. Either fixed stanchions or removable stanchions must be fitted to chocks.



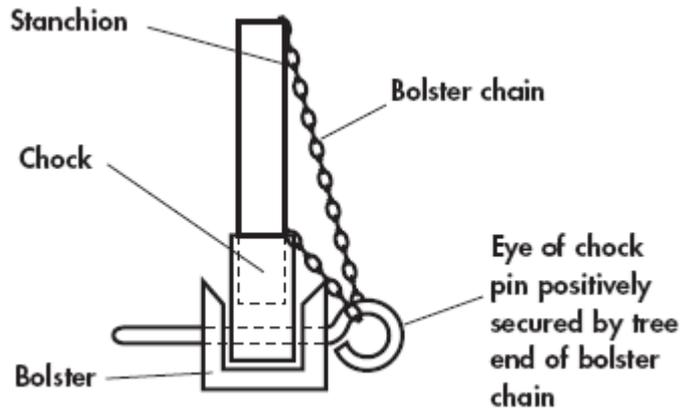
The stanchion must be strong enough to prevent deflection by the load which the truck is designed to carry.



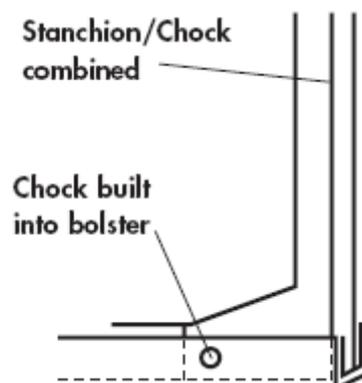
Stanchions and their extensions must be purpose built. Stanchion extensions must be positively secured.



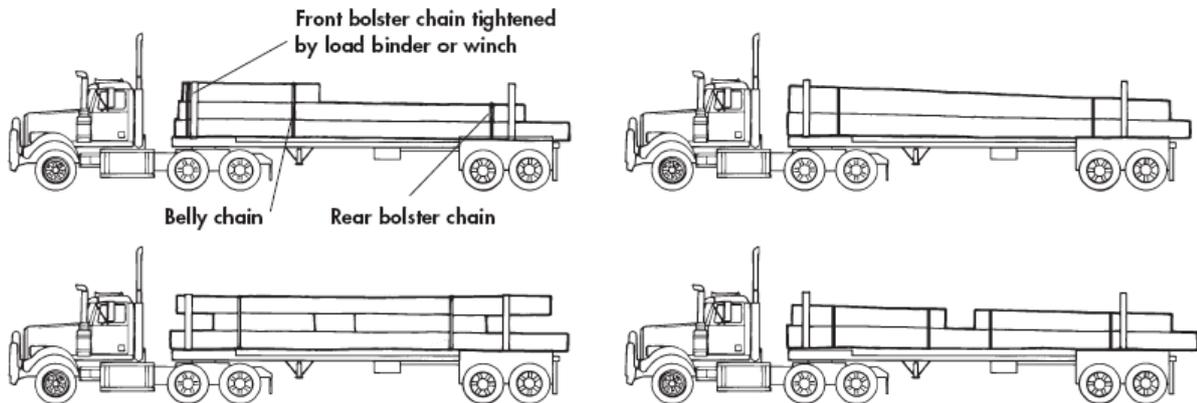
Chocks must be positively secured to the bolster by at least two pins which are positively retained. The minimum diameter of the pins is 22 mm, except in the case of folding down stanchions where one pivot pin (of adequate strength) is acceptable.



All loads must be secured by a bolster chain to the forward and rear bolsters of jinkers. If hauling on steep or winding forest roads, consider using additional belly chains for more security.



*Note: The following 4 diagrams are indicative of the inner logs only. Outer logs must be restrained by at least 2 stanchions.*

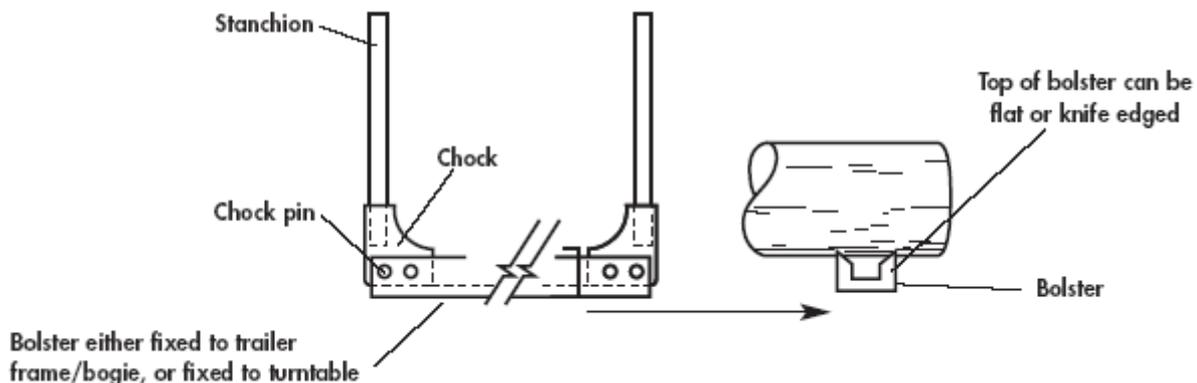


Each outside log must be secured by at least two chains. The two outside logs must be secured by the stanchions, and have at least half their diameters below the top of the stanchions.

The top of a load of logs must be crowned so as each log has a proper lay and be contained by at least half of its diameter by the log immediately to its outside to ensure that the securing chains contact each log on the top and the outsides of the load.

The truck driver must ensure that the load of logs is securely chained. Drivers must stop and check the security of the load at least once while travelling to their destination.

All equipment used for the security of logs on trucks must be in a sound condition, regularly checked for wear and damage, and replaced when damaged, weakened or worn.



Chains used to secure stanchions to the truck/trailer must have a safe working load of at least two tonnes. Typical chains, which comply with this requirement, are 7.3 mm Hilite 2, 8.0 mm Hi 65, and 10 mm PWD Grade P.

Trucks not using stanchions on both sides must comply with Queensland Transport and National Truck Loading requirements. These require that chains used to secure loads shall have a total minimum breaking strength of one and a half times the weight of the load being carried.

The truck driver must wear appropriate safety equipment when not in the cab, such as safety helmet, protective footwear and high visibility clothing in compliance with section 9.1. – Personal protective equipment.

Maintenance of log securing equipment

### **Chock pins**

Replace any chock pin that is worn, bent, or not capable of positively securing the chock to the bolster.

### **Chain**

When assessing the serviceability of chains and their attachments, if any of the following conditions exist, replace the chain or attachment:

- any link weakened by wear, damage or corrosion which reduces its diameter by more than 10 per cent
- any bent, twisted, stretched or collapsed link
- any link repaired by welding, or any unsuitable repair link
- a knot in any portion of the chain, and
- any attachment (turnbuckle, load binder, grab hook, etc) weakened or prevented from functioning by wear, damage or corrosion.

### **Straps**

Replace any strap that is worn or damaged, and ensure the strap securing hardware is not damaged, or not capable of positively securing the strap to the vehicle.

## **5.2 Securing loads other than logs**

Securing the load must not begin until the loading operation is completed. The driver must secure all load binders to the load securing chains before the first load binder is tightened. It is the driver's responsibility to ensure that the load complies with the relevant load restraint legislation for the load being transported by road.

Loads of light weight, short length final crop top logs must be limited in crown height to be equal to or less than the height of the stanchions. Extendable stanchions or stanchion extensions are permitted for such loads, provided they meet the height restrictions and other requirements of transport legislation and the National Load Restraint Code.

#### **Unloading logs**

When unloading logs, a forklift truck, front end loader (with a hydraulic log grab), a grab excavator, overhead or mobile crane may be used.

The truck driver must inspect the load of logs for possible movement before securing chains and/or straps are released.

Load security chains and/or straps are to be released only when the load is restrained by an unloading machine on the load binder side, or by another positive form of restraint.

It is possible for a top log of a load to fall off when the freed securing chain or strap is pulled from the truck. Top logs may shift during transit and as a result they can become unstable. The driver can lessen the risk of injury if this should happen by:

- walking away from the truck, pulling the freed chain/strap over the load, onto the ground or
- pulling the chain/strap from under the truck so that the chain travels away from the driver.

Both methods will ensure that the driver is away from the danger areas (approximately two metres from both sides of the truck) should a log fall.

The driver must always remain in view of the unloader operator, preferably in front of the truck, unless the driver is absent during the unloading operation. The unloader operator must cease operations if the whereabouts of the truck driver is unknown. The truck driver or any other person is not permitted to stand on the load or the truck during unloading.

Unloading logs at night without appropriate lighting is prohibited. Using only the lights of the unloading machines is not safe as they do not provide adequate safe illumination for unloading.

## Part B: Workplace health and safety

### 6. Working near powerlines

The presence of powerlines and associated hardware in close proximity to harvesting operations represents a safety hazard to all people involved. Leaving trees adjacent to energised powerlines also poses a multitude of additional risks to forest harvesting workers as well as consumers.

If a powerline is above any part of the felling zone<sup>1</sup> during forest harvesting activities, additional measures must be employed to ensure the trees being felled do not encroach on the 'exclusion zone'<sup>2</sup> from the powerline. The additional controls should be developed in conjunction with the owner of the powerline.

The *Electrical Safety Act 2002* and the *Electrical Safety Regulation 2002* provide the framework for working with and around electrical hazards. In particular, the code of practice – *Working Near Exposed Live Parts* gives advice on how to manage electrical risks. In matters pertaining to electrical safety, workplace duties exist under both the electrical safety and work health and safety legislation.

Where there is a reasonable likelihood during the performance of harvesting operations that a person or operating plant will contact a live part or come within the 'exclusion zone', a PCBU must advise the owner of the overhead electrical line in writing of the proposed works at least 7 days before that work commences (see *Electrical Safety Regulation 2002* section 64A).

When working near high voltage live parts, a person or operating plant does not have to physically touch the exposed live part to be at risk of injury. Any live part carrying 1000 volts or greater is considered high voltage and is capable of arcing (jumping). Most of the powerlines that traverse forest harvesting areas are high voltage.

For high voltage situations, a person is working near exposed live parts when that person is likely, either directly or through any conducting medium, to enter the 'exclusion zone'. A part is considered live until it is isolated and proven to be de-energised and not likely to become re-energised. If the part is a high voltage conductor, it is considered live until it is earthed.

Most high voltage powerlines have an auto re-close mechanism that triggers the circuit to re-energise shortly after it trips out. If the auto re-close mechanism is not switched off, a fallen powerline will remain live and pose significant danger to anyone in the vicinity.

The *Electrical Safety Regulation 2002* states that a PCBU must ensure that work performed in the conduct of the person's business or undertaking does not involve, except in accordance with requirements:

- a person coming into direct contact with an electrical part
- any operating plant or vehicle coming into direct contact with an electrical part
- a person coming within the exclusion zone for the person for an electrical part
- any operating plant or vehicle coming within the exclusion zone for the operating plant or vehicle for an electrical part.

### 7. Accidents and incidents

Collecting and analysing health and safety information is a key part of a health and safety management system. Every accident must be recorded regardless of the amount of damage or injury. This allows less obvious risks to be identified and appropriate strategies to be developed to improve health and safety.

<sup>1</sup> **felling zone** means the area in all directions around the tree being felled equivalent to a radial distance of two times the height of the tallest tree within the felling zone

<sup>2</sup> **exclusion zone** means the minimum zone prescribed by Schedule 2 of the *Electrical Safety Regulation 2002* in which an operator, person, vehicle or machine cannot encroach. The zone varies under a range of scenarios.

PCBUs must encourage workers to report any incidents or accidents, and then follow up if there is a problem. Early reporting can make the difference between rapid recovery and a serious injury or disease resulting in a lengthy absence from work.

### **7.1 Emergency planning**

PCBUs must develop procedures to ensure they can deal with accidents and emergencies. These procedures should include:

- means by which serious traumatic injury cases receive earliest possible access to treatment
- means by which all people in the workplace can be accounted for
- availability of suitable emergency equipment and materials to enable damage minimisation of a possible accident/emergency
- appropriate involvement of relevant authorities (e.g. police, ambulance, state emergency services, local authority and fire service) in a PCBU's accident response plan
- appropriate training of workers in accident/emergency procedures, and
- emergency pick-up points must be marked on the harvesting plan.

The accident/emergency procedures must be documented. The PCBU must ensure all workers are aware of these procedures.

### **7.2 First aid**

The PCBU is responsible for providing adequate facilities for the health and safety of workers. This includes the provision of adequate and appropriate first aid facilities and trained personnel. The PCBU must determine requirements associated with:

- selection, location and maintenance of first aid facilities
- policies and procedures associated with the use of first aid services and facilities, and
- selection and training of first aid personnel.

To ensure first aid facilities are appropriate for the workplace, the PCBU must also consider the:

- nature of the work performed and the possible injuries or diseases needing treatment
- location, layout and size of the working area, and
- number and distribution of workers.

Workers must always have access to first aid, vehicles must carry appropriate first aid kits, and all forest harvesting workers should be trained in first aid.

### **7.3 Accident investigation**

Accident sites should not be disturbed until after the investigation, except to aid injured people and prevent further risk. Accidents must be investigated to get factual information that can be used to prevent recurrences. Any accident, especially those involving personal injury or property damage, must be investigated as soon as possible. The scope of investigation should be in proportion to the accident's seriousness or potential for seriousness. Accident investigation steps include:

- get the facts
- determine the cause
- decide on a method of prevention
- take appropriate action to prevent a similar occurrence, and
- keep all relevant parties at the workplace informed.

From the information gathered in the investigation, appropriate action can be taken to minimise future accidents. See Appendix 5 for further information on accident investigation. Other methods of accident investigation can also be used.

### **7.4 Incident recording and reporting**

PCBUs and self-employed people must make a record of every workplace incident that happens at their workplace. Where there is a workplace incident that involves a serious injury or illness or dangerous incident, the PCBU must notify Workplace Health and Safety Queensland immediately

after becoming aware that the incident has occurred. This information may also be required if legal action ensues as a result of an incident in the workplace.

**Dangerous incident** means an incident in relation to a workplace that exposes a worker or any other person to a serious risk to a person's health or safety emanating from an immediate or imminent exposure to—

- (a) an uncontrolled escape, spillage or leakage of a substance; or
- (b) an uncontrolled implosion, explosion or fire; or
- (c) an uncontrolled escape of gas or steam; or
- (d) an uncontrolled escape of a pressurised substance; or
- (e) electric shock; or
- (f) the fall or release from a height of any plant, substance or thing; or
- (g) the collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be authorised for use under a regulation; or
- (h) the collapse or partial collapse of a structure; or
- (i) the collapse or failure of an excavation or of any shoring supporting an excavation; or
- (j) the inrush of water, mud or gas in workings, in an underground excavation or tunnel; or
- (k) the interruption of the main system of ventilation in an underground excavation or tunnel; or
- (l) any other incident prescribed under a regulation;

but does not include an incident of a prescribed kind.

**Serious injury or illness** of a person means an injury or illness requiring the person to have—

- (a) immediate treatment as an in-patient in a hospital; or
- (b) immediate treatment for—
  - i. the amputation of any part of his or her body; or
  - ii. a serious head injury; or
  - iii. a serious eye injury; or
  - iv. a serious burn; or
  - v. the separation of his or her skin from an underlying tissue (for example, degloving or scalping); or
  - vi. a spinal injury; or
  - vii. the loss of a bodily function; or
  - viii. serious lacerations; or
  - ix. medical treatment within 48 hours of exposure to a substance;

and includes any other injury or illness prescribed under a regulation but does not include an illness or injury of a prescribed kind.

## 8. Information and training

### 8.1 Health and safety information

Health and safety information is any information relevant to hazards in a workplace and ways to minimise associated risks. A PCBU must maintain information in relation to plant, equipment, hazardous chemicals, work processes and training.

This information is needed for making decisions, developing health and safety policies and procedures, educating staff, and reducing the potential of workplace injury and disease.

Workers have a right of access to any information about their health and safety. Information on workplace health and safety issues such as new equipment, harvesting techniques, and controls must be brought to their attention. A PCBU must also provide information about the health and safety management system during a worker's induction. This will enhance responsible attitudes to workplace health and safety.

### 8.2 Training

**A PCBU must not allow a worker to operate any power-driven tool, machine or equipment before the worker has been fully trained and instructed in its operation.** After training and instruction is given, an inexperienced worker must only operate equipment under the supervision of a

competent experienced operator. Supervision does not necessarily imply that the supervisor should stand beside the operator, as this may place the supervisor at greater risk.

Supervision will vary according to:

- the type of training being given
- the level of trainee competence, and
- the complexity of the task.

Supervision can vary from constant visual supervision, through to checking on progress via radio, to checking the outcomes of the trainee's work on a daily basis.

A PCBU must ensure that a worker is competent in all forest harvesting activities that they are expected to undertake.

Training may include site instruction, "in house" training programs and components of formal training. All training must cover where applicable:

- work methods to be used
- use, care, and storage of plant, tools and equipment
- use, care and storage of personal protective equipment, and
- procedures to be adopted in emergencies, such as fire, accident or injury.

### **8.3 Certification requirements**

Where plant operators are required to be certificated, (e.g. Workplace Health and Safety Queensland and Queensland Transport) such certification must be current and appropriate to the machinery being operated.

Chainsaw accreditation appropriate to the type of hand-held chainsaw work being undertaken must be held by the operator of a chainsaw in forest harvesting work, unless undergoing training.

### **8.4 Induction training**

Induction training must be provided to each worker at the commencement of their deployment in forest harvesting activities. Induction training must consist of two parts:

- 1. General induction**, which provides information on the health and safety risks commonly encountered, and the common methods of ensuring work can proceed with a minimum of health and safety problems.
- 2. Site specific induction**, which includes information on the site specific hazards, methods of work, and any health and safety requirements of the PCBU and owner of the site.

PCBUs must ensure that their workers are competent in all forest harvesting work activities they will be expected to undertake. PCBUs must use nationally recognised industry competency standards and assessment procedures (where available) to determine, certify and record worker competency.

## **9. Personal protective equipment (PPE)**

### **Controlling risk with personal protective equipment**

Personal protective equipment should only be used when it is not practicable to use other methods to control risks. Design, substitution and separation are generally better methods to control risks. Administrative controls are also often preferable to personal protective equipment. However, on a harvesting site, the changing circumstances often mean that personal protective equipment is an appropriate choice.

This section gives guidance on personal protective equipment to be used in forest harvesting.

Dependent on the task, equipment and conditions in the forest, the following items may be used:

- safety helmets
- safety gloves

- protective footwear
- eye protection
- respiratory protection
- hearing protection
- high visibility clothing
- leg protection, and
- wet weather gear.

Before commencing forest harvesting, the PCBU must assess the conditions likely to affect the health and safety of people employed to carry out the work, and arrange for the provision and use of appropriate personal protective equipment.

The selection, fit and maintenance of personal protective equipment is an important part of any protection program. In selecting the most appropriate personal protective equipment, the PCBU must consider factors such as:

- the nature and degree of exposure to risk
- the protection offered by equipment selected
- the fit of such equipment for the wearer
- wearability and comfort
- the length of time the equipment is to be worn
- the ease of maintenance and availability of replacement parts where applicable, and
- limitations on performance of equipment.

Workers are more likely to wear items of personal protective equipment if they are consulted on the choice and fit, and if the equipment is comfortable.

The PCBU must also ensure all those who wear, issue or service personal protective equipment are trained for these tasks. Training should include:

- information on the risk which the personal protective equipment is to protect against
- the type of protection provided by such equipment
- the reason for selection of particular equipment and its limitations and capabilities, and
- the importance of proper fit, use and maintenance of personal protective equipment.

## 9.1 Personal protective equipment requirements

The PCBU must ensure personal protective equipment is clean and operational when it is supplied for use, and defective personal protective equipment is not used.

**Helmets:** An industrial safety helmet and appropriate accessories complying with *AS 1801: Occupational protective helmets* and *AS 1800: Occupational protective helmets - Selection, Care and Use*, must be used by each person exposed to the risk of head injury. Helmets must be worn at all times in a harvesting area. In circumstances within the forest where there is no risk of being struck by falling objects, a helmet need not be worn (e.g. a mechanic working on a forwarder, an operator working within an operator protective structure).

**Protective footwear** must be worn by anyone working in forest harvesting. Where appropriate, footwear should comply with *AS 2210: Occupational protective footwear*. Protective footwear must be replaced when it no longer provides the protection intended. For example, damaged or worn soles may cause slippage, and inability to fasten securely may create a risk.

**Hearing protection** must be worn at all times when a person is exposed to noise levels exceeding 85 dB(a). Appropriate hearing protection should be established in accordance with the requirements of *AS/NZS 1269: Occupational noise management*. Hearing protectors must comply with *AS 1270: Acoustics - Hearing protectors*.

**Leg protection:** Cut resistant trousers or chaps must be worn by a person exposed to risk of injury from accidentally touching the legs with a chainsaw. They must be replaced when they no longer provide full protection.

Where climatic or mobility issues cause additional risks from the use of leg protection, a chainsaw operator with appropriate training and accreditation<sup>3</sup> may choose not to wear leg protection after performing a written risk assessment in accordance with the Standards Australia document *HB 205-2004 : OHS Risk Management Handbook*. The chainsaw operator must include the following risk factors in their risk assessment:

- slope, terrain and ground surface (e.g. stone litter) affecting escape speed
- understorey to be cleared (e.g. lantana, wallum grass, vines and shrubbery)
- size of timber to be felled and density of the stand
- risk of throwback from falling trees
- fatigue, heat stress and operator comfort levels with the leg protection
- temperature and humidity levels
- characteristics of the chainsaw
- suitability of the chainsaw (including bar length) and chainsaw maintenance
- the work does not pose above average risk to leg injury such as the bar often being in close proximity to the legs or higher risk of kick-back, and
- other controls that are in place.

The risk assessment must be accepted and signed by the PCBU, and must state the conditions under which the leg protection may not be worn. A separate risk assessment is to be completed by each chainsaw operator who intends to work without leg protection in certain circumstances.

**Safety gloves** complying with *AS 2161: Occupational protective gloves* must be worn by any person requiring hand protection (e.g. people engaged in chainsaw operations carried out in cold or wet conditions, or when using wire ropes).

Gloves or mittens used by people working in forest harvesting must provide protection for the hands, wrists, and part of the forearms. Gloves or mittens should be of appropriate strength for the work performed.

**Eye protection** complying with *AS 1336: Recommended practices for occupational eye protection* should be used by any person who is exposed to the risk of eye injuries, such as being struck in the eye by flying dust or woodchips.

Eye protection should be either safety glasses or full face shields which are impact resistant, allow maximum vision and ventilation, and are capable of accommodating the wearing of prescription spectacles.

**High visibility clothing** made of highly visible materials must be worn at all times when a person is working in forest harvesting. Highly visible **reflective** clothing must be worn for night work.

**Respiratory protective devices** complying with *AS 1716: Respiratory protective devices* must be used by anyone working in forest harvesting who is exposed to dust or fumes which may be harmful to their health.

When chemicals are used, personal protective equipment and respiratory protective equipment must be used in accordance with the appropriate Safety Data Sheet (SDS). Respiratory devices should be cared for and maintained in accordance with *AS 1715: Selection, use and maintenance of respiratory protective devices*.

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<sup>3</sup> “Appropriate training and accreditation” means chainsaw training or accreditation to at least intermediate level for pine or cypress, and advanced for native hardwood as per the applicable National Competency Standards.

## 10. Plant safety

For guidance on the use of plant, machinery and equipment follow the *Plant Code of Practice*.

A **PCBU** must ensure that:

- Power driven plant is maintained in a safe condition, and a logbook is maintained for each machine.
- All dangerous parts of power driven plant are securely guarded and these guards are effectively maintained.
- A guard that is removed for maintenance or repair is replaced before the machinery, plant or equipment is re-used. A danger/lock-out system must be used.
- Where necessary, machinery steps and handholds are provided and maintained.
- Seat belts are provided on plant.
- Plant is not left unattended when running.
- Hydraulic equipment is bedded or at rest before being maintained or left unattended.
- Powerlines in the vicinity at tree felling, log extraction and log loading must be signposted with safety signage alerting operators to their presence. Signs must comply with *AS 1319: Safety signs for the occupational environment*. Operation of log loading and tree felling plant and equipment must not be undertaken within distances specified in the *Electrical Safety Regulation 2002* (see *section 6* for guidance). Where this is unavoidable, the relevant power authority should be approached to arrange de-energising of the powerlines while harvesting is in progress.
- Operators of log transport machines (i.e. forwarders and truck mounted loaders) must take particular care when travelling under powerlines.
- Powered mobile plant should be fitted with a warning device such as a reversing alarm and/or flashing amber light that can effectively warn people who may be at risk of injury from movement of the vehicle. Warning devices may not be required where documented and strictly enforced procedures are in place to exclude people from the vicinity of machinery (including such features as signage, radio contact protocols etc.). Such procedures should reduce the risk of injury beyond that achieved by warning devices.
- All operators are made aware of the risks from the pressures used in hydraulic systems and the risks to health of handling hydraulic fluids without taking proper safety precautions.

A PCBU must ensure exposure to noise does not exceed 85 dB(a). The *Managing Noise and Preventing Hearing Loss at Work Code of Practice* provides further information to help manage noise at work. Machinery should have cabin noise levels indicated within the cabin, and should indicate whether or not hearing protection is required.

### 10.1 Harvesting plant

The PCBU must ensure harvesting plant, including the operator protective structure, is properly maintained and kept in a safe condition.

**Equipment safety:** Mechanical harvesting plant must be capable of carrying out the relevant work activities such as the felling, processing, and loading logs. The plant must incorporate safety features and provisions as follows:

- falling objects protective structures
- roll-over protective structures
- access steps and handrails
- clear windows with shatterproof glass panes or suitable mesh screens
- adjustable seat with securely attached safety belt, and
- adequate braking system including an independently operating parking brake.

In addition, harvesting machines must carry fire fighting equipment and a first aid kit. An instruction manual and logbook must be provided for details and records of the necessary maintenance procedures.

**Equipment operational checks:** Before work is started, a careful examination of the equipment should be made. The following operational checks should be performed to verify the 'ready-for-work' condition of the equipment:

- indication of oil, water, or fuel leakage
- signs of chassis or engine damage
- condition of tyres or tracks
- faulty or damaged hoses, fittings and pins
- serviceability of guards and shields
- brakes functioning
- levels of coolant, lubrication, hydraulics and transmission
- fuel supply
- air induction system and filters, and
- batteries.

**Operational techniques and equipment limitation:** Operators should be familiar with the operational procedures and be aware of the safe operating limits of the equipment. Safe working methods should include the following:

- The safe working load and other safety limits of the equipment should not be exceeded.
- Auxiliary equipment should be secured when the machine is moving.
- Stability of the equipment should be maintained under all conditions.
- Brakes should be applied to stationary machines.
- Loads of logs should be moved smoothly and low to the ground, and be kept steady.

Any plant used in forest harvesting which requires an operator to be positioned on it during use, must incorporate an appropriate operator protective structure.

Operator protective structures include Roll Over Protective Structures (ROPS), Falling Object Protective Structures (FOPS), or some other structure which will offer protection in a particular application. Incorporation of seat belts is a requirement of ROPS and FOPS standards and the seat belt must be worn by the operator while operating the machine.

Where possible, ROPS should comply with *AS 2294: Earth-moving machinery - Protective structures - General*, or *AS 1636: Tractors - Roll-over protective structures - Criteria and tests*. Where possible, FOPS should comply with *AS 2294: Earth-moving machinery - Protective structures - General*. Seat belts must comply with *AS 2664: Earthmoving machinery – Seat belts and seat belt anchorages*.

Where the Australian Standard cannot be applied (such as ROPS for excavators), or where ROPS and FOPS are not readily available, an operator protective structure, which provides appropriate protection, must be designed to an appropriate standard by a competent person (such as a qualified mechanical engineer). The structure must be manufactured and fitted by a suitably qualified trades person (such as a qualified boiler maker).

The PCBU must ensure that the **operator** of forest harvesting plant:

- Is competent to operate the harvesting plant safely. Competence implies:
  - the operator must be certified as competent (unless undergoing training) using nationally recognised industry competency standards where available
  - the operator has received instruction and training from an experienced certificated operator on all aspects of the safe usage of forest harvesting plant
  - the operator must hold an appropriate current driver's licence if driving the forest harvesting plant on public roads.
- Is appropriately attired in personal protective equipment that complies with section 9.1 – Personal protective equipment.
- If the operator is a trainee, the trainee may operate forest harvesting plant while under the supervision of an experienced certificated operator.

## 10.2 Hand held chainsaws

A PCBU must ensure a hand held chainsaw used by a worker is maintained in a safe condition.

Only people trained to the standard outlined in *AS 2727: Chainsaws - Guide to safe working practices* may operate chainsaws in forest harvesting operations.

The chainsaw must be kept in good condition, and complies with *AS 2727*. All chainsaws must be equipped with a reliable off switch, chain catcher, rear hand guard, anti-vibration handle mountings, throttle lockout, efficient muffler, chain brake and front hand guard. For further guidance, see *AS 2726: Chainsaws - Safety requirements – Chainsaws for general use*.

## 11. Manual tasks

Manual tasks are those activities that involve the use of force to move, hold, carry or throw an object.

These activities can cause injury if they involve:

- high force (e.g. lifting heavy tree trunk portions)
- awkward postures (e.g. reaching above and to the side of shoulder height)
- static postures (e.g. sitting or standing in one position for long periods), and
- performing a movement repeatedly (e.g. chainsaw operation for full shift).

Manual tasks can cause injury immediately (e.g. lifting something heavy or awkward and injuring your back) or over time through gradual wear and tear on the body (e.g. damaging a shoulder/s from repetitive movements over a long period).

Manual tasks can lead to:

- sprains and strains of muscles
- injuries to muscles, discs and ligaments in the back, and
- injuries to nerves, ligaments and tendons in joints (e.g. wrist, shoulder, knee).

While some people are at higher risk of suffering these types of injuries, anyone performing manual tasks can be injured. To decrease the likelihood of injuries from manual tasks, wherever possible the harmful task should be eliminated completely. This is not always possible though, so changes need to be made to the task to reduce the risk of injury.

Where a lot of **force** is involved:

- reduce the weight of the item being moved
- provide mechanical aids for moving heavy items
- ensure that equipment used for cutting is sharp as this will dramatically reduce the force required to be exerted to make the cut
- reduce the amount of time each person spends performing forceful tasks (such as chainsaw operation for lengthy periods)
- rotate people between tasks requiring significant forces and “lighter” tasks.

Where **awkward or static postures** are involved:

- where possible, adjust the height of the work to minimise the bending and twisting required
- ensure that workers are not working for extended periods with arms above shoulder height, especially when carrying/suspending weights (such as a chainsaw), and
- encourage workers to take short breaks.

Where **repetitive movements** are involved:

- use machines to perform the task when possible
- rotate people between repetitive and non-repetitive tasks, and
- train all employees in all the tasks that they do to make sure that they are doing them in the safest and most efficient way.

The *Hazardous Manual Tasks Code of Practice* provides a comprehensive guide to managing the manual task activities at a workplace. It provides essential information on identifying, assessing and controlling hazardous manual task activities.

## 12. Chemicals

Fuel, diesel, engine oil, chain oil, and hydraulic fluid are some of the chemicals usually used in forest harvesting. Other chemicals may also be used.

Chemicals are sometimes used in the forest prior to forest harvesting. If this is the case, appropriate controls must be established, and documented in the harvesting plan, to prevent possible health problems of workers that may arise from contact with residues from the chemical.

When working with any chemical, workers need to know how to protect themselves and others from harm when using it. Workers can do this by:

- identifying the chemicals being used
- protecting themselves and others when working with chemicals, and
- getting advice about the health effects of chemicals.

Work safely with chemicals by following these steps:

**Read the label:** Always read the label on the container to find out:

- the trade name of the chemical
- the proper chemical name and ingredients
- about any possible harmful effects, and
- how to use the chemical safely.

If there is no label, check with the chemical supplier before using the chemical.

**Ask for the SDS:** More information about a chemical is available from the Safety Data Sheet (SDS). This gives more details about a chemical than the product label, and is available from the chemical supplier. The SDS will explain:

- the chemical and trade names
- how the chemical may be a danger to health
- about using and handling the chemical safely
- about first aid in case of an accident.

An SDS must be held at work for every hazardous chemical used at work. If hazardous chemicals are used, read the label and the SDS. Use a safer chemical if practical to do so.

**Ask questions:** Before asking for advice about a chemical, find out:

- the correct name of the chemical, not just the trade name, from the label
- if it has a 'hazardous chemicals' or 'poisons' label, or if the word 'hazardous' is on the label
- the name of the manufacturer of the chemical, and
- how and where the chemical is being used.

**Safe storage, handling and disposal of chemicals:** The *Work Health and Safety Regulation 2011* and the *Hazardous Chemicals Code of Practice* explain how to store, handle and dispose of chemicals safely. The SDS also gives advice on storage. Check that the chemicals being used are stored safely.

**Seek first aid or medical attention:** If a worker feels unwell when working with a chemical, they should seek first aid or go to see a doctor immediately.

## 13. Fatigue

Fatigue is an acute or ongoing state of tiredness that affects worker performance, safety and health, and requires rest or sleep for recovery.

Fatigue is associated with health and safety risks in the workplace as it affects the physical and mental capacities required for the performance of work and can lead to increased workplace incidents. The build-up of sleep debt can result in errors of judgement that may lead to injury or death. Work-related fatigue affects the worker's health and safety, as well as the health and safety of others.

The longer term health effects of fatigue are less well known, but prolonged sleep loss from chronic sleep deprivation, due to long periods of night and morning shiftwork, has been associated with increased rates of gastrointestinal and cardiovascular illness and even death.

### **Fatigue can be caused by:**

- mentally or physically demanding work (high and low demands)
- long periods of time awake
- inadequate amount or quality of sleep
- inadequate rest breaks
- disruption of the body clock (i.e. working when we would normally be asleep or sleeping when we would normally be awake)
- environmental stresses (e.g. heat, noise and vibration), and
- work schedules and payments that provide incentives to work longer and harder than is safe.

### **Possible indicators of workplace fatigue include:**

- feeling drowsy/relaxed
- feeling tired or sleepy, or not feeling refreshed after sleep
- blurred vision
- increased irritability
- finding it difficult to keep your eyes open
- taking more frequent naps during leisure hours, or falling asleep at work
- finding it hard to concentrate and/or making more mistakes than usual
- excessive head nodding or yawning
- increased absenteeism
- repeatedly moving off track while driving vehicles and plant, and
- near misses.

This list is not exhaustive and the presence of these indicators does not necessarily mean that fatigue is a risk. Management of fatigue should not just rely on workers recognising these symptoms, as the symptoms on their own have been found to be unreliable indicators of fatigue. The PCBU must assess the risk and implement control measures as required.

### **Managing workplace fatigue can:**

- reduce workplace incidents and work-related claims
- reduce absenteeism and staff turnover
- reduce damage to plant and equipment, and associated costs
- improve work quality, performance and productivity.

### **A basic fatigue management program is made up of:**

- an outline of responsibilities
- consultation and communication with everyone in the supply chain
- the process to manage fatigue (e.g. hazard identification, risk assessment and risk control)
- training and information on fatigue
- reporting incidents and other workplace records, and
- monitoring the program, including monitoring the health of workers.

## **Fatigue risk factors**

To assess the factors or hazards that contribute to fatigue risk, a PCBU should consider the:

- **combination of hazards:** (e.g. long working hours doing heavy, physical work in hot conditions)
- **time of day:** (e.g. continuous long shifts of more than 10 hours that extend into the night (midnight to 6 am) or early afternoon (2 pm to 4 pm), which are periods of low alertness)
- **length of time working:** (e.g. long periods doing physically and mentally demanding work), and
- **lack of opportunity to recover from fatigue:** (e.g. working continuously without a short break).

If these risk factors are present, the risks should be controlled. The more risk factors there are, the higher the risk.

## **Controlling fatigue risks**

The best way to control fatigue risks is to try to eliminate the hazards or factors at the source first. If that is not practical, use methods that reduce the risk.

No worker should work more than 12 hours in any 24 hours, and if working at night, it should be shorter than this. A PCBU must not require any forest harvesting worker to work more than 12 hours in any shift.

An example of reducing a risk factor would be to schedule later starting times so that maximum night sleep can be taken before starting work. Better planning and work scheduling (e.g. having a flexible work schedule to allow for both production targets and likely delays) is the best way to build in a safety margin and manage fatigue risks.

In some cases, such as in hot working conditions, the source of the hazard can not be changed, but the risks can be reduced through better planning, such as:

- building flexibility into contractual arrangements for delays and disruptions
- scheduling work to avoid the hottest parts of the day
- making sure workers take regular breaks sheltered from extreme heat or cold
- planning to have the log landings in the shade during summer
- working two or three faces of the harvesting site, to facilitate working in the shade during the afternoon, and
- ensuring workers have ready access to fluids to reduce the likelihood of dehydration, which can speed up the onset of fatigue.

In the case of cab conditions, reduce the risk by ensuring that:

- ventilation and cooling levels are adequate
- seats are adjustable, and
- noise and vibration levels are minimised.

Because fatigue is caused by a combination of factors, the most effective way to manage it is by using a combination of risk control measures. Everyone has a role to play in managing fatigue.

## **Basic principles for reducing fatigue in forestry**

1. Understand that everyone in the harvesting and cartage supply chain has a role to play in minimising fatigue.
2. Build allowances into contracts and schedules for the nature of the harvesting area and for typical delays and disruptions.
3. Ensure that working arrangements do not provide incentives for working practices or working hours that create fatigue risks.
4. Organise schedules to allow workers the opportunity to get at least 6 hours sleep every night.
5. Understand that schedules should also take into account the requirements of daily living (e.g. eating, hygiene, getting to and from base, family life).
6. Compensate long shifts and working weeks with longer recovery periods before the next shift or week.

7. Limit the build-up of sleep debt by allowing for at least two consecutive full nights sleeps every week and having at least one work free day a week.
8. Ensure workers take regular rest breaks, particularly when working in extreme conditions.
9. Use short rest breaks, nutritious food and hydration as short-term measures, but understand they have to be backed up by good job planning.
10. Understand that personal awareness of tiredness and fatigue is never a substitute for a work pattern that allows for short rest breaks and regular sleep.

### **13.1 Hints on minimising fatigue for forest harvesting workers**

Sometimes the things you do outside of work lead to you being fatigued at work. If you're getting overtired when working, it may be because you're not getting enough good sleep, you're dehydrated or you're not eating the right foods.

#### **Sleep and fatigue**

- The best sleep is night sleep.
- Make sure your family and friends understand the need for you to get good quality sleep.
- If sleeping during the day, do all you can to simulate darkness, and allow more time for sleep than you would for night sleep.
- Try to have a quiet, peaceful place for sleep and stick to a routine if possible.
- Most people need 7–8 hours sleep a day, so keep to this routine in your time off.
- Plan and schedule family, social and work commitments in advance.
- Excessive snoring, irregular breathing during sleep or just an inability to get to sleep can lead to fatigue. You may need to get advice from your doctor if you have these problems.
- Don't take sleeping pills without first discussing it with your doctor.

#### **Drugs and alcohol**

- Alcohol not only impairs work performance, but also affects the quality of sleep and contributes to dehydration.
- Avoid drinking an excessive amount of alcohol the night before work.
- Stimulant drugs only delay the need for sleep.
- Common stimulants such as coffee, tea or other caffeinated drinks should be avoided before going to bed so you can get as much quality rest as possible.

#### **Medical conditions**

- Advise your PCBU of any medical condition that may limit your ability to work or increase your susceptibility to fatigue.
- Some medications may cause drowsiness and you should discuss alternatives with your doctor or pharmacist.
- Use of medications needs to be reported to your PCBU if they are likely to have an effect on driving, other forest jobs or on other workers.

#### **Fluids, nutrition and fatigue**

- Outdoor work is very dehydrating, especially in summer. Have a nourishing drink before starting work, particularly if you were drinking alcohol the night before.
- Ensure adequate fluid intake throughout the day and drink before you are thirsty.
- Dark urine and infrequent urinating indicate you are suffering from dehydration.
- Avoid drinks that are high in sugar. Alternate between water and flavoured drinks.
- Diets high in complex carbohydrates are good for sustained energy.
- Have a good breakfast (e.g. toast, cereal, eggs, juice and fruit).
- Minimise fatty and sugary foods. Foods high in sugar will give a fast, short burst of energy followed by a big slump.
- Try to maintain consistent intervals between meals.

#### **Fitness and fatigue**

- Keep up a basic level of fitness to protect your health.

- Physical activity helps keep weight down. Obesity contributes to sleep problems such as obstructive sleep apnoea.

## 14. Heat stress

Heat stress occurs when heat is absorbed from the environment faster than the body can get rid of it. The resulting strain on the body comes from the combined contributions of job (e.g. work activity), environmental factors (e.g. air temperature, humidity, air movement, radiant heat), and worker factors (e.g. extent of acclimatisation and hydration).

In Queensland, especially between October and April, sudden hot spells are responsible for most cases of heat illness and discomfort. Workers returning from holidays have lost the benefits of acclimatisation and humidity levels can be high as well. When humidity is high sweat will not evaporate as quickly, so our ability to lose heat is reduced.

**To avoid heat stress:** the golden rule for workers in hot conditions who may be feeling weak or faint is to stop work immediately and cool down.

The human body maintains a fairly constant internal temperature, even though the body may be exposed to varying environmental temperatures. To keep internal body temperatures within safe limits in hot conditions, the body must get rid of its excess heat. It does this by varying the blood flow to the skin and by the evaporation of sweat. These automatic responses usually occur when the temperature of the blood exceeds 37°C and are controlled by the brain.

Evaporation of sweat cools the skin eliminating large quantities of heat from the body. Sweating does not cool the body unless the moisture is removed from the skin by evaporation. Cooling efficiency is greatly reduced and dehydration is increased when sweat drips from the body. As humidity increases, the body's ability to cool through evaporation decreases. Much of the blood flow within the body is re-directed towards the skin to assist heat loss from the body. This reduces the availability of blood in active muscles, the brain and other internal organs.

Consequently, working in hot environments causes strength to decline, and fatigue occurs sooner than it would otherwise. Alertness and mental capacity also may be affected.

When conditions become increasingly hot, the most common health problems to occur are fainting, transient heat fatigue and heat rash. However, with excessive exposure to heat, especially for those who are overweight, elderly or those on specific medications, more serious heat illnesses such as heat cramps, heat exhaustion and heat stroke may occur.

### Heat illnesses

**Prickly heat:** is an intense, itchy red skin rash caused by a blockage of the sweat ducts from prolonged wetting of the skin. It should be treated by keeping the skin cool and dry, wear suitable clothing and stop hot work until it has settled down.

**Heat fainting:** Blood vessels in the extremities particularly the legs, dilate to increase heat transfer to the skin, causing reduced return blood flow to the heart. In turn, this temporarily reduces the blood flow to the brain and the person faints.

**Heat cramps:** These painful muscle cramps can occur alone or in combination with other heat disorders and usually occur in un-acclimatised workers.

**Heat exhaustion** is a serious heat illness which may progress to heat stroke if not promptly treated. This is most common in people who are not acclimatised. A person may complain of weakness or nausea or giddiness and could appear pale, breathless and exhausted. The skin is usually sweating.

First aid treatment for fainting, cramps or exhaustion include:

- laying the person in the shade

- discarding clothing
- providing cool water, and
- fanning vigorously.

**Heat stroke** is a medical emergency with a high fatality rate in untreated cases. It is caused by a rise in core body temperature to dangerous levels of 41°C and higher. Normal body temperature is 37°C.

The person becomes confused, staggers and may collapse. The skin may be moist or dry (no sweating, in which case cooling does not occur).

Anyone doing hot work who exhibits confusion and odd behaviour should be treated initially as having heat stroke.

**Treatment for heat stroke:** urgent first aid is required. Remove clothing, wet skin and fan vigorously to increase evaporation. Call an ambulance. These cases require intravenous fluids urgently.

Factors contributing to heat problems include:

#### **A. Job factors**

- work of a strenuous nature
- work that is sustained for extended periods
- awkward or uncomfortable body postures, and
- inadequate cooling off or rest periods.

#### **B. Environmental and seasonal factors**

- high air temperature
- radiant heat from hot objects such as machinery
- radiant heat from working in the sun
- higher relative humidity levels, and
- low air movement.

#### **C. Worker factors**

- excessive or inappropriate clothing, protective or otherwise
- incomplete acclimatisation
- dehydration which can be caused by poor diet, vomiting, diarrhoea, alcohol and caffeine (diuretics) consumption, and insufficient drinking
- medical conditions (e.g. heart problems, diabetes, hypertension, or fever caused by infections)
- medication for medical conditions mentioned above (tranquillisers, travel sickness remedies and others may also cause impaired temperature regulation)
- advancing age
- being overweight
- poor physical fitness
- inadequate salt in the diet, and
- tiredness or being run down.

# Appendices

**Appendix 1: Dictionary**

**Appendix 2: Risk management**

**Appendix 3: Sample harvesting plan**

**Appendix 4: Audit checklist**

**Appendix 5: Accident investigation**

**Appendix 6: Snigging methods and risks**

# Appendix 1: Dictionary

**Act** means the *Work Health and Safety Act 2011* unless otherwise stated.

**Bight** (in skyline or cable logging) means a hazard zone within the angle of a rope passing through a block or around any obstacle.

**Choker man** means a skidder operator's, skidder's, or yarder's offsider, who hooks up logs to skidder.

**Dangerous incident** means an incident in relation to a workplace that exposes a worker or any other person to a serious risk to a person's health or safety emanating from an immediate or imminent exposure to—

- (a) an uncontrolled escape, spillage or leakage of a substance; or
- (b) an uncontrolled implosion, explosion or fire; or
- (c) an uncontrolled escape of gas or steam; or
- (d) an uncontrolled escape of a pressurised substance; or
- (e) electric shock; or
- (f) the fall or release from a height of any plant, substance or thing; or
- (g) the collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be authorised for use under a regulation; or
- (h) the collapse or partial collapse of a structure; or
- (i) the collapse or failure of an excavation or of any shoring supporting an excavation; or
- (j) the inrush of water, mud or gas in workings, in an underground excavation or tunnel; or
- (k) the interruption of the main system of ventilation in an underground excavation or tunnel; or
- (l) any other incident prescribed under a regulation;

but does not include an incident of a prescribed kind.

**Dry stag** or **stag** means a dead or dry standing decayed tree. Dead or dry standing decayed trees are particularly dangerous as they can fall at any time, particularly if they are disturbed during a forest harvesting operation.

**Felling** or **falling** includes the cutting, chopping or pulling down of standing trees for commercial purposes.

**Felling zone** means the area in all directions around the tree being felled equivalent to a radial distance of two times the height of the tallest tree within the felling zone.

**Feller** means the person who does the felling.

**Forest harvesting** includes the process of felling trees and moving of logs or segments of logs from or within a harvesting area.

**Forwarding** means the extraction of logs from the harvesting area where the logs are carried clear of the ground by mobile mechanical plant.

**FOPS** means a Falling Object Protective Structure designed, built and fitted to protect the operator of a machine from a falling object, when the operator is wearing a seat belt.

**Guy** (guyline, guyrope) means a length of anchored rope attached near the top of a spar, gin pole or tower. The guy opposes the force of the load during hauling and loading.

**Harvesting area** means the area generally covered by a harvesting plan. It contains one or more harvesting sites, and includes other work such as marking and roadworks. Caution signs are usually used at entry points to the area (such as on roads).

**Harvesting plant** includes any plant, machinery or equipment used in forest harvesting.

**Harvesting site** means the site in which forest harvesting is actively in progress. This area must be signposted with danger signs.

**Landing or Log landing** means a log landing (an area where logs are snigged to for temporary storage, further merchandising, and loading onto transport).

**Manual harvesting** means the harvesting of trees by hand held tools, for example, chainsaws.

**Merchandising area** means an area used to cut logs to length, and otherwise make them suitable for transport.

**Must** means a mandatory requirement under this Code of Practice.

**Pad** means a log landing (an area where logs are snigged to for temporary storage, further merchandising, and loading onto transport).

**Personal protective equipment** includes any clothing, equipment and substance designed—  
(a) to be worn by a person, and  
(b) to protect the person from risks of injury or disease.

**Plant** includes—

- (a) machinery, equipment, appliance, pressure vessel, implement and tool,
- (b) personal protective equipment, and
- (c) a component of plant and a fitting, connection, accessory or adjunct to plant.

**Ramp** means a log landing (an area where logs are snigged to for temporary storage, further merchandising, and loading onto transport).

**Regulation** means the *Work Health and Safety Regulation 2011* unless otherwise stated.

**ROPS** means a Roll Over Protective Structure designed, built and fitted to protect the operator of a machine during a roll-over, when the operator is wearing a seat belt.

**Serious injury or illness** of a person means an injury or illness requiring the person to have—

- (a) immediate treatment as an in-patient in a hospital; or
  - (b) immediate treatment for—
    - i. the amputation of any part of his or her body; or
    - ii. a serious head injury; or
    - iii. a serious eye injury; or
    - iv. a serious burn; or
    - v. the separation of his or her skin from an underlying tissue (for example, degloving or scalping); or
    - vi. a spinal injury; or
    - vii. the loss of a bodily function; or
    - viii. serious lacerations; or
    - ix. medical treatment within 48 hours of exposure to a substance;
- and includes any other injury or illness prescribed under a regulation but does not include an illness or injury of a prescribed kind'.

**Should** means a recommended requirement under this Code pending an appropriate assessment of the risks.

**Skidder** means both a rubber tyred tractor and a crawler tractor.

**Widow maker** means a limb of a tree or similar object which falls out of a tree without warning.

## Appendix 2: Risk management

This chapter should be read in conjunction with the *How to Manage Work Health and Safety Risks Code of Practice*.

Risk management is the process of identifying, assessing, and controlling risks so they are eliminated or reduced. The outcomes, decisions or action plans coming out of the risk management process must be documented. In forest harvesting work, this must be part of the harvesting plan.

Before commencing harvesting, usually when formulating the harvesting plan, assess the conditions likely to affect the health and safety of people employed to do the harvesting. This assessment must include forest conditions, weather conditions, ground conditions, terrain, tools, equipment and plant to be used.

The PCBU must ensure all work, whether manual or mechanical, is carried out by people fully trained in the required techniques and safe work practices, and who are trained in the use of the equipment to be used and the tasks to be performed.

### Hazard identification

Examine all potential health and safety hazards relating to people, equipment, materials, and environment.

There are a number of ways to identify potential sources of injury or disease. Selection of the appropriate procedure will depend on the type of work processes and risks involved. Local knowledge and an understanding of the forest type must be used if available. Other methods of identifying forest harvesting risks include:

- Using a walk-through survey of the harvesting area, and a map of the area, to identify sources of risks. It is particularly helpful if the survey is conducted by the PCBU in conjunction with workers. For more complex work processes, the use of an outside expert may be required.
- Reviewing 'near miss', accident and injury data relating to forest harvesting to help identify problem areas. However, the use of data should not be solely relied on to identify risks. Using data requires a suitable reporting and recording system to be in place, as well as a certain number of incidents, to be reliable. Also, such data often covers losses only, and not potential losses, injuries and diseases.
- Evaluating work processes using risk analysis to determine and evaluate the tasks associated with the work processes that give rise to risks.
- Consulting with workers is one of the easiest and most effective means of identifying risks. Workers are usually well aware of what can go wrong and why, based on their experience with a job.
- Using Safety Data Sheets and product labels as sources of information regarding hazardous chemicals and their control.
- Consulting with specialist practitioners and representatives of industry associations, unions and government bodies who may be of assistance in gathering health and safety information relevant to forest harvesting risks or injuries.

The hazard identification stage of the risk management process should result in a list of risk sources, the particular form in which that risk occurs, the areas where the risk occurs, and the people exposed to that risk.

## Risk assessment

Before commencing forest harvesting, a PCBU must assess the risks to workers and any person who may be affected by forest harvesting in relation to:

- the potential sources of injury and illness
- the number of people involved
- the skill and experience of the people involved
- the general condition of the terrain (e.g. state of ground, position of stag trees)
- the type of work to be performed
- the work practices in use, and
- the type of plant, machinery and equipment to be used.

The assessment should be part of the process for developing a harvesting plan, and will identify the potential injuries and diseases which may result from the risks identified.

The most common injury or disease risks are those which result in:

- strain/overuse injuries and disease to back, shoulder and wrist
- cut and abrasion injuries to the eyes, hands, fingers, feet and head
- impact and crush injuries to the head, feet and fingers
- burns (by heat, light or chemicals) to the eyes, feet and skin
- noise induced hearing loss, and
- toxic effects (short or long term) to respiratory system or skin, resulting in poisoning, cancers, or dermatitis.

The risk assessment should result in a list of injury and disease consequences arising from the risks identified. In general, these should be stated from the most to the least serious (e.g. from 'death by crushing' to 'abrasion'). The potential for fatal injury should be considered for each risk identified.

## Risk control

Outlining the methods of risk control is the primary function of the harvesting plan. The controls used to eliminate or minimise the risk must be clearly stated in the harvesting plan.

Having identified the hazards and assessed the risks, determine the control measures to be taken to eliminate or minimise the risks. The PCBU is responsible for ensuring risks are controlled, and for ensuring the method of control is effective.

Control measures must be chosen and implemented to eliminate or minimise risks. Control measures can be categorised into the following types:

- **Elimination** - removes the hazard completely.
- **Substitution** - replacing the material or process with a less hazardous one.
- **Redesign** - redesigning equipment or work processes to reduce the risk.
- **Separation** - isolating the risk from persons by enclosing or guarding.
- **Administration** - adjusting the time or conditions of risk exposure.
- **Personal protective equipment** - using appropriately designed and properly fitting equipment where other controls are not practical.

Preferred methods of controlling risks are elimination, substitution, redesign or separation. These controls generally eliminate or minimise risk in a more reliable manner than administration or personal protective equipment.

Personal protective equipment must only be used where other controls are not practical in the circumstances. The practicality of corrective measures is determined by issues such as:

- the nature of the work or the work process concerned
- the severity of any potential injury or disease
- the state of knowledge about the injury or disease related to the work or process
- information available to PCBUs about methods of preventing injury or disease associated with a particular hazard or risk

- the availability and suitability of methods to prevent, remove or mitigate causes of injuries or diseases associated with a hazard or risk, and
- whether the costs of preventing, removing or mitigating that injury or disease are prohibitive in the circumstances.

Risk management is an ongoing process. Whenever circumstances change, the process of hazard identification, risk assessment and deciding on control measures must be repeated. The harvesting plan must be updated, and workers affected by the change must be informed of any new requirements.

## Appendix 3: Sample harvesting plan

<b>1. Description</b>	
This plan involves the cutting, skidding, cross-cutting, loading and hauling of:	
Species:	
Type of operations:	

<b>2. Location</b>	
Lot number:	
Logging area:	
Compartment(s):	
Property description:	
Owner's name and address:	
Purchaser's name and address:	
Relevant dates:	

<b>3. Resource details</b>	
Area to be harvested:	
Species or types to be harvested:	
Estimated volume:	
Minimum D.B.H.:	
Small end diameter cutting limit:	
Maximum stump height:	

<b>4. Area description</b>	
Terrain type:	
Slope:	
Soil type:	
Erosion class:	
Unusual safety hazards:	
Wet weather area available?	
Chemicals used previously on site:	

<b>5. Harvesting requirements</b>	
Operation type:	
Logging equipment restrictions:	
Equipment to be used for cutting:	
Equipment to be used for snigging:	
Equipment to be used for loading:	
Equipment to be used for hauling:	
Roads:	
Log landings:	
Snig tracks:	
Buffer strips and stream crossings:	
Special values:	
Utilities (such as powerlines):	

<b>6. Safety risk assessment</b>	
Equipment:	
Fire protection equipment:	
Operator's details:	
Terrain:	
Merchandising area:	
Truck route:	

Emergency pick-up points:	
Other hazards:	

<b>7. Order of working</b>

<b>8. Plan of operations</b>

<b>9. Map attached</b>
A map of the area, identifying significant hazards, areas to be harvested, track and road routes, extraction paths, log landings etc. is to be attached.
Mark emergency pick-up points on the map, and ensure that all workers are familiar with them. Also, provide this information to emergency services where appropriate.

<b>10. Agreement</b>	
Logging plan prepared by (name):	
(Signature):	
Owner's signature:	
Purchaser's signature:	
Date:	

## Appendix 4: Audit checklist

Issue	Yes/No/NA	Comments
<b>Harvesting plan and area safety management</b>		
Has the harvesting plan been prepared?		
Has the risk of unauthorised visitors been minimised?		
Does the harvesting plan denote issues specific to the harvesting area including: <ul style="list-style-type: none"> <li>• old mine shafts</li> <li>• wells</li> <li>• tunnel erosion</li> <li>• narrow bridges</li> <li>• dead trees</li> <li>• excessive undergrowth</li> <li>• chemicals used in the harvesting area which may have an adverse health impact on forest harvesting workers</li> <li>• other issues which are a potential health or safety hazard.</li> </ul>		
Is the harvesting plan updated when other issues are identified subsequent to the commencement of harvesting?		
<b>Felling</b>		
Are manual fellers certified to the appropriate level for tree felling and cross cutting with a chainsaw?		
Do fellers wear appropriate PPE? helmet safety boots high visibility clothing cut-resistant leg protection (trousers or chaps) hearing protection eye protection		
Are hung-up trees marked off?		
Is there a method for safely bringing down hang-ups when they occur?		
Do fellers keep the required distance away from energised powerlines?		
Are chainsaws maintained to manufacturers' recommendations?		
Are signs and/or road barriers erected in line with the harvesting plan?		
Are the fellers familiar with the harvesting plan?		
Do the fellers use safe work practices?		
Is there evidence on stumps or logs that inappropriate manual felling techniques, such as inappropriate scarfing, are used?		

<b>Extraction / Snigging</b>		
Is all snigging machinery fitted with ROPS, FOPS and a seat belt?		
Does the operator wear the seat belt whenever the machinery is in use?		
Do sniggers and their offsideers wear appropriate PPE? helmet safety boots high visibility clothing cut-resistant leg protection (trousers or chaps) hearing protection eye protection		
Is snigging machinery maintained to manufacturers' recommendations?		
Are chains and wire rope inspected regularly, and replaced as required?		
Are forwarders working at least the required distance away from energised powerlines?		
Are sniggers and/or their offsideers using unsafe work practices?		
Are the sniggers and their offsideers familiar with the harvesting plan?		
<b>Skyline / cable logging</b>		
Is the minimum grade of all ropes 1770 or better?		
Are anchor ropes of the same capacity as the skyline rope?		
Is the clearance between the ground and the skyline sufficient to prevent logs being snagged?		
If standing trees are used for tail holds or anchor points, are they at least 2 tree lengths away from the skyline, skyline rack or any work area?		
Does the choker man always approach and choke logs from the safest end (usually uphill)?		
Does the hauler operator re-land logs that have landed crossed or unsafely?		
Are there always at least 5 laps of rope on the drum during hauling operations?		
Is a safe and effective signalling system in place between the hauler operator and the choker man?		
When work is done in the bight of ropes or under ropes, are they always stationary?		
Are the other work practices used by skyline / cable logging workers safe?		
<b>Log landing</b>		
Is the log landing located away from powerlines and dead trees?		
Is the log landing positioned appropriately, and reasonably level?		
Is all loading machinery fitted with ROPS, FOPS and seat belts?		
Does the loader operator wear the seat belt whenever the machinery is in use?		
Do loader operators wear appropriate PPE? helmet safety boots		

high visibility clothing hearing protection		
Do truck drivers wear appropriate PPE on a log landing? helmet safety boots high visibility clothing hearing protection		
Is loading machinery maintained to manufacturers' recommendations?		
Is appropriate signage in place on the log landing?		
Is the loader fitted with warning lights or reversing horns?		
Are truck drivers and other personnel on the log landing in appropriate positions while log loading is undertaken?		
Are unsafe work practices being used on the log landing?		
Are the loader operator and other log landing workers familiar with the harvesting plan?		
<b>Log transport</b>		
Have the haulage routes been planned and other traffic made aware of potential problems (e.g. school bus operators)?		
Is truck speed appropriate for the road conditions?		
Do loaded trucks comply with load limit, configuration and restraint requirements?		
Are all drivers adequately trained and experienced in log transport?		
Are truck drivers using safe work practices?		
Are the truck drivers familiar with the harvesting plan?		
<b>Accidents and emergency</b>		
Are the number and location of workers trained in First Aid appropriate?		
Are the number, distribution and contents of first aid kits available on-site adequate?		
In case of an emergency, do all workers know what to do?		
Is the emergency plan incorporated in the harvesting plan?		
<b>Information and training</b>		
Do all operators have current certificates where required?		
Have all personnel been given safety induction training?		
Is the harvesting plan available to all workers?		
Is the harvesting plan discussed in detail with workers before harvesting commences, and during the on-site induction of each new worker?		
Are workers informed about changes to the harvesting plan when they are made?		
<b>Personal Protective Equipment (PPE)</b>		
Is the PPE regularly checked, cleaned and maintained?		
Are all workers trained to use their PPE?		

For those risks for which you use PPE, is it the most suitable means of reducing the health and safety risks?		
<b>Plant safety</b>		
Is all plant maintained to manufacturer's requirements?		
Are maintenance records available and up to date?		
Does plant design and guarding meet current standards?		
Are there any vibration hazards?		
Are safe systems of work in place?		
<b>Manual tasks</b>		
Are the risks associated with manual tasks, or repetitive activities, minimised?		
Is training provided to workers to help minimise manual task risks?		
Are the lightest and least vibrating chainsaws used for the work?		
<b>Chemicals</b>		
Are hazardous chemicals used?		
If so, are the SDSs available to workers?		
Is appropriate PPE used when handling hazardous chemicals?		
Does storage of all chemicals comply with requirements? (including fuel storage, oils in labelled containers, etc)		

## Appendix 5: Accident investigation

Accident prevention is the key to minimising injury to people at work. Learning from past accidents is one of the essential elements in accident prevention. This appendix outlines procedures which can be followed for all accidents resulting in employee injury or property damage. Other procedures may also be acceptable.

### PCBU's responsibilities:

- Consider providing accident prevention and investigation training for supervisors.
- Ensure all accidents and injuries are investigated.
- Ensure immediate and long term corrective actions are taken to prevent recurrence.
- Maintain accident reports permanently on file.
- Provide all necessary medical care for injured workers.

### Worker's responsibilities:

- Report all accidents and injuries to the supervisor immediately.
- Assist as requested in all accident investigations.
- Report all hazardous conditions and near misses.

### Supervisor involvement

If possible, a person familiar with the work environment and tasks should conduct the accident investigation. The supervisor must take the accident situation under their control and immediately eliminate or control the hazards.

### Immediate steps:

1. Provide first aid for any injured persons.
2. Eliminate or control the hazards.
3. Document accident scene information to determine the cause.
4. Interview witnesses as soon as possible.

### 1. Accident prevention

Accidents are usually complex. An accident may be caused by ten or more events. A detailed analysis of an accident will normally reveal three cause levels: basic, indirect and direct. At the lowest level, an accident results only when a person or object receives an amount of energy or hazardous material that cannot be absorbed safely. This energy or hazardous material is the **DIRECT CAUSE** of the accident. The direct cause is usually the result of one or more unsafe acts or unsafe conditions, or both. Unsafe acts and conditions are the **INDIRECT CAUSES** or symptoms. In turn, indirect causes are usually traceable to poor management policies and decisions, or to personal or environmental factors. These are the **BASIC CAUSES**.

In spite of their complexity, most accidents are preventable by eliminating one or more causes. Accident investigations determine not only what happened, but also how and why. The information gained from these investigations can prevent a recurrence of similar or perhaps more disastrous accidents. Accident investigators are interested in each event as well as in the sequence of events that led to an accident. The accident type is also important to the investigator. The recurrence of accidents of a particular type, or those with common causes, show areas needing special accident prevention emphasis.

## 2. Investigation procedures

The actual procedures used in a particular investigation depend on the nature and results of the accident. Generally, the following steps are appropriate:

1. **Do not disturb** the scene unless a hazard exists.
2. **Define the scope** of the investigation.
3. **Select** the investigators. Assign specific tasks to each (preferably in writing).
4. **Present** a preliminary briefing to the investigator or investigating team including:
  - description of the accident, with damage estimates
  - normal operating procedures
  - maps (local and general)
  - location of the accident site
  - list of witnesses
  - events that preceded the accident.
5. **Visit** the accident site to get updated information.
6. **Inspect** the accident site and:
  - Secure the area. Do not disturb the scene unless a hazard exists.
  - Prepare the necessary sketches and photographs. Label carefully, and keep them accurate.
7. **Interview** each victim and witness. Also interview those who were present before the accident and those who arrived at the site shortly after the accident. Keep accurate records of each interview. Use a tape recorder if desired and if approved.
8. **Determine**:
  - what was abnormal before the accident
  - where the abnormality occurred
  - when it was first noted
  - how it occurred.
9. **Analyse** the data obtained in step 8. Repeat any of the prior steps, if necessary.
10. **Determine**:
  - why the accident occurred
  - a likely sequence of events and probable causes (direct, indirect, basic)
  - alternative sequences.
11. **Check** each sequence against the data from step 8.
12. **Determine** the most likely sequence of events and the most probable causes.
13. **Conduct** a post-investigation briefing, with workers, contractors and any others involved.
14. **Prepare** a summary report, including the recommended actions to prevent a recurrence. Distribute the report to appropriate people, to maximise the prevention of a recurrence.

An investigation is not complete until all data are analysed and a final report is completed. In practice, the investigative work, data analysis, and report preparation proceed simultaneously.

### Fact-finding

Gather evidence from any available sources during an investigation:

- Get information from witnesses and reports as well as by observation.
- Interview witnesses as soon as possible after an accident.
- Inspect the accident site before any changes occur.
- Take photographs and make sketches of the accident scene.
- Record all relevant data on maps.
- Get copies of all reports. Documents containing normal operating procedures, flow diagrams, maintenance charts, or reports of difficulties or abnormalities are particularly useful.
- Keep complete and accurate notes. Record pre-accident conditions, weather conditions, the accident sequence, and post-accident conditions.

- Document the location of victims, witnesses, machinery, energy sources, and hazardous materials.

### Interviews

If possible, experienced personnel including the Workplace Health and Safety Representative and a person with a legal background should conduct interviews. In conducting interviews:

1. Appoint a speaker for the group (if there is more than one interviewer).
2. Get preliminary statements as soon as possible from all witnesses.
3. Locate the position of each witness on a master chart (including the direction of view).
4. Arrange for a convenient time and place to talk to each witness.
5. Explain the purpose of the investigation (accident prevention) and put each witness at ease.
6. Listen, let each witness speak freely, and be courteous and considerate.
7. Take notes without distracting the witness.
8. Use sketches and diagrams to help the witness.
9. Emphasise areas of direct observation. Label 'hearsay' accordingly.
10. Be sincere and do not argue with the witness.
11. Record the exact words used by the witness to describe each observation. Do not "put words into a witness's mouth."
12. Word each question carefully and be sure the witness understands.
13. Identify qualifications of each witness (name, address, occupation, years of experience, etc.)
14. Supply each witness with a copy of their signed statement.

After interviewing all witnesses, analyse each statement. There may be a need to re-interview one or more witnesses to confirm or clarify key points. While there may be inconsistencies in witnesses' statements, investigators should assemble the available testimony into a logical order. Analyse this information along with data from the accident site.

Not all people react in the same manner to a particular stimulus. For example, a witness within close proximity to the accident may have an entirely different story from one who saw it at a distance. Some witnesses may also change their stories after they have discussed it with others. The reason for the change may be additional clues.

A witness who has had a traumatic experience may not be able to recall the details of the accident. A witness who has a vested interest in the results of the investigation may offer biased testimony. Finally, eyesight, hearing, reaction time, and the general condition of each witness may affect their powers of observation. A witness may leave out entire sequences because of a failure to observe them or because their importance was not realised.

### 3. Problem solving techniques

Accidents represent problems that must be solved through investigations. Several formal procedures solve problems of any degree of complexity. Following are summaries of two of the more common procedures: **change analysis** and **job safety analysis**.

## **Change analysis**

As its name implies, this technique emphasises change. To solve a problem, an investigator must look for deviations from the norm. Consider all problems to result from some unanticipated change. Analyse the change to determine the causes. Use the following steps in this method:

1. Define the problem (What happened?)
2. Establish the norm (What should have happened?)
3. Identify, locate, and describe the change (What, where, when, to what extent)
4. Specify what was and what was not affected.
5. Identify the distinctive features of the change.
6. List the possible causes.
7. Select the most likely causes.

## **Job safety analysis**

Job safety analysis (JSA) is part of many existing accident prevention programs. JSA breaks a job into basic steps, and identifies the hazards associated with each step. The JSA also prescribes controls for each hazard. A JSA is a chart listing these steps, hazards, and controls. Review the JSA during the investigation if a JSA has been conducted for the job involved in an accident. Perform a JSA if one is not available.

## **4. Investigation report**

**The purpose of the investigation is to prevent future accidents.** The following outline may be useful in developing the information to be included in the report:

### **1. Background information**

- where and when the accident occurred
- who and what were involved
- operating personnel and other witnesses.

### **2. Account of the accident (What happened?)**

- sequence of events
- extent of damage
- accident type
- agency or source (of energy or hazardous material).

### **3. Discussion (analysis of the accident – HOW and WHY)**

- direct causes (energy sources, hazardous materials)
- indirect causes (unsafe acts and conditions)
- basic causes (management policies, personal or environmental factors).

### **4. Recommendations (to prevent a recurrence) for immediate and long-range action to remedy:**

- basic causes
- indirect causes
- direct causes (such as reduced quantities or protective equipment or structures).

## **Possible causes**

Obvious accident causes are most probably symptoms of a 'root cause' problem. Some examples of unsafe acts and unsafe conditions which may lead to accidents are:

<b>Unsafe acts</b>	<b>Unsafe conditions</b>
<ul style="list-style-type: none"> <li>- unauthorised operation of equipment,</li> <li>- running or horse play,</li> <li>- not following procedures,</li> <li>- by-passing safety devices,</li> <li>- not using protective equipment, and</li> <li>- under influence of drugs or alcohol.</li> </ul>	<ul style="list-style-type: none"> <li>- ergonomic hazards,</li> <li>- environmental hazards,</li> <li>- inadequate housekeeping,</li> <li>- blocked walkways or poor escape routes,</li> <li>- improper or damaged PPE, and</li> <li>- inadequate machine guarding.</li> </ul>

**Recommendations**

As a result of the findings, there may be a need to make changes to:

- employee training
- the harvesting plan, and
- work procedures or practices.

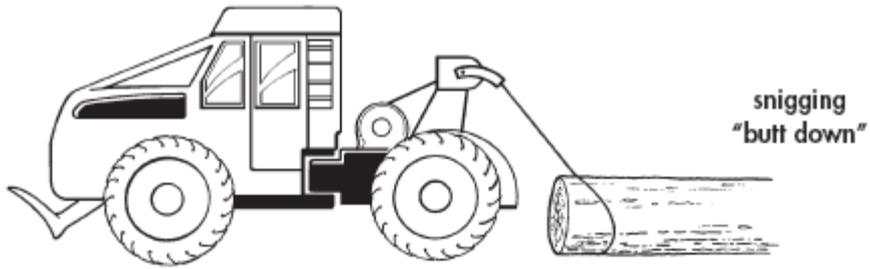
**Records**

All accident reports should be maintained on file permanently. They should all receive timely review by management to ensure proper corrective actions have been taken.

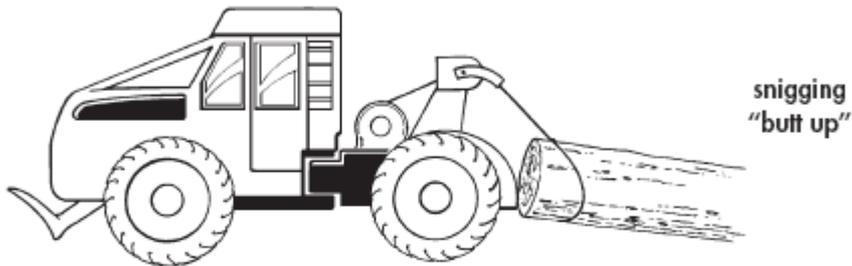
# Appendix 6: Snigging methods and risks

## Methods of snigging

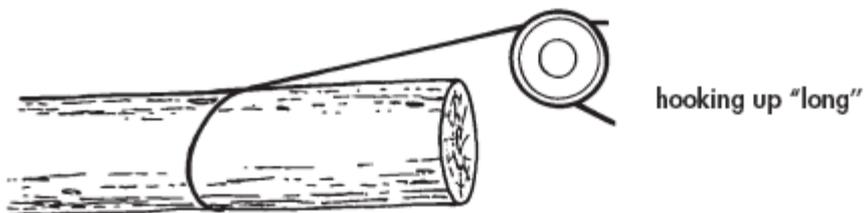
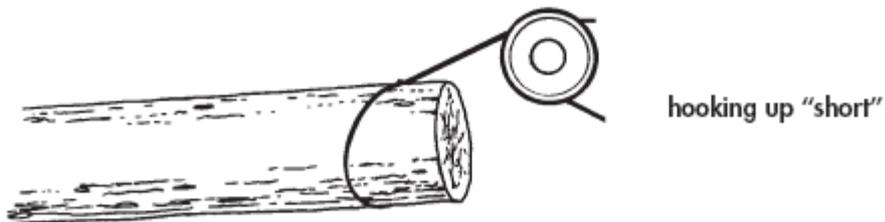
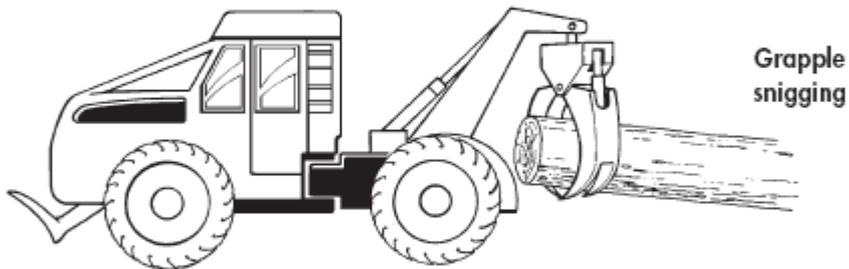
Butt down



Butt up



Grapple



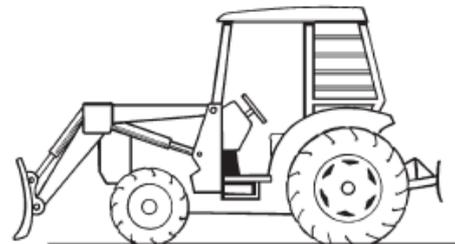
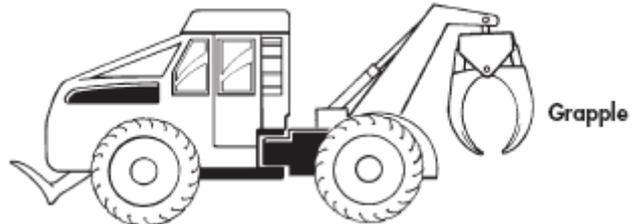
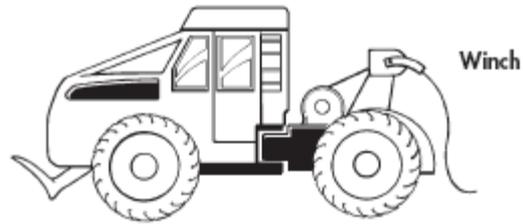
## Rubber tyred skidder

### Advantages

- Rubber tyred skidders are much more nimble than crawler tractors, making turn around time much shorter.
- Rubber tyred skidders are capable of snigging large amounts of timber (smaller in size) to the log landing in a relatively short period. They are particularly effective when felling is carried out some distance from the log landing.

### Disadvantages

- Although skidders are available in a variety of sizes and power ranges, they are generally restricted in the size of log(s) they can snig. Large skidders (engine capacity above 80 kW) can safely manage logs up to 5-8 m, depending upon terrain conditions. Smaller skidders are usually designed to snig logs up to 3-5 m.
- Rubber tyred skidders are greatly affected by wet/slippy conditions.
- The stability of a rubber tyred skidder is greatly affected when traversing side slopes.
- Rubber tyred skidders do not have the same capacity to work on steep to very steep country as a crawler tractor. Great care should be taken when working a rubber tyred skidder on steep country.
- Rubber tyred skidders have limitations when working on rocky terrain due to the ever present risk of tyre damage.
- Rubber tyred skidders have limited capacity to perform earth works.

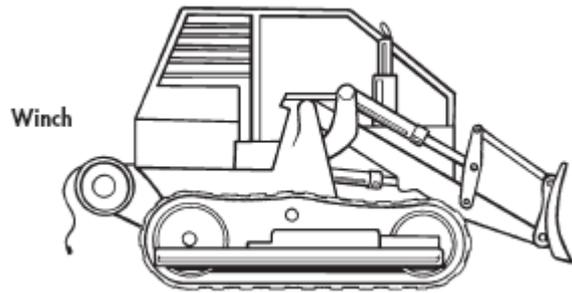


Snigging direct from a 3-point linkage, or a winch

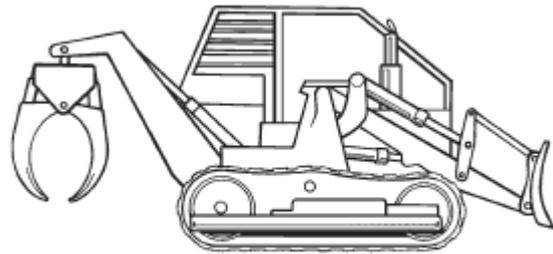
## Crawler tractors fitted with a winch

### Advantages

- Crawler tractors have a greater capacity to snig larger logs. Tractors in the Caterpillar D7 or similar size/power range, can safely snig logs in the order of 15 to 20m (draw bar pull in the order of 38 000 kg).
- Crawler tractors have the capacity to operate more safely on steeper country than rubber tyred skidders.
- Crawler tractors can handle wet/slippery conditions more safely than rubber tyred skidders.
- Crawler tractors are more effective in performing earth works such as for road construction and soil erosion mitigation.



Winch



Tractor with grapple

### Disadvantages

- Crawler tractors have a slower operational time than rubber tyred skidders.
- In general, crawler tractors are not equipped with an arch and fair lead rollers, thus for larger logs it is difficult to snig “butt-up”.

**Note:** Snigging “butt-up” decreases the friction generated between log(s) and ground. Therefore the tractor/skidder does not have to work as hard to snig a given load. This could result in a significant saving in diesel fuel.

## Crawler tractor and rubber tyred skidder working together

As a general principle, the crawler tractor is mainly employed to put in snig tracks, and “break-out” logs located in difficult positions (i.e. only snig the log to the snig track). The crawler tractor can also snig logs that are beyond the capacity of the rubber tyred skidder.

The rubber tyred skidder is principally used for the quick and efficient haulage of felled logs from stump to log landing. Its efficiency increases when the distance between the stump and log landing increases, especially on less steep terrain.

## Tandem snigging

The crawler tractor and rubber tyred skidder working together can be used to snig very large or heavy logs, especially up long steep grades. Two basic methods are used:

- **Crawler tractor in front:** This method involves the crawler tractor snigging “butt-down” and winching while the rubber tyred skidder pushes. This method may also be employed to snig a very large or heavy log (i.e. a log whose weight is equal to or just beyond the crawler tractor's capacity to handle).  
It is essential that both operators have a good understanding of the process involved. The skidder operator takes his cue from the tractor in front. When winching is required, the skidder takes the weight of the log whilst the tractor moves ahead and repositions itself to winch. When winching occurs, the skidder pushes.
- **Rubber tyred skidder in front:** This method involves the rubber tyred skidder winching a log, with the crawler tractor pushing as well as snigging its own log. The size of the log would be beyond the skidder's capacity, but within the tractor's capacity. The tractor pushes the log being winched from behind. At the same time, depending on the weight of the front log, the tractor can snig its own log(s).

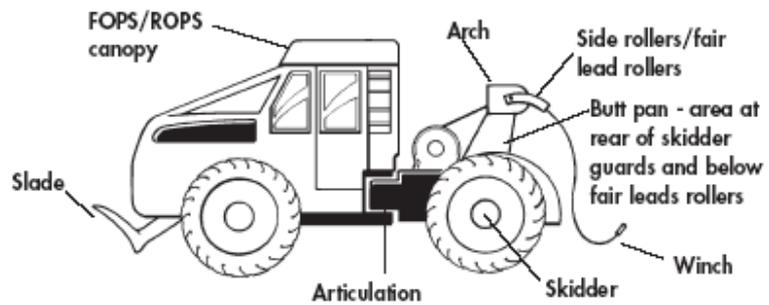
**Note:** Tandem snigging can be employed using any combination of two skidders.

## Snigging risks

### Running unloaded

**Dismounting:** The skidder operator must ensure the security skidder before dismounting by:

- applying the parking brake
- lowering the blade to the ground
- putting the transmission in neutral.

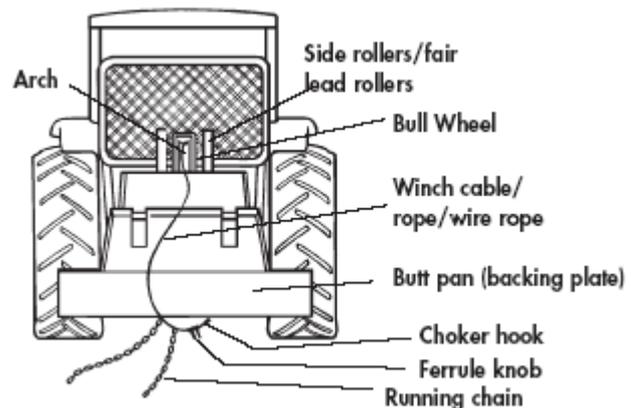


**Note:** On steep slopes, it might be necessary to drive the blade into the ground, or with the blade on the ground, reverse to build a mound of soil behind the blade.

**Speed:** The skidder operator must ensure that the skidder is driven at a speed consistent with terrain conditions and in a safe manner at all times.

**Ascending and descending steep grades:** It is the operator's responsibility to ensure the stability of the skidder at all times. Crawler tractors have greater capacity to ascend and descend steeper grades than rubber tyred skidders. A skidder's or tractors climbing ability depends on:

- terrain conditions
- ground conditions
- ground moisture
- condition of crawler tractor's grouse plates
- condition of the tyres on the skidder, and
- presence of water in the tyres on the skidder.



Blades should be kept low to improve stability.

Generally, the maximum ascent/descent grade for a rubber tyred skidder is approximately 28°, and the maximum ascent/descent grade for a crawler tractor is approximately 32°. Refer to the manufacturer's specifications to determine the maximum slopes for travel before working in steep areas.

**Note:** These grades are for ideal ground and machinery conditions with the skidder/tractor making a straight ascent/descent.

## Traversing side slopes

When working in steep timbered country, an operator should be careful when traversing an unfamiliar side slope. To ensure maximum safety, an operator should dismount and walk the side slope prior to driving across it. Skidder/crawler tractor operation on side slopes can be very hazardous. The potential for a rollover increases with the extent of the side grade and uneven ground (e.g. rocky outcrops, washaways, and tree stumps), and when working in wet conditions.

Crawler tractors are particularly prone to slipping sideways when working on a shale covered side slope or sheet rock. Green heads and branches lying on the forest floor can also cause rollover. Refer to the manufacturer's specifications to determine the maximum side slopes for travel before working. Traversing side slopes greater than 20° should be avoided.

**Note:** The safe maximum side slope that can be traversed by industrial and agricultural tractors may be significantly less than 20°. The front blade of a skidder/tractor should be lowered as close to the ground as possible while traversing side slopes.

## The snigging task

### Load of log(s) verses skidder/tractor capacity

Rubber tyred skidders, crawler tractors and 2/4WD agricultural tractors are available in a wide range of load and engine capacity. The operator must have a clear understanding of the skidder's:

- capacity to ascend/descend steep terrain
- ability to traverse side slopes, and
- maximum load the skidder can handle in the particular country being worked.

The operator should not attempt to snig a load that is greater than the skidder's capacity to handle (i.e. snig both uphill and downhill).

### Hooking up

**Dismounting:** The operator must ensure the security of the skidder prior to dismounting, particularly when working on steep terrain.

**Overhead risks:** The operator must be mindful of overhead risks when dismounted from the cabin. Exercise care when hooking-up in close proximity to tangled or stressed tree heads or elevated root plates (i.e. limbs that are subjected to top, bottom or side binds, or snigging logs salvaged from pushed trees).

**Winching:** Most skidders/tractors are equipped with a winch designed for direct pull operations only. Winching at an angle (i.e. off a direct line from the winch's centre line) is hazardous because there is a danger of pulling the machine on its side, or creasing or cutting the winch cable.

Winches fitted with side fairlead rollers can winch at small side angles, but this should only be used if it is impossible to manoeuvre the skidder in such a position as to obtain a direct pull.

### Snigging "butt-up" verses "butt-down"

Butt-up snigging reduces friction between log and ground, thus taking some load off the skidder. This will result in a more efficient operation in terms of time taken and diesel fuel used.

Butt-down snigging is employed when:

- the size or the weight of the log is beyond the skidder's or tractor's capacity to lift
- snigging a heavy load down hill
- turning a corner with a heavy load.

### Snigging more than one log

An operation can be made more efficient by snigging more than one log at a time. This would be determined by the pattern of work.

The total combined weight of the logs must not exceed the skidder's pulling capacity.

During hook-up stage, take care to ensure the stability of each log in the load.

If an offsider is used to hook-up, make sure that the offsider is not at risk when the skidder's power is applied to the hooked-up log.

### **Snigging downhill**

**Dismounting:** The operator should take care to ensure the security of the skidder prior to dismounting by:

- applying the parking brake
- lowering the blade and applying positive pressure, and
- putting the transmission in neutral.

**Snigging heavy logs downhill:** The operator should take care to ensure that the log(s) being snigged do not overrun the skidder during the descent, as the skidder will be at risk of becoming uncontrollable.

This danger can be reduced by hooking-up the log 'short' and winching the butt of the log (butt-down) right up against the skidder's butt pan or the tractor's winch drum.

**Turning corners while snigging downhill:** Turning corners, particularly tight corners while snigging a heavy load downhill can be dangerous (i.e. load pushing the skidder on its side).

A safe method of negotiating a corner is to drop the load short of the corner, proceed around the corner with the skidder, and then winch the load to the skidder. This will ensure that the weight of the load does not generate a sideways force on the skidder. When using skidders fitted with a grapple, take care when negotiating corners while snigging large logs downhill.

### **Snigging uphill**

**Dismounting:** the operator should take care to ensure the security of the skidder/tractor prior to dismounting by:

- lowering the blade and applying positive pressure (reverse to build a mound of soil behind blade)
- applying the parking brake, and
- putting the transmission in neutral.

**Snigging heavy logs uphill:** The most efficient method to snig a log uphill is to employ the "butt-up" method. Snigging uphill "butt-down" increases the load on the skidder.

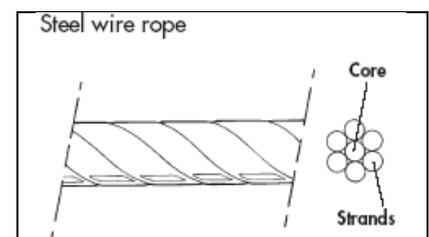
**Breaking out:** Heavy log(s) can be successfully snigged up steep grades by employing a series of winch - move forward - winch again, manoeuvres. Take care to ensure a direct pull on the winch.

**Side slopes:** It is dangerous to snig up and across a side slope. All snigging should be either straight up or straight down a slope. If this is not possible, then it may be necessary to bench out the snig track.

### **Stability of rubber tyred skidders and agricultural tractors**

Pulling a heavy load uphill behind an agricultural tractor may be dangerous, if the load applied to the tractor's rear is higher than the centre line of the rear axle. The over centre load may cause the front of the tractor to "rear up".

Additional stability and traction can be obtained by adding water to all four wheels of a skidder, and to the rear wheels of an agricultural tractor. If additional weight is required on the front of the tractor, then concentrated steel ballast, located at the front, should be used.



## Steel wire rope

Steel wire rope has the following advantages:

- ease of attachment to logs in both single or multiple log snigging
- steel wire rope is less prone to breakage from shock loads than chain, and
- wire rope is easier to maintain and to repair breakages.

However, steel wire rope can be subjected to considerable wear during prolonged “butt-down” snigging as the rope is in constant contact with the ground during the snig.

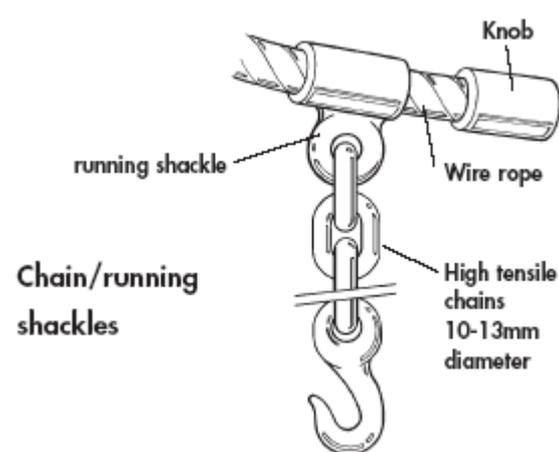
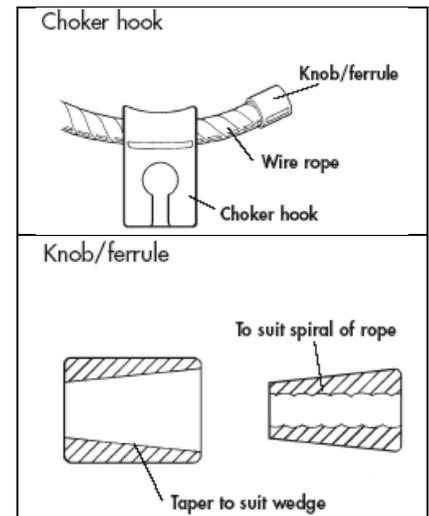
## Steel wire rope type

Six-strand centre core steel wire rope is standard, with a diameter between 19 mm ( $\frac{3}{4}$ ”) and 30 mm ( $1\frac{1}{8}$ ”) depending on size and power range of the skidder. 21 mm ( $\frac{7}{8}$ ”) or 25 mm (1”) are the preferred sizes.

When under load, the wire rope must not be allowed to completely run out from the winch drum. To do this would put undue strain on the rope and winch, and the rope could become detached.

Leave a minimum of two full turns of rope on the winch drum at all times during operations.

**Wire rope maintenance:** Steel wire rope used for snigging is subjected to constant abrasion and shock loading and therefore has a relatively short life (usually between three and six months). Snigging rope is usually not subjected to rust or corrosion, but should be regularly inspected for damage (i.e. cut strands, etc.) and be kept in as good repair as possible. Inspection should be in accordance with *AS 2759: Steel wire rope – Use, operation and maintenance*.



**Chains:** The use of chains is usually restricted in snigging work to ‘running chains’ that are used in conjunction with steel wire rope. Chains are subjected to damage resulting from excessive shock loading and must be regularly inspected for defects, particularly the stretching of the links. Stretched links must be replaced.