



**WORKSAFE VICTORIA**

# FATIGUE MANAGEMENT GUIDELINES FOR THE FORESTRY INDUSTRY

March 2004







## PURPOSE OF THIS GUIDE

This guide was developed to help employers and employees address the issue of fatigue in the forestry industry.

It will help you to understand your role and responsibilities and what you can do to help manage fatigue in your workplace.

Fatigue in harvesting and cartage can only be managed if everyone in the supply chain – land/forest owners, principal contractors / syndicates, contractors, subcontractors and employees – plays their part and works together.

Advice is provided about how you can manage the factors within your control that contribute to fatigue. The guide sets out the following steps:

- understand responsibilities
- use planning checklist to start the process
- identify hazards that may contribute to fatigue
- assess any fatigue risks
- control any fatigue risks
- monitor the program and investigate incidents

These steps should be similar to the approach you take in your existing occupational health and safety (OHS) program.

This document is not meant to replace industry award provisions or other schemes such as the Transition Fatigue Management System (TFMS). However, as the state of knowledge about fatigue improves – for example as outlined in the proposed National Road Transport Commission Fatigue Code of Practice – employers and contractors would be expected to implement additional measures to deal with fatigue.



The responsibility for managing fatigue in forest operations lies with all parties, but the action that each can take depends on their level of control over the work and other factors that may impact on fatigue.

A combination of factors contribute to fatigue as a workplace safety issue.

Everyone in the supply chain of timber harvesting and haulage has a role to ensure the risk of fatigue among forest workers is minimised.

It is difficult to determine the degree to which fatigue contributes to fatalities and serious injuries in the forest industry. However, the experience of tree fellers and other forestry workers as well as research, supports a strong link between physically and mentally demanding work and fatigue.

WorkSafe Victoria joined with the forest industry to form the state-wide Forest Industry OHS Stakeholder Forum in October 2002. It focuses on occupational health and safety hazards and the development of shared solutions to reduce the risks faced by forest industry workers.

The Stakeholder Forum identified fatigue as a priority issue and a sub group of the Forum, the Forest Industry Fatigue Working Group, took up the challenge of developing this guide, with funding by WorkSafe's Safety Development Fund.

At the request of the State Coroner, who was concerned about the high rate of fatalities and serious injuries in tree felling operations, WorkSafe's ergonomic unit conducted field studies on fatigue in logging operations. The results were presented to the forest industry by WorkSafe in a series of information workshops.

This publication describes common daily tasks performed within the falling, harvesting and haulage sectors and provides up-to-date information on ways to reduce the impact of the factors which contribute to fatigue experienced by workers.

I commend Victoria's forest industry which has led the way by developing guidance material on managing the risk of fatigue in forest operations and hope the guide encourages employers and workers to continue their commitment to this important work.

**John Merritt,  
Executive Director,  
WorkSafe Victoria.**

## WHO SHOULD USE THIS GUIDE?



You should use this guide if you are an employer or worker in the forestry industry. This includes land/forest owners, principal contractors / syndicates, contractors, subcontractors and employees. This guide recommends practices to help you meet your legal obligations in relation to fatigue and workplace health and safety.

Where possible, this guide indicates the specific role of each workplace party. Colour-coding is used to help you find the parts relevant to your role.

Fatigue is a problem that has a variety of contributing factors. Responsibility for managing fatigue lies with all parties in the forestry environment but the action that each party can take will vary according to their level of control over the work undertaken in the workplace. It is important to remember that decisions made by any of the parties may impact on other people's health and safety in the workplace.

ROLE	DEFINITION	EXAMPLES OF WHO MAY TAKE ON THIS ROLE
<b>Land/forest owner</b>	The person in control of the land or forest on which the forestry work takes place	Victorian government agencies who manage and control state forests  Private plantation owner or manager  Forest owner or forest manager  Sawmill or customer
<b>Principal contractor / Syndicate</b>	The person who hires contractors to undertake harvesting or haulage activities	Anyone in the landowner role who hires harvesting or haulage contractors  Harvesting contractor  Syndicated company established by licensee(s)
<b>Contractor</b>	The provider of a harvesting or haulage service	Contractors who have their own employees or who hire subcontractors (e.g. felling contractor, haulage contractor)  Owner-operators
<b>Subcontractor</b>	Anyone hired by a contractor other than by direct employment	Anyone working under contract to a contractor
<b>Employee</b>	Anyone hired by direct employment	Anyone who is a direct employee and does not hire any other employees



## FATIGUE AND WORKPLACE HEALTH AND SAFETY

### WHAT IS FATIGUE?

Fatigue is an acute or ongoing state of tiredness that affects employee 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 is associated with increased workplace incidents. Through the build-up of sleep debt, it can result in errors of judgement that may lead to injury or death. Work-related fatigue affects not only the employee's health and safety, but the health and safety of others as well.

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.

### What causes fatigue?

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 circadian rhythms (that is, working when we would normally be asleep or sleeping when we would normally be awake)
- environmental stresses (e.g. heat, noise and vibration)
- work scheduling and payment systems that provide incentives to work longer and harder than may be safe

### How to recognise fatigue

Workplace fatigue can be difficult to spot, but look out for the following:

- 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
- near-misses

The list above is not exhaustive and the presence of these indicators does not necessarily mean that fatigue is a risk in your workplace. Management of fatigue should not just rely on employees recognising these symptoms, as the symptoms on their own have been found to be unreliable indicators of fatigue. You must assess the risk and this guide will help you determine whether risk control measures are required.

### Advantages of managing fatigue

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



Understanding your role is the first step in managing workplace fatigue. Responsibility for managing fatigue lies with all parties in the forestry environment, but the action that each party should take will vary according to their level of control and corresponding legal duties.

## Legislative obligations for managing fatigue

Employers – whether they are landowners, syndicates or contractors – have duties to eliminate or reduce fatigue in the workplace and to monitor the health of their employees.

Health and safety laws also require consultation in the workplace. Employers should consult with employees in developing and implementing a fatigue management program, and on all aspects of hazard identification, risk assessment and risk control.

Employees have a duty to follow procedures and to cooperate with their employer in minimising fatigue.

This guide recommends practices to help employers and employees meet their OHS obligations using a risk management approach. Risk management is a way of recognising that each situation will have its own characteristics and that these circumstances have to be assessed to decide what is the best way of fixing any health and safety problems.

## What makes up a basic fatigue management program?

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 of incidents and other workplace records
- monitoring of the program, including monitoring the health of employees

The following tables explain the roles and responsibilities of each workplace party. Some parties may take on more than one role depending on the circumstances.

LAND/FOREST OWNER	
<b>Key role</b>	Planning role is critical in minimising fatigue
<b>What you can do to help manage fatigue</b>	<p>Make sure that the workplace and the roads and tracks to and from the workplace are safe and without risks to health</p> <p>Coordinate the activities of the overall forest environment to ensure that no one is exposed to risks to their health or safety</p> <p>Make sure that your requirements about how work is done at the coupe do not contribute to fatigue, which could create a risk to the health and safety of other people</p> <p>Gather information about hazards that may contribute to fatigue risks on a worksite and give it to the principal contractor and harvesting or haulage contractors</p> <p>Use the relevant planning prompts on page 9</p>



## ROLES AND RESPONSIBILITIES

### PRINCIPAL CONTRACTOR / SYNDICATE

<b>Key role</b>	Management role is critical in minimising fatigue
<b>What you can do to help manage fatigue</b>	<p>Use any information provided by the landowner about fatigue hazards, risks and possible control measures</p> <p>Identify, assess and control fatigue risks in allocated coupes and on roads</p> <p>Ensure contractors have made adequate provisions for health and safety, including fatigue management</p> <p>Consult with contractors on fatigue management and exchange fatigue-related information</p> <p>Develop and communicate procedures for managing fatigue in allocated coupes</p> <p>Monitor employees' health and keep records</p> <p>Monitor conditions at the worksite and ensure supervision to enable employees to work safely and without risks to health</p> <p>Investigate incidents to determine if fatigue was a contributing factor</p> <p>Use the relevant planning prompts on pages 10 and 11</p>

### CONTRACTOR

<b>Key role</b>	Implementation role is critical in minimising fatigue
<b>What you can do to help manage fatigue</b>	<p>Identify, assess and control fatigue risks in specific coupes</p> <p>Consult with employees on fatigue management and exchange fatigue-related information</p> <p>Develop and communicate procedures for managing fatigue</p> <p>Monitor employees' health and keep records</p> <p>Monitor conditions at the worksite and ensure supervision to enable employees to work safely and without risks to health</p> <p>Investigate incidents to determine if fatigue was a contributing factor</p> <p>Use the relevant planning prompts on page 12</p>



## SUBCONTRACTOR

<b>Key role</b>	Cooperation is critical in minimising fatigue
<b>What you can do to help manage fatigue</b>	<p>If you hire any employees, see the table on contractor responsibilities</p> <p>Cooperate with your employer in relation to control measures put in place to minimise any fatigue risks</p> <p>Take reasonable care to ensure fatigue does not affect your own health and safety or the health and safety of others</p> <p>Follow fatigue management policies and procedures</p> <p>Report any incidents (e.g. fatigue-related situations, symptoms, signs or near-misses)</p> <p>Use the relevant planning prompts on page 12 and the 'Information for forest workers' section on page 30</p>

## EMPLOYEE

<b>Key role</b>	Cooperation is critical in minimising fatigue
<b>What you can do to help manage fatigue</b>	<p>Cooperate with your employer in relation to control measures put in place to minimise any fatigue risks</p> <p>Take reasonable care to ensure fatigue does not affect your own health and safety or the health and safety of others</p> <p>Follow fatigue management policies and procedures</p> <p>Report any incidents (e.g. fatigue-related situations, symptoms, signs or near-misses)</p> <p>Use the 'Information for forest workers' section on page 30</p>

In line with their legal duties, each party must then work through a fatigue management process to make sure they are meeting these responsibilities.

**Initial planning is the most important part of the process and planning prompts for land/forest owners, principal contractors / syndicates and contractors are shown in the next section. These lists are the starting point for identifying measures to control fatigue.**



## HOW TO MANAGE FATIGUE

This section will help you manage the factors that contribute to fatigue, using the following process:

1. PLAN
2. IDENTIFY THE HAZARDS
3. ASSESS THE RISKS
4. CONTROL THE RISKS
5. MONITOR AND REVIEW YOUR FATIGUE MANAGEMENT PROGRAM

Remember that throughout this process, consultation and communication with all parties in the supply chain is vital.

### **Linking fatigue management to your existing OHS program**

The information in this guide should be incorporated into your existing OHS programs and systems.

Fatigue management covers many common hazards that you should already be addressing as part of an overall OHS program (e.g. terrain, slope, heat, humidity, noise and vibration).

**The emphasis in this guide is on whether these hazards combine with other factors to create fatigue risks.**



Planning is crucial in managing fatigue, since many potential issues can be avoided by taking steps before work even commences.

Planning should take place before the start of each season, before any major operations commence or on a coupe-by-coupe basis, in consultation with all relevant parties in the supply chain.

The following **planning prompts** list some things that each workplace party should think about before work begins.

#### LAND/FOREST OWNER

Do your OHS policies and procedures cover hazards that contribute to fatigue?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consider how your actions and decisions affect the physical and mental demands of the harvesting and cartage work?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consider how your actions and decisions may affect scheduling, season length and working time?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Are non-legislated seasonal environmental constraints (e.g. weather) based on actual conditions rather than on pre-determined dates?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consult with the principal contractor / contractor when determining entry to and exit from the coupe (coupe roads), including entry to and exit from log dumps?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you gather information on hazards that may contribute to fatigue (e.g. terrain and slope)?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you pass on information to principal contractors about characteristics of the particular coupe/compartments that will make work more difficult or demanding than usual?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Before any work starts, do you work out ways with the principal contractors that you can help the contractors avoid safety problems caused by fatigue?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you require sign-off from the principal contractor in the coupe planning/assessment stage?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you have back-up coupes planned with information already gathered on hazards that may contribute to fatigue risk?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consider fatigue implications (e.g. hours, time of day) when negotiating log supply agreements with customers?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consider the effect that unexpected increases in timber demand could have on the contractor?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
<p>If you answered <b>yes</b>, you should be able to show what methods you used to achieve results and compare them to the <b>risk control solutions</b> shown on pages <b>18-19</b> and illustrated in the <b>fatigue risk control guide</b> on pages <b>24-28</b>.</p> <p>If you answered <b>no</b>, you need to address each issue by working through the <b>hazard identification</b> and <b>risk assessment</b> sections. Finally, compare your practices to the <b>risk control solutions</b> shown on pages <b>18-19</b> and illustrated in the <b>fatigue risk control guide</b> on pages <b>24-28</b>.</p>	



## 1. PLAN

<b>PRINCIPAL CONTRACTOR / SYNDICATE</b>	
Do your OHS policies and procedures cover hazards that contribute to fatigue?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
As part of your health and safety system, do you obtain information from land/forest owners on hazards that may contribute to fatigue risk?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you identify hazards that may contribute to fatigue risk, assess risks and put control measures in place, in consultation with contractors, subcontractors and employees?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consider how your actions and decisions affect the physical and mental demands of the harvesting and cartage work?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consider how your actions and decisions regarding coupe allocation, contractor selection and scheduling create fatigue risk for others?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you require your contractors to have a health and safety system, including a fatigue management system?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you build flexibility into your contractual or production arrangements to allow for delays (including loading and unloading) and disruptions due to weather and other exceptional circumstances?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
When allocating coupes/compartments, do you consider the impact of hazards that can contribute to fatigue risk?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consult with cartage and harvesting contractors to get agreement that production targets can be achieved without creating fatigue risks?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you make sure that contractors have the suitable skills and equipment to meet the coupe requirements while minimising fatigue risk?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you make sure that contractors have the necessary information, training and instruction on fatigue management?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you make sure that working arrangements (e.g. production quotas and payment arrangements) minimise, as far as practicable, any incentives for work practices or working time patterns that could create or increase fatigue risks?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you pass on known fatigue-related information about the coupe, compartment or mill hours to contractors or employees?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you allocate coupes to allow contractors to balance work loads in 'hard coupes' over a longer period?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you coordinate the activities of different contractors who may be working in the same area at the same time?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Before any work starts, do you work out ways with the contractors that can help prevent safety problems caused by fatigue?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Is there flexibility for negotiation with contractors to ensure that variations in forest coupes, for example, do not encourage longer working hours?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you coordinate the activities of different cartage configurations to suit the varying coupe, terrain and travel times of the contractors?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consider mill opening hours when planning delivery?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you consider fatigue implications when negotiating log supply agreements with customers?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
[continues on next page]	


**PRINCIPAL CONTRACTOR / SYNDICATE**

Do you consider the effect that unexpected increases in timber demand could have on the contractor?

 YES/NO 

Do you look at reports of incidents that have occurred in your company or syndicate in the last year to determine whether fatigue was a contributing factor?

 YES/NO 

If you answered **yes**, you should be able to show what methods you used to achieve results and compare them to the **risk control solutions** shown on pages **18-19** and illustrated in the **fatigue risk control guide** on pages **24-28**.

If you answered **no**, you need to address each issue by working through the **hazard identification** and **risk assessment** sections. Finally, compare your practices to the **risk control solutions** shown on pages **18-19** and illustrated in the **fatigue risk control guide** on pages **24-28**.



## 1. PLAN

CONTRACTOR/SUBCONTRACTOR	
Do your OHS policies and procedures cover hazards that contribute to fatigue?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Have you negotiated with the principal contractor or syndicate any special arrangements for delays and disruptions due to weather and other circumstances?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
When taking on work and setting work schedules, do you recognise hazards that may contribute to fatigue (e.g. terrain, slope, type of species, ease of entry to, exit from and movement within the coupe, such as truck turning areas)?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you include fatigue issues in pre-planning consultation with crew or other subcontractors?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you make sure that working arrangements (e.g. production quotas and payment arrangements) minimise, as far as practicable, any incentives for work practices or working time patterns that could create or increase fatigue risks?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you have agreed procedures for dealing with extreme weather conditions (e.g. stop work, take extra breaks)?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you make sure that crews and drivers have the suitable skills and equipment to meet the requirements of the work while minimising fatigue risk?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you set work schedules to allow crews or drivers to get to and from the coupe or depot and still get a minimum of 6 hours sleep every night?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you have a plan to ensure exposure to noise and vibration caused by machines or trucks is minimised?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Have you provided any information to crews or drivers on fatigue and how they can help minimise fatigue (e.g. quality sleep, fluid intake)?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
Do you report and discuss any fatigue issues with your contractor or principal contractor?	<input type="checkbox"/> YES/NO <input type="checkbox"/>
<p>If you answered <b>yes</b>, you should be able to show what methods you used to achieve results and compare them to the <b>risk control solutions</b> shown on pages <b>18-19</b> and illustrated in the <b>fatigue risk control guide</b> on pages <b>24-28</b>.</p> <p>If you answered <b>no</b>, you need to address each issue by working through the <b>hazard identification</b> and <b>risk assessment</b> sections. Finally, compare your practices to the <b>risk control solutions</b> shown on pages <b>18-19</b> and illustrated in the <b>fatigue risk control guide</b> on pages <b>24-28</b>.</p>	

## 2. IDENTIFY THE HAZARDS



If you've implemented risk control measures following your initial planning, you may have already reduced potential fatigue risks. You should use this section to focus on fatigue hazards that arise in the course of the job.

Everyone with responsibility for managing fatigue should:

- use the **fatigue hazards checklist** on page 14-15
- ask contractors/employees if there are particular types of coupes, conditions or activities they find most tiring
- look at any reports of incidents that have occurred in your company/syndicate in the last year to determine whether fatigue was a contributing factor
- consider any information about fatigue and fatigue-related incidents available from your industry association, WorkSafe Victoria or other government agencies
- find out what other operators are doing about fatigue

### Using the fatigue hazards checklist

The checklist is designed to be used for typical coupes and compartments or operations that are normally undertaken. The checklist can also be used by contractors on a coupe-by-coupe basis to fine-tune arrangements to manage fatigue.

Other parties can also use the checklist to make sure their decisions and actions are not creating or increasing any fatigue risks.

Coupe plans are an example of a general hazard identification tool (rather than a specific tool to determine hazards that may contribute to fatigue). However, many hazards identified in the coupe plan may contribute to fatigue risk.

Some hazards may increase the mental demands of the task (e.g. dead stags or widow-makers) or may contribute to the physical demands of the task (e.g. heavy regeneration or steep slope).

**If you identify any hazards, you should use the risk assessment section to assess any risks involved. In other words, are those hazards likely to create a situation in which fatigue will cause injuries?**



## 2. IDENTIFY THE HAZARDS

### HAZARDS/FACTORS THAT MAY CONTRIBUTE TO FATIGUE

*Tick if you answer yes to any of the following questions:*

#### MENTAL AND PHYSICAL DEMANDS OF THE JOB

Do you or your employees/contractors undertake heavy physical work such as driving wedges, cross cutting and carrying felling equipment?

YES

Do you or your employees/contractors undertake activities that require a high level of concentration (e.g. assessing fall direction, balance of machine, grade of log, overhead hazards and degree of slope)?

YES

Do you or your employees/contractors undertake activities that require constant awareness of danger zones and the presence of other workers?

YES

Do you or your employees/contractors undertake activities that may require continuous concentration with little stimulation (e.g. driving)?

YES

Do you or your employees/contractors undertake work that involves particular types of coupes, conditions or jobs that they find especially tiring?

YES

#### ENVIRONMENTAL CONDITIONS

Do you or your employees/contractors encounter extreme (hot, humid or very cold) weather conditions during a job?

YES

Do you or your employees/contractors work on steep slopes or difficult terrain?

YES

Is the ventilation poor and the atmosphere stuffy and uncomfortable in vehicle cabins?

YES

Do machine operators or drivers have to work in a glary environment in which it is difficult to see because of a lack of contrast, flickering light and reflections?

YES

Do you or your employees/contractors operate plant or machinery or work in trucks that cause whole-body or hand-arm vibration?

YES

#### WORK SCHEDULING

Do you or your employees/contractors work under pressure that requires working faster or for longer periods to enable catch up on backlog?

YES

Do you or your employees/contractors have to travel for more than an hour to get to the job (coupe, compartment or depot)?

YES

Do you or your employees/contractors work or travel in night hours (midnight to 6 a.m.) consistently?

YES

Does the work schedule prevent you or your employees/contractors from having one full day away from work in a week?

YES

Does the work schedule make it difficult to consistently get at least two full nights sleep in a week?

YES

#### WORKING TIME

Do you or your employees/contractors regularly work days longer than 12 hours?

YES

Is the normal break between shifts less than 10 hours?

YES

Do you or your employees/contractors have to work continuous periods of more than 4 hours without a break?

YES

Do you or your employees/contractors regularly need to work at night or during the circadian low period (2 a.m. to 6 a.m.) when safety risk due to fatigue peaks?

YES

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## 2. IDENTIFY THE HAZARDS



### HAZARDS/FACTORS THAT MAY CONTRIBUTE TO FATIGUE

#### INDIVIDUAL

Do your employees/contractors average less than 10 hours per day away from work during a week?

YES

Do you notice your employees/contractors using fluids such as coffee to try and combat tiredness?

YES

Are you aware of any sleeping disorders (e.g. obstructive sleep apnoea) or other sleep difficulties your employees/contractors may suffer?

YES



### 3. ASSESS THE RISKS

If you've identified any hazards that can contribute to fatigue, you need to work out whether they present a risk. That is, how likely are these hazards to lead to incidents that could affect the health and safety of the contractor/employee and anyone else affected by the contractor/employees' actions?

If you've already taken action following your initial planning, your risk assessment will be more of a fine-tuning process to deal with conditions that arise in the course of the work.

#### Fatigue risk factors

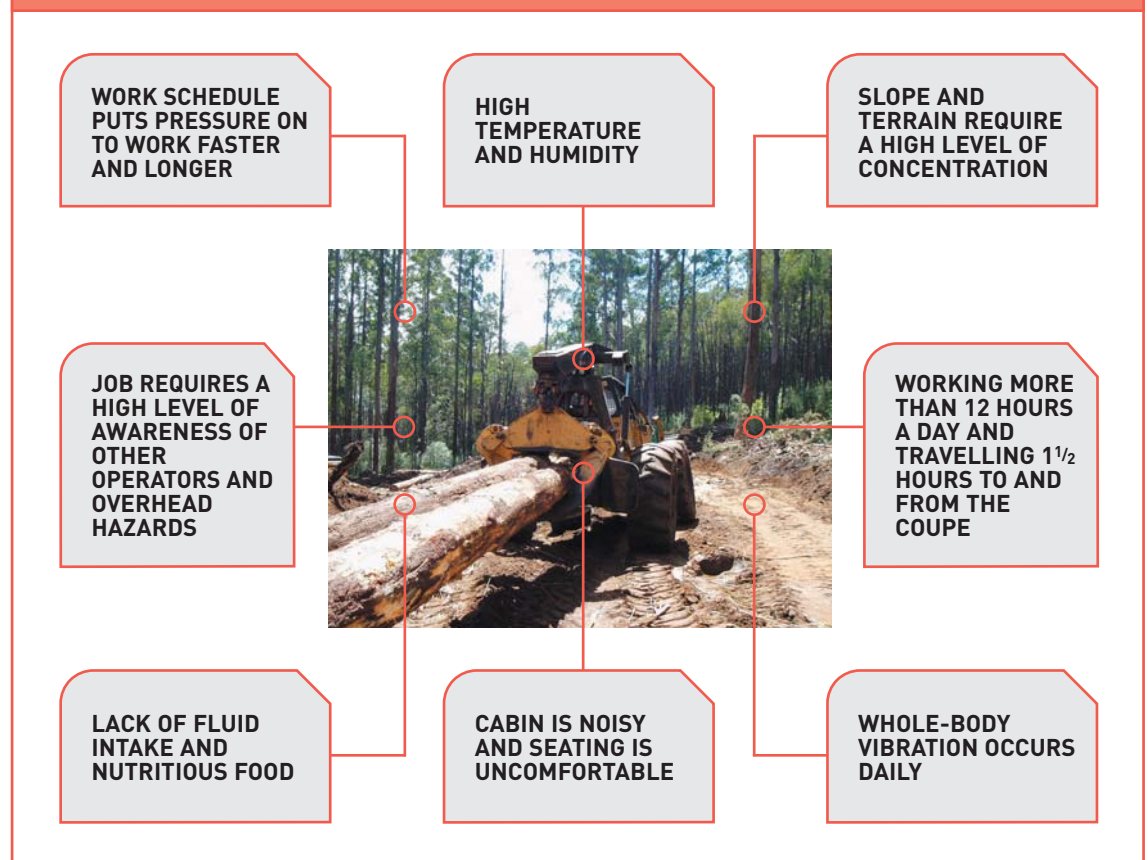
To assess the factors or hazards that contribute to fatigue risk, you need to consider the following:

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

If any of these risk factors are present, you need to take action to control any risks. The more risk factors there are, the higher the risk.

#### Example: High-risk fatigue situation – skidder operator

The combination of fatigue hazards in the following example creates a high-risk situation. Are you working in similar circumstances?



Fatigue is caused by a combination of factors, so to fix the problem you need measures that address all of the contributing factors.

The next section will help you control any fatigue risks in your workplace.



The next step is to control any fatigue risks that you've assessed. In deciding on risk controls, you should also check whether measures currently being used to address the problem are effective.

Find out what others in the forestry industry are doing to best manage fatigue, and incorporate any appropriate risk control measures into your fatigue management program.

If you've already taken action following your initial planning, your risk controls will be mainly concerned with issues that arise in the course of the job.

Remember, decisions made by any one of the parties may affect the health and safety of others in the workplace.

### Use the most effective measures

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

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, while you can't change the source of the hazard/factor, you can reduce the risk 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 coupe to be in the shade during the afternoon
- 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, you can reduce the risk by ensuring that:

- ventilation and cooling levels are adequate
- seats are adjustable
- 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. Remember that each party has a role to play in managing fatigue.**

The example on the next page shows how fatigue results from a combination of factors and needs control measures that address all of the factors. It's rarely possible for this to be achieved by any one of the parties in the harvesting and cartage supply chain – it requires everyone to play their part, which includes land/forest owners, principal contractors / syndicates and contractors.

Use the **fatigue risk control solutions** on pages 18-19 to control any risks in your workplace. Also check your practices against the examples in the **fatigue risk control guide** on pages 24-28, which illustrate a range of practices from high risk to low risk that you can use to compare with your current situation.



## FATIGUE RISK CONTROL SOLUTIONS

Use as many of the following as practicable to control any fatigue risks at your workplace

### Mental and physical demands of the job

- **Reduce the excessive physical demands of a task** (e.g. clear flat areas for getting in and out of machines or use cording and matting if appropriate)
- **Redesign or modify plant, tools or equipment** to reduce the excessive physical or mental demands of a task (e.g. use ergonomic equipment that is lighter or easier to handle, ensure seating in cabins is adjustable and has suspension to decrease vibration, and ensure machines have auto-levelling devices where appropriate)
- **Improve communication** between operators by using agreed signals and signs or headset radio communications
- **Use mechanical alternatives** to reduce the excessive physical demands of a task (e.g. mechanical harvesting where possible)
- **Use rest breaks** (in addition to regular, scheduled breaks for meals etc.) to reduce the physiological demands of the job and allow the heart rate to recover
- **Introduce job variety** to vary the mental and/or physical demands of work and the pressure to perform
- **Use job rotation** to limit the build-up of physical and mental fatigue

### Work scheduling and planning

- **Alter the work schedule** by reducing the overall time that a worker is required to perform moderately demanding work
- **Reschedule moderately demanding work** to avoid circadian low periods between the hours of 2 a.m. and 6 a.m. (and to a lesser degree 2 p.m. to 4 p.m.), when dips in alertness and performance occur; if early starts are being used to manage heat stress during hot summer days, consider options such as on-site camping or driving 'pools' where appropriate
- **Organise the work** so that the demands of the work gradually increase towards the middle of the shift and decrease towards the end of the shift
- **Plan the work schedule** with sleep and rest opportunities in mind
- **Build in time for delays** (e.g. weather, fire, breakdowns)
- **Avoid working arrangements that provide incentives to work excessive hours**
- **Extend the season by using harvesting systems such as cording and matting**, if practicable, in your coupe to allow work to continue in wetter conditions

### Working time

- **Eliminate or reduce, where practicable, the need to work extended hours or overtime**
- **Eliminate or reduce, where practicable, the need to work night shifts (e.g. drivers) during circadian low periods** (this is when the natural body clock is programmed to sleep, particularly between 2 a.m. and 6 a.m., and to a lesser degree between 2 p.m. and 4 p.m.; these periods are associated with a decrease in alertness and performance and a rise in accident and injury rates)
- **Take into account the previous work and rest undertaken by workers**
- **Eliminate or reduce, where practicable, the need to work long shifts for more than 3 consecutive days**
- **Enable workers to get rest during normal sleep hours** (10 p.m. to 8 a.m.) where practicable
- **Use work–rest patterns that minimise fatigue** (for example, processor operators take rest, meal or maintenance breaks every 3–4 hours in addition to 5-minute breaks off machinery each hour of continuous operation)



## Environmental conditions

- **Schedule work to avoid extremes of temperature** where possible
- **Provide heating methods** in cold conditions
- **Provide shelter** and a cool environment where workers can escape harsh conditions
- **Provide ventilation and mechanical cooling methods** to reduce hot and stuffy working conditions in vehicle cabins
- **Provide facilities for optional on-site camping**
- **Use driving 'pools'** where appropriate
- **Provide seats that dampen vibration and can be adjusted for the operator or driver**
- **Provide supplies of suitable drinking fluids** to reduce the likelihood of dehydration, which can speed up the onset of fatigue

## Individual

**Provide training and information** on fatigue management that covers, as a minimum:

- occupational health and safety laws and responsibilities for managing fatigue
- the body clock
- risk factors for fatigue
- symptoms of fatigue
- assessing the risks associated with fatigue
- effective fatigue countermeasures (e.g. work scheduling)
- procedures for managing fatigue (e.g. incident reporting)
- drugs and alcohol
- nutrition, fitness and health links to fatigue
- balancing work and life demands



## BASIC PRINCIPLES FOR REDUCING FATIGUE IN FORESTRY

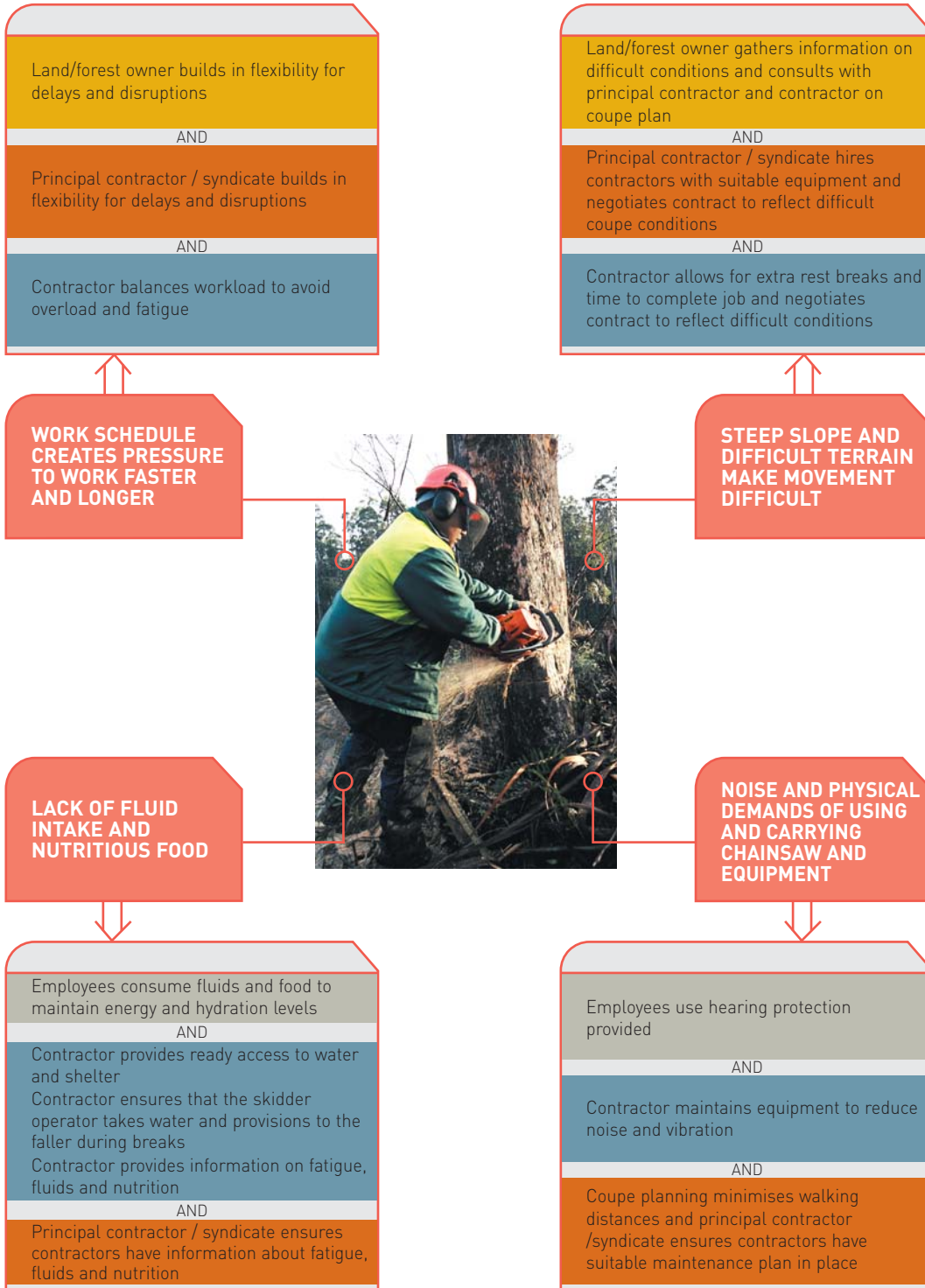
### BASIC PRINCIPLES FOR REDUCING FATIGUE IN FORESTRY

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 coupe or compartment 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 night sleeps every week and having at least one day a week free of work
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



## Example – Manual Faller

This example shows how managing fatigue requires everyone to work together and depends on more than what happens on the day in a particular coupe or compartment. A combination of measures is needed to control the risks.



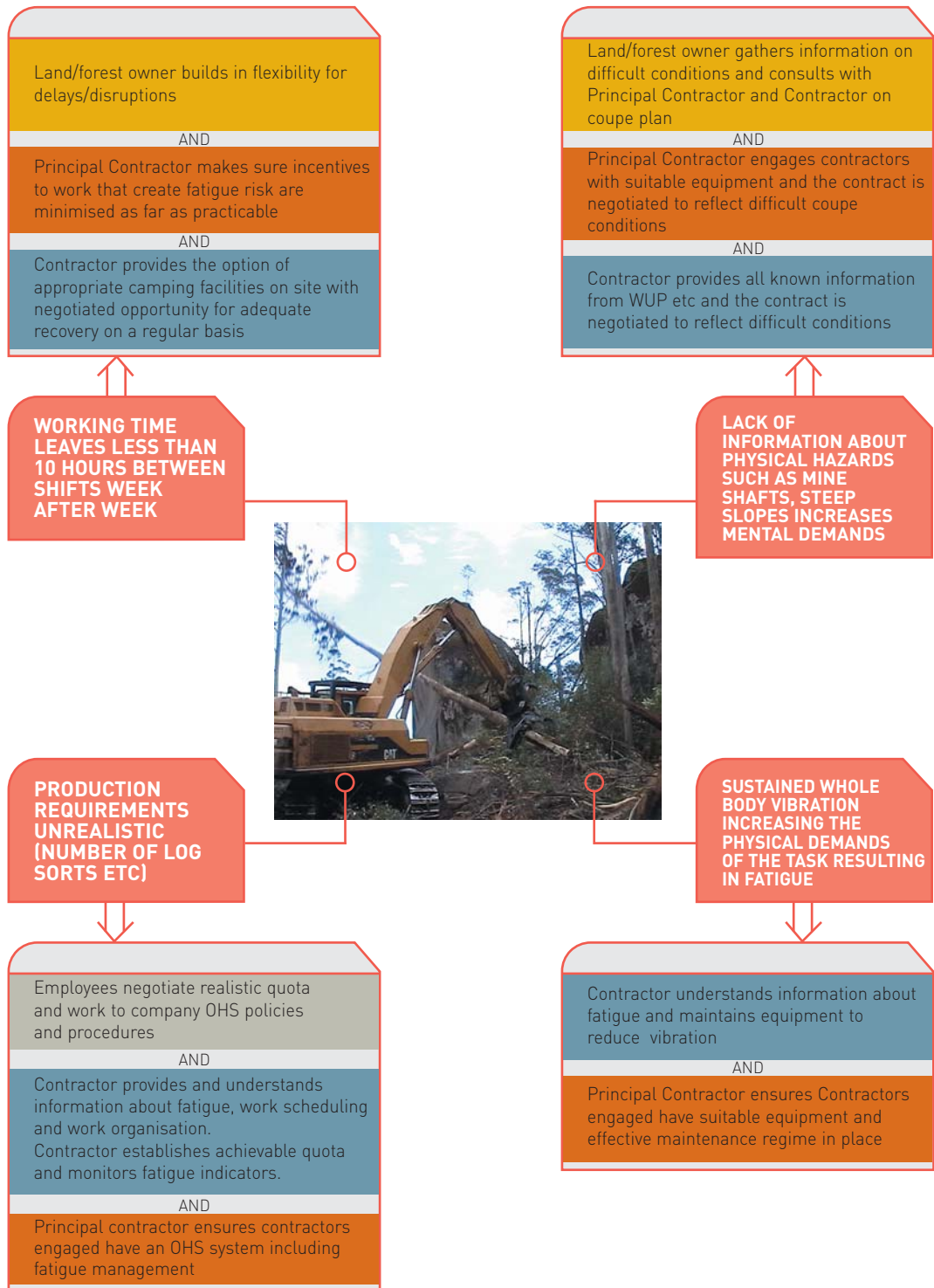
- Land/forest owner
- Principal contractor / Syndicate
- Contractor
- Subcontractor / Employee



# COMBINATIONS OF MEASURES TO REDUCE FATIGUE

## Example – Harvester

This example shows how managing fatigue requires everyone to work together and depends on more than what happens on the day in a particular coupe or compartment. A combination of measures is needed to control the risks.

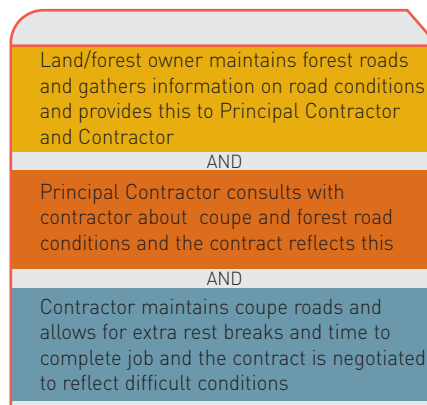
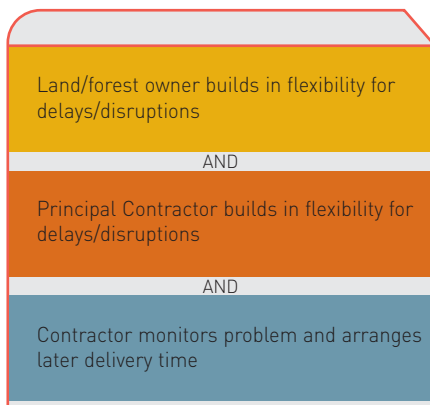


- Land/forest owner
- Principal contractor / Syndicate
- Contractor
- Subcontractor / Employee



## Example – Haulage Driver

This example shows how managing fatigue requires everyone to work together and depends on more than what happens on the day in a particular coupe or compartment. A combination of measures is needed to control the risks.



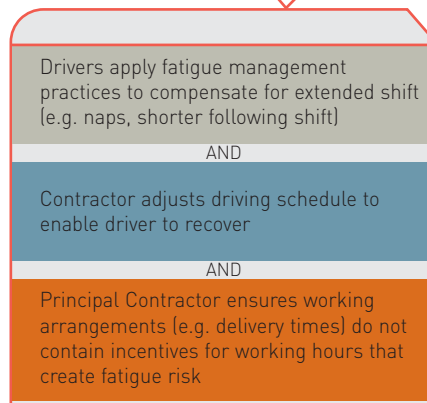
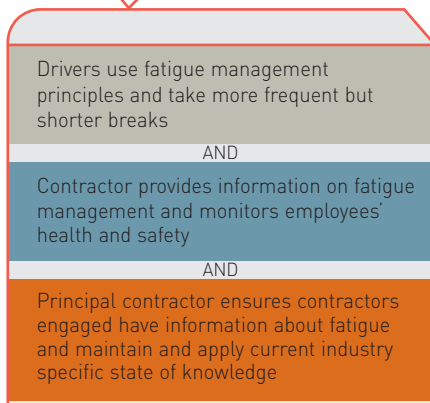
**DRIVER HAS TO PUSH DRIVING HOURS TO THE LIMIT TO CATCH UP BECAUSE OF UNEXPECTED DELAYS**

**POOR COUPE 'ROAD' CONDITIONS INCREASING MENTAL AND PHYSICAL DEMANDS RESULTING IN FATIGUE**



**DRIVERS ONLY TAKE SHORT BREAKS AT THE END OF LONG CONTINUOUS DRIVING SESSIONS**

**LESS THAN 7-8 HOURS SLEEP BEFORE WORKING LONG SHIFTS THAT EXTEND INTO THE MIDNIGHT TO 6AM PERIOD**



- Land/forest owner
- Principal contractor / Syndicate
- Contractor
- Subcontractor / Employee



## FATIGUE RISK CONTROL GUIDE

In this section, some typical practices are shown in a 'traffic light' format, showing how fatigue risks can be reduced from high risk to low risk. While the examples given do not cover all possible problems and solutions, they do illustrate some common issues and the need to apply the 10 basic principles for reducing fatigue in forestry summarised on page 20.

This section is designed to allow you to quickly assess if all of your fatigue risks are being managed and the practices you should aim for.

Compare your current situation with the examples shown. What else can you do to reduce the risk of fatigue?

### FATIGUE RISK

#### Red – high risk

Any one of these practices is likely to cause fatigue, but more than one factor requires immediate action.

Eliminate these practices as soon as possible. If that's not possible, reduce the risk by using interim measures.

#### Amber – medium risk

These practices may reduce fatigue but are interim measures.

Use a combination of these practices as interim measures but plan to replace them with lower risk practices.

#### Green – low risk

These practices should be the target for all workplaces.

Use as many of these practices as possible.

# FATIGUE RISK CONTROL GUIDE



FATIGUE RISK	HIGH RISK	MEDIUM RISK	LOW RISK
<b>Manual faller working in extremely hot conditions and coupe with steep slope (greater than 20°)</b>	Working in extreme weather conditions without access to water and frequent breaks	Working in extreme weather conditions but with access to water and frequent breaks	Heat stress procedure limits work in extreme conditions by rescheduling work to a cooler time of day, working in shade and providing access to water and frequent breaks
	No workload adjustments made for difficult terrain and steep slope	Extra time to complete job while working in difficult terrain and steep slope	Workload adjusted at coupe planning stage to account for difficult terrain and steep slope
	No additional hydration in first period of work before morning break	Additional hydration in first period of work before morning break	Additional hydration and rest breaks in first period of work before morning break
<b>Manual faller starts work before 6 a.m. after travelling 1 hour or more to the coupe or compartment</b>	Schedule and coupe location means worker gets less than 6 hours sleep per day	Schedule and coupe location allows worker to get 6–7 hours sleep per day	Schedule and coupe location allows worker to get 7–8 hours sleep per day
	Starting work without breakfast and little intake of nutritious food during work	Starting work with breakfast and some intake of nutritious food during work	Starting work with a nutritious breakfast and intake of nutritious food during work
	Working extended shifts into night hours to account for reduced length of season	Extended working hours to account for reduced length of season are limited to daylight hours	Extra demands because of reduced length of season are met by additional crew
<b>Manual faller using noisy equipment that has to be carried long distances in a day</b>	Using noisy equipment without hearing protection throughout the day	Using noisy equipment with hearing protection throughout the day	Equipment is adjusted to minimise noise, hearing protection is used and tasks are rotated if practicable
	Lack of job planning means faller has to carry equipment long distances	Lighter equipment selected to minimise physical effort	Lighter equipment selected and better job planning used to minimise the distance to be covered
	Working with a smaller crew size than needed to meet production targets	Working with the minimum crew size needed to meet production targets	Working with a suitable crew size needed to meet production targets

Note: The examples given do not include all possible problems and solutions, but are used to illustrate common issues. You should ensure that all risk factors are assessed and controlled.



## FATIGUE RISK CONTROL GUIDE

FATIGUE RISK	HIGH RISK	MEDIUM RISK	LOW RISK
<b>Choker setter has high physical demands moving to and from loads in hot and difficult conditions</b>	Working in extreme weather conditions without access to water and frequent breaks	Working in extreme weather conditions but with access to water and frequent breaks	Heat stress procedure limits work in extreme conditions by rescheduling work to a cooler time of day, working in shade and providing access to water and frequent breaks
	Working in difficult terrain and steep slope without extra time or breaks	Extra time to complete job while working in difficult terrain and steep slope	Workload adjusted at coupe planning stage to include job-sharing and extra breaks
	Type of timber and cable-logging method used requires high concentration without extra time to complete tasks	Extra time to complete difficult and demanding tasks allowed for on a day-by-day basis	Workload adjusted at coupe planning stage to include job-sharing and extra breaks
<b>Harvester operator works over 60 hours in a week to meet production targets</b>	Working time leaves less than 10 hours between shifts	Working time leaves 10–12 hours between shifts	Working time leaves up to 14 hours between shifts
	Working shifts longer than 12 hours on any day without a longer break before the next shift	Working shifts of 10–12 hours on any day without a longer break before the next shift	Any extended shift is compensated by a longer break before the next shift
	Production requirements are unrealistic (number log sorts, quality requirements)	Production requirements reflect crop conditions, and machine and operator capabilities	Production requirements reflect stand conditions, and machine and operator capabilities

Note: The examples given do not include all possible problems and solutions, but are used to illustrate common issues. You should ensure that all risk factors are assessed and controlled.

# FATIGUE RISK CONTROL GUIDE



FATIGUE RISK	HIGH RISK	MEDIUM RISK	LOW RISK
<b>Skidder operator needs to be constantly aware of overhead hazards and the whereabouts of other workers</b>	Vehicle causes high level of whole-body and hand-arm vibration	Vehicle causes reduced level of vibration because of adjustments to the suspension	Vehicle causes low level of vibration due to regular maintenance and selection of appropriate seating
	Starting work without breakfast and little intake of nutritious food during work	Starting work with breakfast and some intake of nutritious food during work	Starting work with a nutritious breakfast and intake of nutritious food during work
	No short breaks taken during a continuous working period of more than 4 hours	Short breaks used only at the end of a 4-hour continuous working period	More than 2 short breaks in a 4-hour period; short breaks taken early in shift
<b>Forwarder operating in area where constant awareness of other operators is required</b>	Vehicle is hot and stuffy with no effective ventilation	Vehicle has effective cabin ventilation through vents and windows	Vehicle has effective air conditioning
	Vehicle causes high level of whole-body and hand-arm vibration	Vehicle causes reduced level of vibration because of adjustments to the suspension	Vehicle causes low level of vibration due to regular maintenance and selection of appropriate seating
	No short breaks taken during a continuous working period of more than 4 hours	Short breaks used only at the end of a 4-hour continuous working period	More than 2 short breaks in a 4-hour period; short breaks taken early in shift

Note: The examples given do not include all possible problems and solutions, but are used to illustrate common issues. You should ensure that all risk factors are assessed and controlled.



## FATIGUE RISK CONTROL GUIDE

FATIGUE RISK	HIGH RISK	MEDIUM RISK	LOW RISK
<b>Truck-driver's work schedule has no flexibility for disruption or delays</b>	Less than 6 hours sleep before working long shifts that extend into the 12 a.m. – 6 a.m. period	Regular 7–8 hours sleep before working shifts that extend into the 12 a.m. – 6 a.m. period	Regular 7–8 hours sleep and most jobs avoid driving at low alertness periods (i.e. night and early afternoon)
	Schedules do not build in time for delays and force drivers to push limits of fatigue and speed	Schedules allow some flexibility for delays	Schedules build in time for typical delays and road conditions
	Less than 2 consecutive night sleeps in a week	3–5 night sleeps in a week	5 or more night sleeps in a week
<b>Truck-driver operating in peak hour through heavy city traffic</b>	Loading and unloading schedule means regular driving at night	Trip planning minimises driving outside daylight hours	Trip planning allows most driving to be done in daylight periods of light traffic level
	Short breaks regularly sacrificed for extended driving shifts of more than 5 hours	Short breaks used only at the end of allowed continuous driving period	More than 2 short breaks in a 5-hour period; short breaks taken early in shift
	More than 72 hours working per week	48–72 hours working per week	48 hours or less working per week

Note: The examples given do not include all possible problems and solutions, but are used to illustrate common issues. You should ensure that all risk factors are assessed and controlled.

Further, this document is not intended to replace existing industry award provisions or other schemes such as the *Transition Fatigue Management System (TFMS)*. However, as the state of knowledge about fatigue improves – for example, as outlined in the proposed *National Road Transport Commission Fatigue Code of Practice* – employers and contractors would be expected to implement additional measures to deal with fatigue.

## 5. MONITOR AND REVIEW YOUR FATIGUE MANAGEMENT PROGRAM



You should review your operations regularly, at least every 3 months, and ask workers if there are any fatigue problems. In particular, each time you start work that's different to your normal operations, you need to work through the hazard identification, risk assessment and risk control process.

As an employer, you are also required to monitor the health of your employees and to keep appropriate records.

You should also make sure the basic procedures that you and your workers use are kept up to date.

Report and investigate incidents and near-misses.

Any incidents or near-misses must be reported and investigated to assess whether fatigue could have been a contributing factor.

Use the hazard identification and risk assessment worksheets to work out if risk factors contributed to fatigue. Review your risk control measures to determine whether the risk factors were controlled effectively.

Once you've found the cause of the problem, take action to prevent it happening again. This may involve consulting with various parties in the forestry environment and making changes at the planning or coupe allocation stage to ensure that risks are controlled. In addition:

- advise other parties if you believe they contributed to the incident, and consult on any changes you would like them to make
- provide feedback to all workers and to workplace health and safety committees about the actions taken to control the risks
- make sure any regulatory requirements for reporting and recording incidents are met



## INFORMATION FOR FOREST 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

- You need to advise your employer 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 and pharmacist.
- Use of medications needs to be reported to your employer 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.
- You should 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. These include cereals, porridge, bananas, rice, beans, bread, root vegetables and potatoes. High-energy or easily digested foods include rice dishes, filled rolls, fruit, yoghurt and muesli bars.
- Have a good breakfast of toast, cereal, eggs, juice and fruit.
- Cut down on 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.



<b>Circadian rhythm</b>	Circadian rhythms (or 'body clock') regulate physiological and behavioural functions on a 24-hour basis. Sleep and wakefulness are programmed, and sleepiness is greatest between 2 a.m. and 6 a.m. and to a lesser extent between 2 p.m. and 4 p.m.
<b>Fatigue</b>	An acute or ongoing state of tiredness that affects employee performance, safety and health, and requires rest or sleep for recovery.
<b>Hazard</b>	A source or situation with the potential to cause injury, illness or disease.
<b>Hazard identification</b>	The process of recognising that a hazard exists.
<b>Night sleep</b>	A continuous rest period taken between 10 p.m. and 8 a.m.
<b>Night work</b>	Any work undertaken between midnight and 6 a.m.
<b>Practicable</b>	Practicable means practicable having regard to: <ul style="list-style-type: none"> <li>(a) the severity of the hazard or risk in question</li> <li>(b) the state of knowledge about that hazard or risk and any ways of removing or mitigating that hazard or risk</li> <li>(c) the availability and suitability of ways to remove or mitigate that hazard or risk, and</li> <li>(d) the cost of removing or mitigating that hazard or risk</li> </ul>
<b>Risk</b>	The likelihood of an injury, illness or disease occurring and the severity of any injury, illness or disease that results from exposure to a hazard.
<b>Risk assessment</b>	The process of working out how big a risk is present and what risk factors are causing the problem.
<b>Risk control</b>	The process of applying appropriate measures to eliminate or reduce any risks.
<b>Sleep opportunity</b>	A continuous break to allow for good quality sleep. It should allow a worker to get 7–8 hours sleep and will vary in length depending on the time of day.
<b>Short rest break</b>	Any rest break that's between 15 minutes and 1 hour long.



## REFERENCES

A variety of sources have been used in the preparation of this guide, including research carried out by WorkSafe Victoria. Some of the key sources are listed below:

### **Fatigue Expert Group**

*Options for Regulatory Approach to Fatigue in Drivers of Heavy Vehicles in Australia and New Zealand*, National Road Transport Commission, 2001

This group of Australian and New Zealand fatigue experts conducted the most detailed recent examination of fatigue. While their focus was on driving hours in long-distance trucking, their research into sleep and time of day has broad application for fatigue management. Their findings on minimum sleep requirements, night work and the build-up of sleep debt have been used in this guide.

### **Logging Industry Research Organisation (LIRO), New Zealand**

Research undertaken by the LIRO has informed some of the thresholds set in this guide. In particular, continuous working periods, differences in the workload of manual fallers and harvester operators, and the importance of hydration and nutritious food are drawn from LIRO studies.

LIRO publications used in preparing this guide include:

- The Impact of Shift Length on Processor Operator Fatigue, v 23, no 18, 1998
- Reducing the Impact of Fatigue on Forest Workers, v 21, no 3, 1996
- Fatigue Levels in Motor-Manual Felling and Delimiting Operations, v 21, no 18, 1996
- Physiological Workload of Forest Work, v 19, no 4, 1994

### **Journal of Safety Research**

- Slappendel C, et al., Factors Affecting Work-Related Injury Among Forestry Workers: A Review, v 23, no 1, 1993
- Lilley R, et al., A Survey of Forest Workers in New Zealand: Do Hours of Work, Rest and Recovery Play a Role in Accidents and Injury?, v 33, 2002



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Forest Industry Occupational Health and Safety Stakeholder Forum and organisations involved in the Fatigue Working Group, a sub group of the Forum

### Forum Members

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- Forest and Forest Products Employment Skills Company
- Victorian Forest Harvesting and Cartage Council
- Victorian Association of Forest Industries
- Syndicated Central Gippsland Logging P/L (Syndicate)
- GCH Harvesting Pty Ltd (Syndicate)
- Forest Division, Construction, Forestry, Mining and Energy Union
- Tree Felling Safety Group
- Plantation Timber Association of Victoria – Carter Holt Harvey
- Department of Sustainability and Environment
- Australian Forest Contractors Association

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## WORKSAFE VICTORIA CONTACTS

### Head Office

Victorian WorkCover Authority

24th Floor

222 Exhibition Street

Melbourne Victoria 3000

GPO Box 4306

Melbourne Victoria 3001

Phone . . . . . 9641 1555

Fax . . . . . 9641 1222

Toll-free . . . . . 1800 136 089

### LOCAL OFFICES

Ballarat . . . . . 5337 1400

Bendigo . . . . . 5443 8866

Dandenong . . . . . 8792 9000

Geelong . . . . . 5226 1200

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{628 Bourke Street} . . . . . 9941 0555

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Warrnambool . . . . . 5562 5600

### PUBLICATIONS

Phone . . . . . 9641 1333

Fax . . . . . 9641 1330

### WEBSITE

[www.workcover.vic.gov.au](http://www.workcover.vic.gov.au)

### EMAIL

[info@workcover.vic.gov.au](mailto:info@workcover.vic.gov.au)

### VICTORIAN WORKCOVER ADVISORY SERVICE

24th Floor

222 Exhibition Street

Melbourne Victoria 3000

Phone . . . . . 9641 1444

Fax . . . . . 9641 1353

Toll-free . . . . . 1800 136 089

### EMAIL

[advisory\\_service@workcover.vic.gov.au](mailto:advisory_service@workcover.vic.gov.au)