Office of Industrial Relations
Workplace Health and Safety Queensland

Sugar industry

Code of Practice 2005

Queensland Government

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

This code of practice was varied by the Minister for Education and Industrial Relations on 27 November 2011 and published in the Queensland Government Gazette on 2 December 2011.

This preserved code commenced on 1 January 2012.

This code was varied on 1 July 2018 by the Minister for Education and Minister for Industrial Relations.

PN11188

Contents

1. Introduction

This Sugar industry Code of Practice is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

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

From 1 July 2018 duty holders are required to comply either with an approved code of practice under the WHS Act or follow another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety to the standard required in the code.

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 WHS 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 WHS Act and the WHS 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.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice. This may include issuing an improvement notice for failure to comply with a code of practice where equivalent or higher standards of work health and safety have not been demonstrated.

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 WHS Act, the WHS Regulation, the *Electrical Safety Act 2002* (the ES Act) and the *Electrical Safety Regulation 2013* (the ES 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** (PCBU) has the primary duty under the WHS 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 WHS Act and the WHS 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 WHS 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 WHS 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, co-operation and co-ordination Code of Practice.*

1.1 About this code of practice

This *Sugar industry Code of Practice* (including supplementary documents) is intended to be used by persons with a duty under the WHS Act, including:
(a) managers of sugar mills and cane railway systems
(b) workers
(c) operators
(d) workplace health and safety representatives.

The *Sugar industry Code of Practice* describes methods for controlling major hazards associated with sugar mill operations and cane rail operations; the machinery, equipment, substances and work practices; and what should be considered to safeguard the health and safety of workers, the public and others.

The *Sugar industry Code of Practice* includes two supplementary documents – *Sugar Mill Safety* and *Cane Rail Safety*. While these two documents form part of the code, they each address risks which are specific to their part of the sugar industry.

1.2 Australian standards

Australian Standards provide useful information, which may assist you to meet your duties. All care should be taken when referring to Australian Standards detailed in the document to ensure it is the current standard.

1.3 Legislation

Legislation that is relevant to the sugar industry includes:
(a) *Work Health and Safety Act 2011* (the WHS Act).
(b) *Work Health and Safety Regulation 2011* (the WHS Regulation).
(c) *Electrical Safety Act 2002* (the ES Act).
(d) *Electrical Safety Regulation 2013* (the ES Regulation).
(e) *Transport Infrastructure Act 1994*.
(f) *Transport Operations (Road Use Management) Act 1995*.
(g) *Transport Operations (Road Use Management—Road Rules) Regulation 2009*.

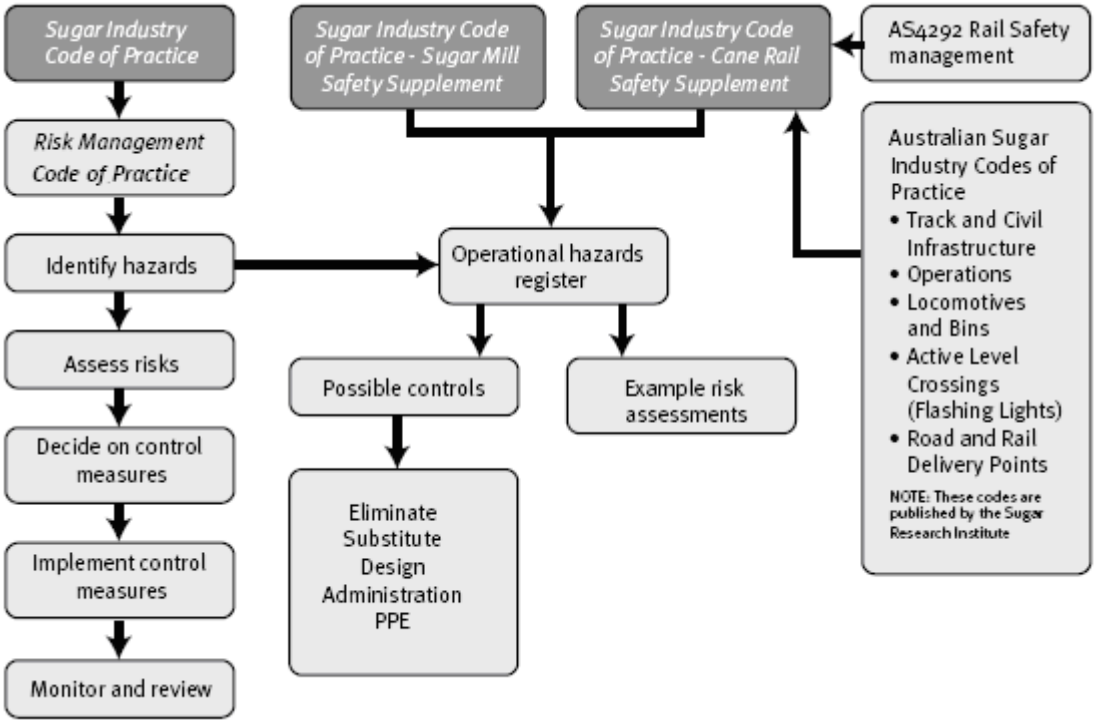
1.4 Duty holders

The following persons have duties to ensure health and safety (see the WHS Act for further information):

- PCBU, whether as employers, self-employed persons or otherwise
- person with management or control of a workplace
- person with management or control of fixtures, fittings or plant at a workplace
- person who designs plant, substances or structures
- person who manufactures plant, substances or structures
- person who imports plant, substances or structures
- person who supplies plant, substances or structures
- person who installs, constructs or commissions plant or structures
- officers
- workers
- other persons at workplaces.

Registrable plant and registrable plant design must be registered with Workplace Health and Safety Queensland. See Schedule 5 of the WHS Regulation for more information.

Figure 1 Relationship between documents



2. Information about the sugar industry

The Queensland sugar industry consists of:
(a) growers who supply sugar cane to sugar mills
(b) harvesting contractors who mechanically harvest cane
(c) transport operators who transport the cane to mills (by road, rail, or both)
(d) sugar millers who produce raw sugar
(e) sugar refiners who produce refined sugar products.

2.1 Cane growing

Growers supply sugar cane to sugar mills. They range in size from small family owned farms through to large corporate landholders (including mill landholders) and have a range of risks common to other rural operations. There is a relationship between growers, millers and harvesting contractors for workplace health and safety in a number of areas, but particularly at delivery points and sidings. Some of these interface areas are discussed in the *Cane Rail Safety Supplement*.

2.2 Harvesting

In the majority, contract harvesters have other cane related businesses such as cane growing in addition to their harvesting operations. Harvesting is a mechanised process that is seasonal and usually does not take place during wet weather due to 'stool damage' (stool is the root system of sugar cane which remains in the ground after harvesting and ratoons or re-grows). The harvest takes place within a very short time frame (usually about 20 weeks) and involves the use of large and expensive equipment including field transport equipment. Sugar cane can be harvested in its normal state (green cane) or after a fire is put through the crop to reduce the amount of leafy material (burnt cane).

2.3 Transport

There are two methods of transport within the Queensland sugar industry. Road transport by trucks, transporters (or haul out vehicles) and cane railway transport using locomotives and bin fleets. In some milling areas the transport system is entirely road based, in others, entirely rail based. In a few mills a combination of both systems is used. Rail based transport is addressed in the *Cane Rail Safety Supplement*.

2.4 Milling

The sugar milling process effectively turns sugar cane into raw sugar plus a range of by-products and is addressed in the *Cane Rail Safety Supplement*. That supplement focuses on sugar manufacturing operations excluding refineries.

2.5 Refining and packaging

Refining is the process of turning raw sugar into a range of final consumption sugar products including white sugar, brown sugar, liquid sugar and castor sugar and can include packaging of those products. Refinery processes are not covered in this code of practice.

3. Managing health and safety

As outlined previously the intent of this code is to identify industry specific hazards, suggest possible controls and provide examples on the risk management process. It is expected that mill and rail operators would develop a risk register as outlined in the *How to manage work health and safety risks Code of Practice*, assess the risks in their operation, implement controls and monitor and review the systems implemented to control those risks.

As part of any overall program for managing health and safety in the sugar industry, operators should consider the following key components:
(a) risk management
(b) consultation
(c) training
(d) emergency procedures.

3.1 Risk management

The *How to Manage work health and safety risks Code of Practice* is a generic risk management standard that applies to all Queensland workplaces to which the WHS Act applies. It provides a risk management process to help you meet your health and safety duties. Duty holders should use the risk management process:
(a) now, if you have not done it before
(b) when a change occurs (for example changing work procedures)
(c) after an incident or 'near miss' occurs
(d) at regularly scheduled times appropriate to the level of risk at your workplace.

Sugar mill operators and cane rail operators should consult with affected persons, including external duty holders where necessary, when conducting risk assessments in areas of joint responsibility.

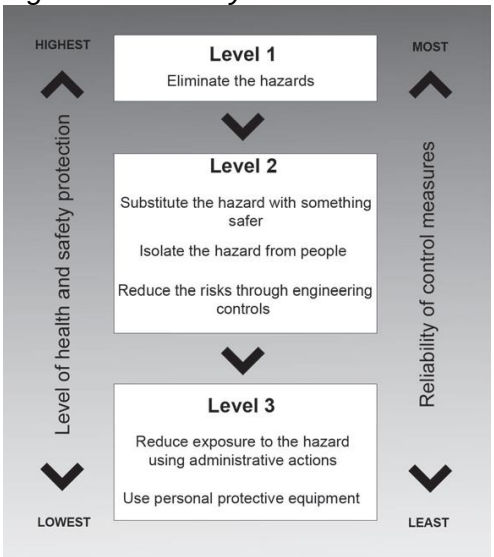
3.2 Risk registers

A risk register or list for all hazards at a workplace should be developed. Hazards can be classified under one of the following areas:
(a) biological hazards
(b) energy and electricity
(c) hazardous manual tasks
(d) plant
(e) hazardous chemicals
(f) work environment.

3.3 Hierarchy of control

The control measures used to control risks in the sugar industry should be chosen according to their effectiveness. The 'hierarchy of control' ranks the ways of controlling the risk from the highest level of protection and reliability to the lowest. Duty holders must always aim to eliminate a hazard, which is the most effective control. If this is not reasonably practicable, you should minimise the risk by working through the other alternatives in the hierarchy.

Figure 2 Hierarchy of control



In practice, several control options are often used in combination. Personal protective equipment (PPE) is usually used in conjunction with other control measures.

3.4 Consultation

The promotion of consultation between PCBUs and workers is a basic concept of the WHS Act. The WHS Act provides for the election of Workplace Health and Safety Representatives and the establishment of workplace health and safety committees. For details on the legislative requirements for consultation, refer to Part 5 of the WHS Act and the *Work health and safety consultation, co-operation and co-ordination Code of Practice*.

Consultation is an important risk management strategy as it involves the sharing of information and the exchange of views between PCBUs, workers and their representatives. Workers must be consulted when identifying, assessing and making decisions about controlling risks. They know the difficulties in performing particular tasks and may be able to suggest ways to improve work practices. If there is a Health and Safety Representative for a work group they must also be included in the consultation process. It is recommended that the workplace health and safety committees be included in the consultation process.

Consultation can take the form of informal on-the-job interaction during a walk-through of the work unit. However, it is also desirable to put a formal structure in place to address issues at regular workplace health and safety committee or staff meetings. This ensures issues are addressed at an early stage and in a formalised manner.

3.4.1 Consultation and the risk management process

Consult workers and workplace health and safety representatives routinely at all stages of the risk management process, including when:

(a) new work processes/equipment/tools are being designed, purchased or modified (consult early to allow changes to be incorporated)
(b) identifying problem jobs which require assessment
(c) establishing priorities for the assessment of problem jobs and during the risk assessment process
(d) deciding on control strategies to reduce exposure to risk factors

(e) reviewing the effectiveness of implemented control measures and identifying whether further risks of injury have been created by the chosen controls
(f) the contents of procedural documents are being decided, as experienced workers can help make sure they are as relevant as possible to the actual work situation.

3.4.2 Other times to consult

Develop a process for consulting with workers regularly on an informal basis to help eliminate or minimise some risks. Opinions should be obtained from workers about:
(a) whether any task is a problem and if there a better way of doing it
(b) how work areas can be improved
(c) what type of training was given or what training is needed for this process.

3.5 Data collection

The collection and review of injury data or statistics is one method of assessing the effectiveness of implemented control measures which also provides a mechanism of identifying other hazards in the workplace.

One of the roles of the workplace health and safety committee is reviewing the circumstances surrounding work injuries, work caused illnesses or dangerous events referred to the committee for review.

3.6 Training

Under the WHS Act, persons may meet part of their duties by providing appropriate training to their workers to ensure health and safety. The aim of training is to ensure that workers have the appropriate skills and knowledge to perform their work without risk to the health and safety of themselves and others.

Training should be appropriate to the type of work to be performed. In some cases, formal training will be appropriate, in others, on-the-job training may be more appropriate. The special needs of workers should be taken into account in deciding on the structure, content and delivery of training. This should include literacy levels, work experience and specific skills required for the job.

Adequate and appropriate training is a way of managing the risks associated with hazards in sugar mills and cane rail operations. This can be done by:
(a) determining who needs to be trained
(b) determining what training is required
(c) determining how training will be delivered
(d) ensuring that the training is provided
(e) evaluating the training
(f) keeping training records.

The amount of training will be determined by:
(a) the nature of the workplace hazard(s)
(b) the degree of risk associated with these hazards
(c) the complex aspects of work, such as operating procedures and equipment
(d) other controls being implemented
(e) the qualification and experience of the worker.

3.6.1 Types of training

There are different types of workplace health and safety training that has different purposes, including:

(a) induction training – for workers when commencing employment or are new to the job. This training is general and may involve a workplace tour, information about conditions of employment, administration, organisational structure, emergency procedures and workplace amenities
(b) supervisor and management training – is provided to help ensure that the supervision and management of the health and safety issues is appropriately carried out in the workplace
(c) specific job training – involves providing information about the risks associated with the job
(d) specific hazard training – involves providing information about the risks associated with a particular hazard
(e) ongoing training or refresher training – should be provided periodically to ensure that work continues to be performed safely
(f) emergency procedures training – is provided to ensure workers know what to do in the event of an emergency
(g) first aid training – is provided to ensure appropriate procedures are followed for administering first aid.

3.6.2 General training information

All people exposed to risk should be provided with information about:

(a) workplace health and safety legislation
(b) the organisations workplace health and safety policy/program
(c) workplace health and safety risk management processes
(d) which control measures are in place to minimise exposure to risks associated with workplace hazards
(e) the correct use of controls and how to ensure they are kept in working order
(f) any known residual risk
(g) safe work procedures
(h) how to use and maintain equipment
(i) any special safety information needed.

4. Health and safety issues

4.1 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:
(a) job (e.g. work activity)
(b) environmental factors (e.g. air temperature, humidity, air movement and radiant heat)
(c) worker factors (e.g. extent of acclimatisation and hydration).

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.

4.1.1 Factors contributing to heat problems

Examples of job factors
(a) Work of a strenuous nature (e.g. clearing chokes).
(b) Work that is sustained for extended periods.
(c) Inadequate cooling off or rest periods.

Examples of environmental and seasonal factors
(a) High air temperatures.
(b) Radiant heat from hot objects such as machinery (e.g. hot boiler drums, effet and pan vessels).
(c) Radiant heat from working outdoors in the sun.

Examples of worker factors
(a) Excessive or inappropriate clothing, protective or otherwise.
(b) Dehydration from poor diet, vomiting, diarrhoea, alcohol and caffeine (diuretics) consumption and insufficient drinking.
(c) Medical condition (i.e. heart problems, diabetes, hypertension or fever caused by infections).

4.1.2 Possible control measures for heat stress

Altering work environment
(a) Reducing the body's metabolic heat production using automation and mechanisation of tasks.
(b) Reducing radiant heat emissions from hot surfaces and plant (e.g. by insulation and shielding).
(c) Using ventilation and air-conditioning.
(d) Humidity reducing methods for example, install a dehumidifier (seek engineering advice).
(e) Creating some shade (i.e. tarp or umbrella) or at least find a tree for outdoor workers' rest breaks.

Hydration
(a) Instead of depending on thirst, the worker should drink 150–200 millilitres of cool fluids every 15–20 minutes (rather than drinking a litre at less frequent intervals).
(b) Full re-hydration should be achieved before recommencing work on subsequent days.

Medication and fitness

(a) Seek a doctor's advice if working in hot environments and using medications like sedatives, tranquillisers, antidepressants, amphetamines, antispasmodics, diuretics or those affecting blood pressure as they may interfere with heat tolerance.
(b) Avoid alcohol and caffeinated drinks as they are diuretics.

Adjusting administrative, work schedule and clothing controls

(a) Limiting duration of exposure to hot work.
(b) Scheduling regular work/rest breaks in cool, shady areas with protective clothing removed.
(c) Schedule hot jobs to cooler parts of the day and maintenance to cooler seasons.
(d) Isolate hot work practices to times/locations distant from other workers.

Supervisors may need training to be effective in identifying and addressing problems. Methods of identification should be outlined clearly in the workplace policy (e.g. number of sick days and if there is a safety risk).

4.2 Fatigue and working hours

The Workplace Health and Safety Queensland *Guide for managing the risk of fatigue at work* and *Fatigue management – a guide for workers* provides information on managing fatigue, the effects of fatigue, shift work and extended working hours. Fatigue is an issue which should be considered as part of an overall safety system for sugar milling and cane rail operations. Fatigue affects a person's health, reduces performance and productivity within the workplace and also increases the chance of a workplace incident occurring.

The following factors are associated with fatigue:

(a) spending long periods of time awake
(b) inadequate amount of sleep over an extended period
(c) insufficient quality of sleep over an extended period.

Fatigue is also caused by prolonged periods of physical and/or mental exertion without enough time to rest and recover. The level of fatigue varies and depends on:

(a) workload
(b) length of shift
(c) previous hours and days worked
(d) time of day or night worked.

4.2.1 Possible control measures for fatigue and working hours

Factors to consider when managing fatigue include:

(a) roster design (e.g. number of consecutive night shifts worked, starting and finishing times of shifts and length of shifts)
(b) commuting hours (e.g. excessive hours spent travelling to and from work can extend the effective length of a shift, and reduce the time available for sleep and recovery between shifts)
(c) shift rotation (e.g. if the starting times of shifts vary throughout the cycle of shifts, the cycle should begin with an early start and move progressively later)
(d) breaks (e.g. time spent away from the work environment has the potential to allow workers to recover from fatigue and improve work performance, vigilance, safety and efficiency)
(e) occupational exposure levels (e.g. exposure to hazards such as noise, heat and chemicals may be increased and should be carefully monitored)

(f) manual tasks (e.g. the prolonged performance of repetitive tasks without the adequate chance of rest and recovery may result in an occupational overuse injury).

4.3 Health assessments

Health assessments are a useful tool to help ensure that all workers are in a state of health compatible with their job requirements, so as not to endanger their own or others' health or safety.

Pre-placement health assessments should be considered by management as they can provide important information relating to a prospective workers' suitability to work in a particular environment.

Health assessments should also be considered prior to a transfer to a position that involves significant change in work location, hours of work, physical demands or exposure.

A health assessment should be carried out if the line manager, supervisor or team leader has a cause for concern for the person's health and their continued suitability for a specific task or work in a specific environment.

Details of these assessments must be treated as confidential.

4.4 Hazardous manual tasks

The *Hazardous manual tasks Code of Practice* provides detailed information about how to manage the risk of a musculoskeletal disorder arising from hazardous manual tasks in the workplace.

Manual tasks are a part of nearly all work performed by workers within sugar mill and cane rail operations. Manual tasks are defined as any activity where workers grasp, manipulate, carry, move (lift, lower, push or pull), hold or restrain a load. This includes operating a control panel or a computer, repairing machinery, driving a bobcat, heavy machinery or raking bagasse.

Hazardous manual tasks can contribute to injuries affecting all parts of the body, particularly the back, shoulder and wrist. Injuries are commonly linked with ongoing wear and tear to the joints, ligaments, muscles and intervertebral discs. They can be, but are rarely caused by a one-off overload situation and are normally caused over a period of time, by a gradual build-up of damage through:

(a) Handling of loads – frequent lifting with the back bent or twisted or pushing/pulling loads.
(b) Working in a fixed position with the back bent, continuous sitting or standing, or driving vehicles for long periods.
(c) Repetitive work with the hand or arm, and having to grip tools or loads tightly for example using a sledgehammer or shovel.
(d) Working with the neck, shoulders and arms in a fixed position for example grinding shredder hammers.
(e) Using vibrating tools for example drills or jack hammers.

Risk factors

'Risk factors' are part of the demands of a job. They affect the worker and can contribute to injury. Risk factors are used to analyse hazardous manual tasks and are divided into three categories:

(a) direct stressors
(b) contributory risk factors
(c) modifying risk factors.

No risk factor occurs alone. There is a crossover between the different categories.

Direct stressors
Direct stressors contribute directly to injury and include:
(a) forceful exertions (the level of muscular force exerted)
(b) working postures (awkward, uncomfortable or fixed, static postures)
(c) repetition and duration (how often actions are repeated and the length of time workers are exposed)
(d) vibration (absorbed from tools and equipment).

There is a risk of injury related to hazardous manual tasks only when a direct stressor is present.

Contributing risk factors
Contributing risk factors are what cause the direct stressors and include:
(a) the work area design (where the particular task is based and includes furniture, equipment and work benches used by the worker to perform the task)
(b) use of tools (the design and the amount of time the tool is used)
(c) nature of loads (the size, shape, dimensions, weight, etc. of the load)
(d) load handling (whether the load is lifted, lowered, pushed, pulled or carried, and effort is required).

If contributory risk factors are redesigned, the impact of the direct stressors can be reduced. A contributory risk factor is not a risk without a direct stressor.

Modifying risk factors
Modifying risk factors can contribute to a further change in the impact of other risk factors, for example:
(a) Individual factors such as a worker's physical capacity.
(b) Work organisation such as the speed at which paced work is set, staffing levels, breaks or maintenance schedule.

A modifying risk factor is not a risk without a direct stressor.

4.4.1 Possible control measures for hazardous manual tasks

The risk management process provides mechanisms for the prevention of musculoskeletal disorders.

The *Hazardous manual tasks Code of Practice* provides detailed information about how to manage the risk of a musculoskeletal disorder arising from hazardous manual tasks in the workplace.

Design controls involve the alteration of the work process or physical aspects of the workplace such as the equipment or the workstation. Design controls are preferred as they are permanent and they can eliminate or minimise exposure to the risk factors. Design controls include:
(a) job design/redesign – altering the way a job is done or making changes to the work area, tools or equipment

(b) mechanical aids – providing mechanical aids to reduce the physical effort required by workers to do the job.

Administrative controls focus on reducing the amount of time workers are exposed to a risk factor. They are not preferred as they do not remove the cause of the problem, they may be forgotten under stressful conditions and they require ongoing supervision to ensure that they are used. Administrative controls include:

(a) work organisation – rotating workers, avoiding peaks in workflow, etc.
(b) task-specific training – ensuring that workers are trained in their specific work including the use of tools or mechanical aids
(c) maintenance programs – servicing and maintaining tools and lifting equipment on a regular basis
(d) PPE – providing PPE such as knee pads or gloves where needed.

Develop and implement solutions that work by:

(a) Finding and selecting the best control option. All control options should be considered, however design type controls are best. Interim controls may need to be chosen where permanent controls will take time to implement.
(b) Implementing the chosen control. It is recommended that controls be tested prior to implementation where possible to ensure that they are suitable, and
(c) Monitoring and reviewing the corrective measures to ensure they are working as planned and they have not created a new risk or problem.

4.5 Whole-body and hand-arm vibration

Many activities in sugar mills and cane rail operations cause vibration which may be either introduced as part of a process or occurs as a by-product. Workers involved in the various processes may therefore be exposed to whole-body or hand-arm vibration. Both types of exposure are capable of causing ill health effects, disorders or disease. Studies have shown that simultaneous exposure to noise and vibration can cause greater hearing loss than exposure to either source alone.

Whole-body vibration

There are no set limits for exposure to vibration. However, AS 2670.1 *Evaluation of human exposure to whole-body vibration – Part 1: General requirements* provides health guidance zones applicable to people in normal health and who are regularly exposed to vibration. It further provides guidance for the assessment of comfort and the incidence of motion sickness.

See *Guide to measuring and assessing workplace exposure to whole-body vibration* and *Information sheet – whole-body vibration* for further information.

Whole body vibration may result in:

(a) damage to bones and joints, especially in the lower spinal region
(b) variations in blood pressure
(c) visual impairment
(d) problems with the balancing system in the ear leading to symptoms like motion sickness and nausea.

Hand-arm vibrations

AS ISO 5349.2 *Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Part 2: Practical guidance for measurement at the workplace* provides guidelines for the assessment of hand-arm vibration. Hand-arm vibration exposure is expressed as an average exposure over a four hour period in a shift. Where exposure

exceeds an acceleration value of 2.9m/s², the worker should be medically examined for the presence of vibration white finger[1] or susceptibility for vibration white finger. People with, or susceptible to, vibration white finger should not perform work which causes hand-arm vibration.

Hand-arm vibration may result in:
(a) nerve and blood vessel degeneration leading to vibration white finger syndrome
(b) pain and cold sensation between attacks of vibration white finger
(c) loss of grip strength
(d) damage to joints and muscles in wrists and/or elbows
(e) carpal tunnel syndrome
(f) bone cysts in fingers and wrists.

See *Guide to measuring and assessing workplace exposure to hand-arm vibration* and *information sheet – hand-arm vibration* for further information.

4.5.1 Possible control measures whole-body and hand-arm vibration

Engineering control measures are the most effective form of controls because once in place they operate all of the time. The use of PPE is considered a less effective form of control as its effectiveness is heavily dependent on the wearer. Reduction of vibration in many instances also leads to reduction in noise emissions and the control of vibrations in work processes therefore serves an important dual purpose.

The risk of injury to workers can be prevented or minimised by:
(a) Assessing the risks, including conducting vibration exposure surveys in accordance with *AS 2670.1 Evaluation of human exposure to whole-body vibration – General requirements* or AS ISO 5349.1 *Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Part 1: General requirements* as appropriate, to identify risk processes and/or activities.
(b) Developing a vibration policy and vibration management program.
(c) Implementing a program for conducting vibration surveys on a regular basis and corrective actions.
(d) Implementing vibration control measures in consultation with workers and the engineering/maintenance section of sugar mills and cane rail operations and in accordance with the hierarchy of controls.
(e) Providing management and workers with education, training and information on vibration exposure, its effects and the need for its control.
(f) Providing regular medical check-ups to exposed workers.

Control measures to minimise exposure to vibration include:
(a) Treating the vibration source (i.e. isolate vibrating plant from its foundation through dampers and springs, redesign or modify).
(b) Treating the vibration transmission path (i.e. isolate ducts etc. from stationary plant, vibration dampened seating in locomotive cabins).
(c) Treating the receiver (i.e. isolate control rooms/enclosures/locomotive cabins, etc. from vibrating plant and surfaces).
(d) Using tools with anti-vibration handles.
(e) Maintaining properly sharpened cutting tools.
(f) Job rotation, to limit exposure to hand arm vibration exposure to no more than four hours per shift and of whole body vibration to no more than eight hours per shift.

[1] Also known as Raynaud's Syndrome.

(g) An adequate plant and equipment maintenance program.
(h) Personal protective equipment (e.g. anti-vibration gloves).
(i) Using minimum hand grip on tools consistent with safe work practices.
(j) Avoiding smoking as this restricts the blood vessels.

Generally administrative controls are not as effective in the long term as engineering control measures. Workers provided with personal protective equipment need proper training and instruction on their correct use, care and maintenance.

Selection of PPE must be on the basis of individual fit, comfort, work tasks and work environment with respect to the equipment being worn and in order to achieve a reduction in vibration exposure.

In each sugar milling and cane rail operation, a program should be developed for the regular monitoring of vibration exposure levels and checking the effectiveness of vibration control measures. Maintenance schedules should be put in place to ensure vibration insulators on plant are maintained in good condition to achieve maximum vibration reduction.

Medical surveillance
If medical surveillance is required it should be conducted by, or supervised by a registered medical practitioner with experience in health monitoring, and include:
(a) pre-employment history, including the taking of medication for migraine, hypertension or heart disease
(b) examination within six months after commencing employment
(c) examination taken before a shift and after at least 12 hours away from exposure;
(d) no smoking for four hours prior to test
(e) challenge tests
(f) provision of information for workers on vibration white finger and other symptoms of vibration exposure.

Monitoring
A monitoring program should include:
(a) regular vibration exposure surveys of workers
(b) identification of sources of hazardous vibration
(c) assessment of vibration control measures
(d) suitability of any personal protective equipment provided
(e) regular medical checks at the discretion of the medical practitioner
(f) periodic review of the effectiveness of the vibration management program.

4.6 Excessive noise

Duty holders must meet the requirements set out under the WHS Regulation for managing risks to health and safety relating to hearing loss associated with noise. A PCBU at a workplace must ensure that the noise that a worker is exposed to at the workplace does not exceed the exposure standard for noise. Further information can be found in the *Managing noise and preventing hearing loss at work Code of Practice*.

Noise is a hazard within most industries and a number of sources of noise exist in sugar mills and cane railways, including:
(a) plant associated with steam and compressed air (e.g. vents, pressure reducing valves, silencers, pipes or turbines)
(b) locomotives
(c) power houses
(d) plant (e.g. shredders, high speed gearboxes, fans, blowers or centrifugals)

(e) miscellaneous items (e.g. vacuum breakers, air operated valves, locomotives, warning horns, bumping cane bins or truck movements)
(f) workshop activities (e.g. grinding, hammering, metal cutting operations).

The exposure standard for noise is defined in the WHS Regulation as:
(a) $L_{Aeq,8h}$ of 85 dB(A) [$L_{Aeq,8h}$ means the eight-hour equivalent continuous A-weighted sound pressure level in decibels (dB(A)) referenced to 20 micropascals, determined in accordance with AS/NZS 1269.1:2005 (Occupational noise management—Measurement and assessment of noise immission and exposure]; or
(b) $L_{C,peak}$ of 140 dB(C) [$L_{\mathbf{C,peak}}$ means the C-weighted peak sound pressure level in decibels (dB(C)) referenced to 20 micropascals, determined in accordance with AS/NZS 1269.1:2005 (Occupational noise management—Measurement and assessment of noise immission and exposure)].

This means that someone exposed to a noise level of 85 dB(A) for eight hours or a single noise event in excess of 140 dB(C) can be considered to have been exposed to noise levels above the exposure standard for noise which may cause permanent damage.

The auditory risk to workers from excessive noise exposure includes permanent loss of hearing and Tinnitus (ringing in the ears). Health risks are also associated with exposure to noise and may include, among others, increased heart rate, higher blood pressure, stress and fatigue.

4.6.1 Possible control measures for excessive noise

The risks to workers health and hearing can be prevented or minimised by using the hierarchy of controls.

Elimination (new plant and workplaces)
Design, purchase or construct plant or the workplace to minimise noise levels. Engineering noise control measures are the most effective form of reducing excessive noise levels and should be implemented where practical.

Engineering controls (existing plant and workplaces)
Treat the noise source (silence noisy plant, redesign or modify), treat the noise transmission path (enclose noisy plant) or treat the receiver (locate the operator in a soundproof enclosure).

Administrative controls
Develop a noise policy and organise schedules so noisy work is completed when as few as people as possible are present.

Implement job rotation and an adequate plant and equipment maintenance program (maintenance schedules should be put in place to ensure plant, acoustic enclosures and silencers are maintained in good condition to achieve target noise levels).

Erect signage indicating noises greater than 85 dB(A) and ensure hearing protection is worn.

Personal protective equipment
Hearing protectors must be worn in situations where noise cannot be practically reduced below the excessive noise limits by engineering and/or administrative controls or, as an interim, until such controls can be put in place.

Workers provided with personal hearing protectors need proper training and instruction on their correct use, care and maintenance. Selection of personal hearing protectors must be on the basis of individual fit, comfort, work tasks and work environment with respect to the protectors being worn and therefore achieving the noise attenuation required.

A policy of personal hearing protection for all persons entering factory processing areas is recommended.

Additional control measures to minimise noise exposure may include:

Assessing noise[2]

(a) Conducting noise exposure assessments in accordance with AS/NZS 1269.1 *Occupational noise management – Part 1: Measurement and assessment of noise immission and exposure*, to identify risk areas and/or activities.
(b) Developing a noise control program in accordance with at least the elements of AS/NZS 1269.2 *Occupational noise management – Part 2: Noise control management* and AS/NZS 1269.3 *Occupational noise management – Part 3: Hearing protector program*.
(c) Implementing a program for conducting noise surveys on a regular basis and correcting any increases in noise exposure levels.
(d) Implementing noise control measures in consultation with the workers concerned, and in accordance with the hierarchy of controls.
(e) Consulting with workers about their needs and expectations.
(f) Providing management and workers with education, training and information on noise, its effects and the need for its control.
(g) Providing regular audiometric testing to exposed workers.

Monitoring

A program for the regular monitoring of noise exposure levels and checking of the effectiveness of noise control measures should be implemented as part of the safety management system.

A monitoring program should include:

(a) regular noise exposure surveys of workers
(b) identification of sources of hazardous noise
(c) assessment of noise control measures
(d) suitability of personal hearing protectors provided
(e) regular audiometric testing
(f) periodic review of the effectiveness of the noise management program based on the results of the noise surveys, audiometric tests, use of hearing protectors and other control measures.

4.7 Leptospirosis

Leptospirosis is a zoonotic disease (transmittable from animals to humans) caused by bacteria known as leptospira. The bacteria survive in water, wet conditions, mud and some clay soils. People are infected via the skin, eyes and mouth usually via animals carrying the bacteria in their kidneys and genital tract and passing the bacteria through urine.

[2] Refer to the *Managing noise and preventing hearing loss at work Code of Practice* for information on noise assessments.

In far north Queensland, environmental conditions are such that leptospirosis is a hazard which should be considered. PCBUs who operate in an area which is known to have a risk of contracting leptospirosis should implement appropriate systems which minimises the risk of exposure of workers to this disease.

4.7.1 Possible control measures for Leptospirosis

The assessment of the risk of workers coming into contact with leptospira should consider issues including:

(a) information on the number of cases of leptospirosis in the area
(b) the type of work to be performed
(c) the environmental conditions in the work area (e.g. tropical, subtropical or dry /wet)
(d) the likely exposure paths
(e) the exposure frequency.

Once a level of risk has been established control measures should be considered based on the likelihood of exposure, such as:

(a) an eradication program for vermin, such as rats and mice
(b) maintaining clean amenities areas with regular disposal of wastes and scraps
(c) wiping down benches and eating areas with a chlorine based product (e.g. bleach)
(d) ensuring workers wear the appropriate protective clothing such as water proof boots and gloves in wet conditions or when handling material which may be contaminated.

5. Transport – other than cane rail

5.1 Road safety

This section covers the requirements associated with road safety and the prevention of road accidents involving vehicles owned or used by mill workers for activities associated with milling operations. It includes qualification of drivers, maintenance of vehicles, training and accident reporting.

The aim is to ensure that all vehicles are used safely to prevent or minimise the risk of accidents.

5.1.1 Possible control measures for road safety

The following controls can be used to prevent or minimise the risk of injury from road transport:

(a) all vehicles owned or used by a mill shall comply with Queensland's road transport rules
(b) all vehicles should be equipped with a first aid kit and fire extinguisher appropriate to the intended use of the vehicle
(c) all vehicles should be regularly inspected and maintained in a roadworthy condition. Any safety deficiencies detected shall be repaired before further use. This should include verifying compliance with noise and emission regulations
(d) any vehicle accident, whether resulting in injury or not, should be reported immediately and investigated
(e) if the vehicle is to be used in remote locations by a single driver, an appropriate form of communication should be fitted to the vehicle and maintained in a serviceable condition. Suitable communications equipment may include radio and/or mobile phone.

5.2 Cane road haulage equipment

This section covers the requirements associated with cane road haulage equipment and aims to ensure that this equipment is operated and maintained in a safe manner so to ensure the workplace health and safety of workers and others.

5.2.1 Possible control measures for cane road haulage equipment

The equipment shall be serviced and maintained to at least the manufacturer's specifications. Records shall be maintained on all servicing and major maintenance.

Operators are to be trained and qualified to operate the equipment. Where use of the equipment is seasonal or an operator does not operate the equipment for an extended period (e.g. six months), the mill should ensure the competency of the operator at the start of the operational period and the assessment recorded.

Where the equipment is interfacing with other transport systems, radio or mobile phone communications should be available and the operators trained in the correct procedures for using the communications equipment.

Operators shall follow the rules set down by Queensland Transport - *Transport Operations (Road Use Management) Act 1995* and *Transport Operations (Road Use Management—Road Rules) Regulation 2009* and the mill's safe work practices.

It should be remembered that these vehicles are classified as heavy vehicles and the operator must not operate them while under the influence of alcohol or prohibited drugs. Some prescribed medications and drugs can cause drowsiness and affect co-ordination. Operators should seek medical advice about the effects of the medication or drugs before operating any of these vehicles.

6. Appendices

6.1 Further information

6.1.1 Workplace Health and Safety Queensland

Further information is available from www.worksafe.qld.gov.au or by contacting 1300 362 128.

Legislation

- *Work Health and Safety Act 2011*
- *Work Health and Safety Regulation 2011*

Codes of practice

- First aid in the workplace Code of Practice
- Hazardous manual tasks Code of Practice
- How to manage work health and safety risks Code of Practice
- Managing risks of plant in the workplace Code of Practice
- Sugar industry Code of Practice
- Sugar industry Code of Practice – Sugar mill safety supplement
- Sugar industry Code of Practice – Cane rail safety supplement

6.1.2 Australian Standards

www.standards.com.au

- AS 2670.1 Evaluation of human exposure to whole-body vibration – Part1: General requirements
- AS ISO 5349.1 Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Part 1: General requirements
- AS ISO 5349.2 Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Part 2: Practical guidance for measurement at the workplace.
- AS/NZ 1269.1 Occupational noise management – Part 1: Measurement and assessment of noise immission and exposure
- AS/NZS 1269.2 Occupational noise management – Part 2: Noise control management
- AS/NZ 1269.3 Occupational noise management – Part 3: Hearing protector program

6.1.3 Australian sugar industry codes of practice

- Cane Railway Operations
- Operations and Procedures at Cane Railway and Road Transport Delivery Points
- Track and Civil Infrastructure Design and Maintenance Practices
- Active Level Crossing Protection Systems on Cane Railways
- Design, Manufacture and Maintenance of Locomotives and Rolling Stock for Cane Railways
- Safe Operating Practices for Cane Railways

Note: These codes are published by the Sugar Research Institute