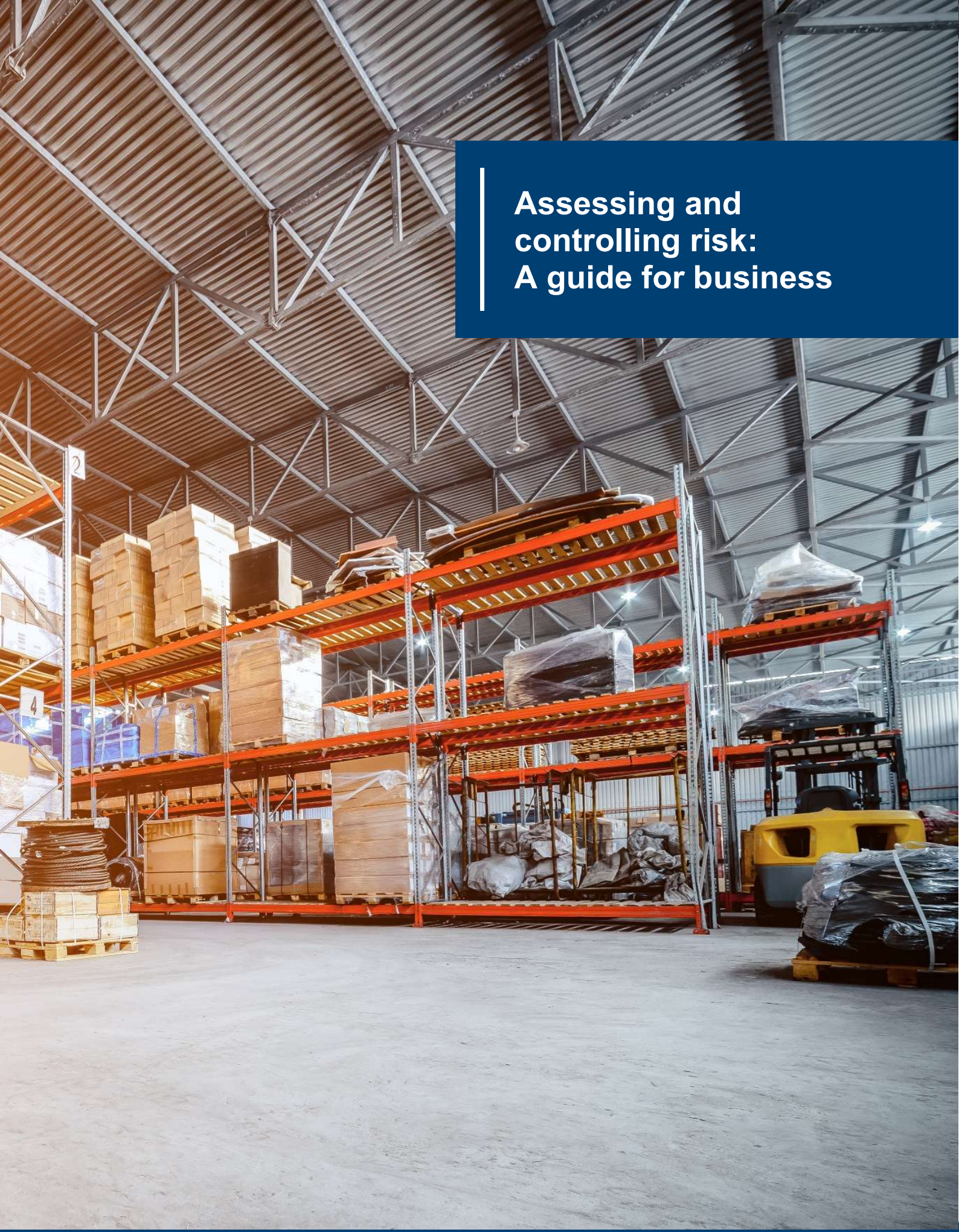

Assessing and controlling risk: A guide for business

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Introduction

Risk is present in all business activities. Understanding and managing it is crucial. Assessing and controlling risk in a structured way will help a business prevent harm to human health and the environment, comply with their legal obligations, and meet community expectations.

The repercussions of this harm can be far-reaching and preventing it can save your business greatly from costs such as litigation and clean up notices.

Purpose

This guide provides businesses with a risk management framework that can be applied to help prevent harm to human health and the environment. Its principles can be applied to businesses of any size, and of varying levels of risk, but larger businesses or those that pose a high level of risk to the environment and public health may need to adopt more complex methods.

The method proposed in this guide is consistent with the approach many workplaces use for managing occupational health and safety (OHS) risks. This guide only addresses risks from pollution and waste and should not be relied upon as a substitute for compliance with your OHS obligations. For information about managing your OHS obligations please consult WorkSafe Victoria.

About this guide

The information in this publication is for general guidance only. It does not constitute legal or other professional advice, and should not be relied on as a statement of the law. Because it is intended only as a general guide, it may contain generalisations. You should obtain professional advice for your specific circumstances.

EPA has made every reasonable effort to provide current and accurate information, but it does not make any guarantees regarding the accuracy, currency or completeness of that information.

What is risk?
There are some key terms that need to be understood so this guide makes sense. **Risk** is the threat that a **hazard** poses to a **receptor**, where: • a **hazard** is something that has the potential to cause harm (for example, release of smoke, spills into stormwater) • a **receptor** is something of value that can be harmed (for example, the environment or human health) • a **pathway** is the route that the hazard can take to reach the receptor (for example, air, water, soil).
Risk is made up of two basic factors; **likelihood** and **consequence**: • **likelihood** is the probability or chance that the hazard will cause harm • **consequence** is the level of harm or severity of impact that a hazard can cause.
Controls can be put in place to manage risk. These can include: • ***eliminating*** the hazard or ***substituting*** it for something else with a lesser risk • ***engineering controls*** that prevent pollution from occurring or stop it spreading, such as automatic shut-down machinery or bunding • ***administrative controls*** such as work processes or monitoring systems.

Steps in controlling hazards and risks

The method for assessing and controlling risk has four steps (see Table 1). This method is a continuous process which returns to step 1 after a control is put in place.

Figure 1: Steps in controlling hazards and risks

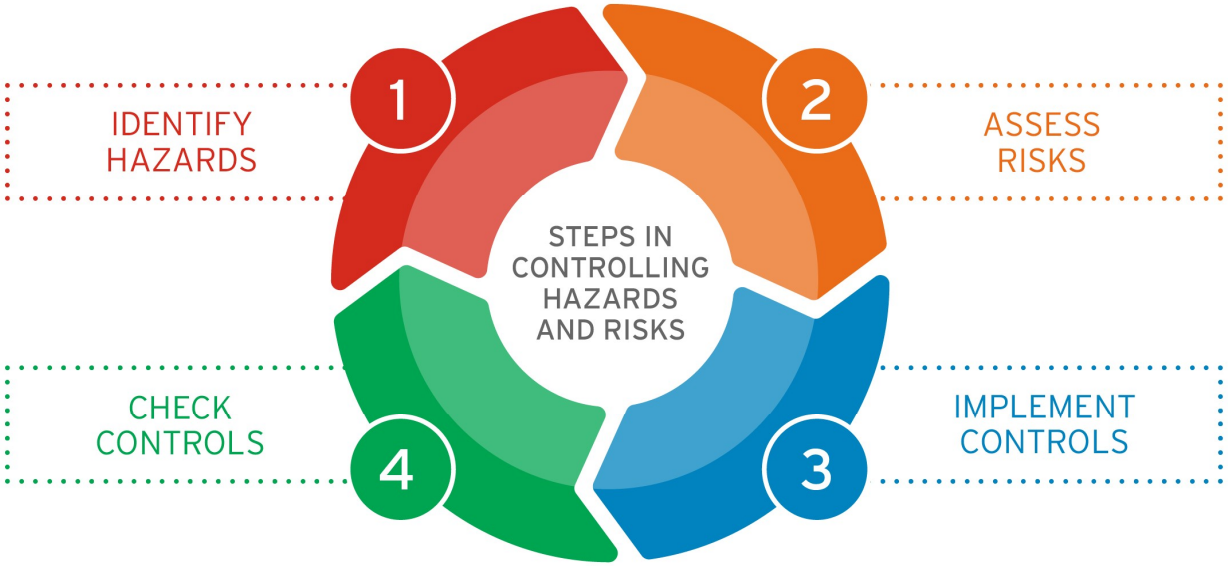

Table 1: Steps in controlling hazards and risks

Step	*Action*	*Description*
1	**Identify hazards**	What hazards are present that might cause harm
2	**Assess risks**	What is the level or severity of risk, based on likelihood and consequence
3	**Implement controls**	What measures are suitable and available to the business to eliminate or reduce a risk
4	**Check controls**	Review controls to ensure they are effective

Step one: identify hazards

What to look for

Hazards associated with commercial and industrial activities include anything that can cause harm to people or the environment. The table below outlines some common hazards.

Table 2: Common workplace environmental and human health hazards

Hazard Potential for the following	***Description***	***Common sources***
Chemical spills	Chemicals can contaminate soil, groundwater, nearby waterways and harm human health.	- leaking containers - inadequate bunding to contain spills - poor storage and handling
Stormwater contamination	Stormwater drains do not lead to a treatment plant but connect to nearby creeks, rivers, wetlands and bays. Whatever goes into stormwater will enter the environment and can have a large impact.	- dirt and erosion - detergents and cleaning agents - litter - oil and grease - cigarette butts - outdoor chemical use
Fire and explosion emissions	As well as the immediate threat to human life and property, fires and explosions present hazards such as runoff, toxic smoke and spreading dust.	- smoking - sparks - hot surfaces - poor storage - electrical hazards - dust - arson
Dust	Dust can cause serious health complications, particularly to the respiratory and cardiovascular systems. It can also irritate eyes, throat and skin.	- woodwork - landscaping - cement works - exposed piles of dirt - grinding - welding - cutting or shredding materials - unsealed roads
Odour	Odour pollution can harm human health causing nausea and headaches. Some odours may also indicate the presence of toxic gases which cause more serious health issues.	- waste - chemical use - sewerage - animals - composting - exhaust and ventilators - food processing
Air contaminants	Toxic or hazardous materials that are discharged to the air from processing or manufacturing activities are a major pollutant.	- furnaces - boilers - process vents - bulk storage tanks - equipment leaks - uncovered solvents
Waste water	Trade waste and other waste water from business activities can carry many harmful pollutants.	- processing - production - manufacturing
Excessive noise	Excessive noise can disturb the community and cause hypertension, heart disease, annoyance, stress and sleep disturbance.	- machinery - animals - vibrations - vehicle movement and beepers
Hazardous wastes	Poorly managed waste can cause harm to human health and the environment.	- hazardous industrial wastes not being properly managed, transported or disposed - dust and soil containing asbestos
Pathogens	Pathogens include bacteria, viruses, or other microorganisms that can cause disease.	- inadequate hand washing stations - unhygienic handling of waste - overflowing septic tanks - wastewater - contaminated food products - organic wastes - animal waste and carcasses

Methods for identifying hazards

There are many methods that can be used to identify hazards to human health and the environment from pollution or waste. Ideally, once hazards have been identified, they should be recorded and documented. The *hazard and risk register* at the end of this guide may be used for this.

Identify business activities

It is important to reflect on what activities your business engages in and how these might present hazards to human health and the environment. For example, material storage and handling, detergent use, landscaping or grinding are common activities which can present hazards.

Inspecting the workplace

A walk around the workplace is a direct way of identifying many hazards.

Inspections should not be limited to physical things such as plant, equipment or buildings and structures, it should also look at systems of work and work procedures. It is often useful to conduct inspections with someone unfamiliar with the activities as common hazards can be easily overlooked by those used to them.

Think about **pathways** and **receptors** (see definitions in 'what is risk?' above). Consider whether there are receptors nearby that could be harmed, such as houses, waterways or parks. Also think about the pathways that pollution could use to reach these, such as a creek, wind and site drainage.

Workshops and meetings

Organising meetings with employees and stakeholders is an effective way of identifying hazards. During these meetings people can discuss aspects of work which might present hazards, such as work processes and materials stored onsite.

These meetings can cement the idea of risk into the workplace culture and provide opportunities to involve stakeholders such as fire authorities or local council.

Using available information

Information that can help identify hazards can come from a range of sources. For example:

- industry associations can provide information about new hazards and risks specific to the industry
- manufacturers and suppliers can provide information about hazards associated with plant, substances or processes
- safety data sheets (SDS), formerly known as material safety data sheets (MSDS), often provide useful information about ecological hazards associated with a product and ways of controlling risks
- insurance providers can often provide useful information about hazards and ways of controlling risks
- technical, fire and HSE specialists
- trade waste arrangements for the site.

Step two: assess risks

The hazards identified during step 1 must be assessed to determine how they could lead to harm, how severe that harm could be and how likely it is to happen.

Risk assessment is a process for building knowledge and understanding of hazards and their associated risks so decisions can be made on how best to control them.

The following steps should be taken:

1. assess the likelihood of a hazard causing an impact
2. assess the consequences, or severity, of each impact
3. calculate a risk rating for each hazard.

Assess likelihood

The first step is to assess the likelihood of a hazard causing harm. Likelihood is based on what is known, or should be known, about the hazard and the way circumstances and activities affect the hazard.

Likelihood can be rated as:

- **certain:** expected to happen regularly under normal circumstances
- **very likely:** expected to happen at some time
- **likely:** may happen at some time
- **unlikely:** not likely to happen in normal circumstances
- **rare:** could happen but probably never will.

Table 3 sets out key concepts that can help you estimate likelihood.

Table 3: Key concepts to establish likelihood

Key concepts	*Explanation*
Previous occurrence	Assessing what has happened previously, such as incidents and near misses, gives a good indication about likelihood. It is important not to just consider your business but think about occurrences across the industry.
Current controls	Consider what controls are already in place and how effective these are.
Frequency	A hazard may exist all the time or only sometimes. The more often the hazard is present, the greater the likelihood that it will cause harm.
Changes in conditions	Operating conditions change over time and vary throughout the year. These changes can influence likelihood of a hazard causing harm.
Behaviour	The way people act or behave can affect the likelihood of a hazard causing harm. For example, people may make mistakes, misuse items or act spontaneously during an incident.

Assess consequence

The second step is to work out the harm that each hazard could cause and how severe this harm could be. It is important to consider:

- **Pre-control risk** (inherent risk) – the degree of harm if no controls at all were in place.
- **Post-control risk** (residual risk) – the degree of harm with existing controls in place. This helps determine the importance of existing controls and if new or improved controls are required.
- How a hazardous activity is actually done instead of how it should be done. For example, how does practise differ from a written procedure?
- Non-routine situations associated with the hazard as well as how things are normally meant to occur. For example, how would extreme weather conditions affect the hazard and the effectiveness of controls in place?

During this process, it is important to consider the potential impacts to:

- **People:** employees, visitors, customers, contractors, emergency service personnel and anyone else who could be impacted.
- **Community:** surrounding occupants (including residents) and businesses and the broader community.
- **Property:** onsite and neighbouring property as well as nearby infrastructure such as highways, schools and hospitals
- **Environment:** local creeks and waterways, the atmosphere and soil.

A description for consequence from low to severe can help guide your rating. For examples of consequence descriptions, see Figure 2: risk matrix example.

Table 4: Typical questions to ask to establish consequence

Typical questions	*Explanation*
What kinds of harm could be caused?	There are many kinds of harm and a single incident might cause multiple types of impact. For example, the same incident might cause harm to both the environment as well as human health.
What factors could influence the severity of harm?	The consequence of a risk may vary under different circumstances. For example, a fire might be more intense and harder to control during warm and dry weather.
In what ways could human health or the environment be harmed?	It is particularly important to consider impacts to sensitive ecosystems, such as wetlands and waterways, as well as surrounding residential areas, hospitals, schools and roads.

Calculate risk rating

After the consequences and likelihood of the risk has been considered, these must be looked at together to create an overall risk rating.

Figure 2 shows an example of a risk matrix which can be used for this purpose. In a risk matrix, likelihood and consequence are given relative scores which can be matched on the matrix to give a risk rating from low to extreme. There are other tools that can be used to assess risk listed in *SA/SNZ HB 89:2013 Risk management – guidelines on risk assessment techniques.*

The purpose of rating risk is to guide decision making on risk management to eliminate or otherwise reduce the risk to an acceptable level.

Figure 2: Risk matrix example

Permanent or long-term serious environmental harm / life threatening or long-term harm to health and wellbeing.	**Consequence**	Severe	Medium	High	High	Extreme	Extreme
Serious environment harm / high-level harm to health and wellbeing.		Major	Medium	Medium	High	High	Extreme
Medium level of harm to health and wellbeing or the environment over an extended period of time.		Moderate	Low	Medium	Medium	High	High
Low environmental impact / low potential for health and wellbeing impacts.		Minor	Low	Low	Medium	Medium	High
No or minimal environmental impact, or no health and wellbeing impacts.		Low	Low	Low	Low	Medium	Medium
			Rare	Unlikely	Possible	Likely	Certain
			Likelihood				
			Could happen but probably never will	Not likely to happen in normal circumst-ances	May happen at some time	Expected to happen at some time	Expected to happen regularly under normal circumst-ances

Description of risk ratings

Risk level	Description
Extreme	Totally unacceptable level of risk. Stop work and/or take action immediately.
High	Unacceptable level of risk. Controls must be put in place to reduce to lower levels.
Medium	Can be acceptable if controls are in place. Attempt to reduce to *low*.
Low	Acceptable level or risk. Attempt to eliminate risk but higher risk levels take priority.

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Step three: implement controls

The options for controlling risk are prioritised from the highest level of effectiveness to the lowest, this is shown in figure 3. In this ranking, controls are placed in three categories:

Elimination: the most effective control is to eliminate the hazard and any associated risk altogether.

Substitute the hazard / engineering controls: the second most effective controls reduce a risk by substituting the cause of the hazard with something safer or controlling the hazard with engineering controls. To be effective, these controls should operate independently of peoples' actions.

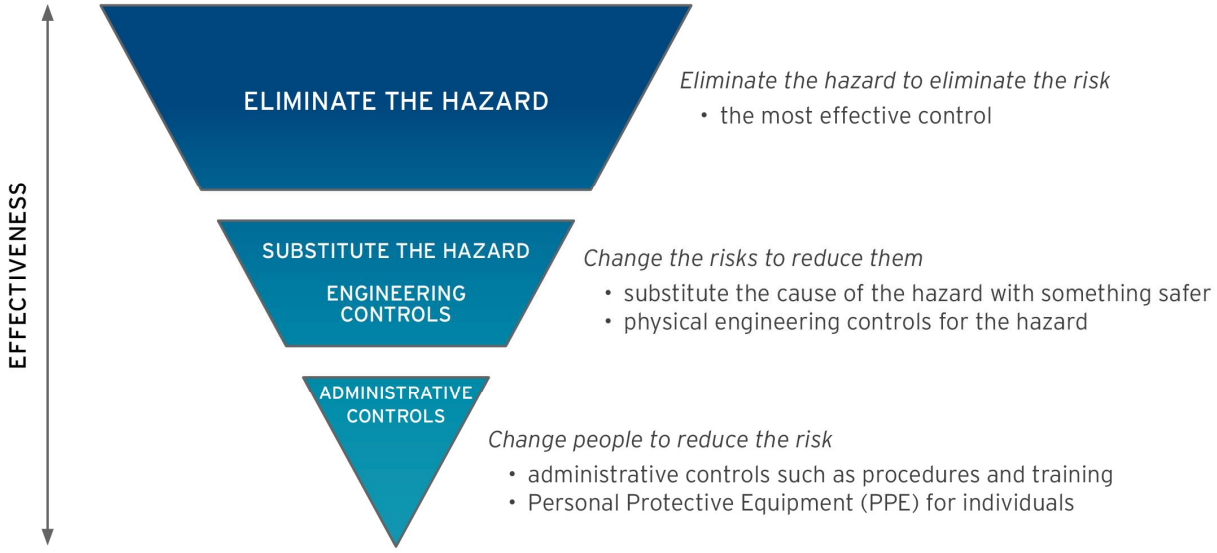
- ***Substituting*** the cause of hazard with a safer alternative takes priority over implementing controls.
- ***Engineering*** controls are physical controls for a hazard. Examples include bunding and automatic shutdown systems for machinery.

Administrative controls and use of personal protective equipment (PPE): The least effective controls rely on people doing the right thing or taking care at all times.

- **Administrative controls** include training, procedure, policy, supervision or shift designs that lessen the threat of a hazard or at least help alert people to a hazard. Examples include induction processes, permitting systems and competency training.
- **Personal protective equipment** (**PPE**) and **spill kits**, etc., should be used if individuals could be directly exposed to harmful pollution or waste.

Together, these elements create a 'hierarchy' of risk control standards.

Figure 3: Hierarchy of controlling hazards and risks



Sometimes it is hard to determine the likelihood or consequences of a hazard. If there are controls available that can be easily implemented, then they should be applied anyway – this is called the precautionary principle.

Preventative and mitigating controls

Controls can be divided into two categories, *preventative* and *mitigating*.

- ***Preventative controls*** prevent harmful events from happening in the first place.
- ***Mitigating controls*** limit the consequence or damage from a harmful event.

Preventative controls are intended to eliminate the risk altogether, while mitigating controls aim to minimise the harmful impacts of any residual risk than cannot otherwise be eliminated.

Table 5: Examples of preventative and mitigating controls

Preventative controls	*Mitigating controls*
Safe storage of dangerous liquids and gas, including wastes	Spill kits that can be quickly deployed in the event of a spill
Permit to work systems	Fire extinguishers
Security systems	Emergency management plans
Regular testing and maintenance of equipment	Bunding
Leak detection and repair programs	Gas flares, also known as flare stacks

Hazard and risk register

All identified hazards, and their associated risks, can be recorded in a register. This enables key personnel to understand the businesses risk profile and address risk as part of decision-making processes.

The register can record the existing controls for each hazard and associated risk. It can also be used to help identify when new controls may be introduced to further address any residual risk.

Reviewing the register regularly will enable the business to maintain focus on hazard controls, and their effectiveness, as well as supporting continuous improvement.

An example of a hazard and risk register is provided at the end of this guide.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned.

Checking controls

Checking controls involves the same methods as in the initial hazard identification step (step 1), and 'closes the loop' in which risk control measures can be maintained.

Common methods used to check the effectiveness of controls are:

- regular site inspections and audits
- consulting with employees, contractors, occupants and landlords
- inspecting, testing and maintenance of risk control systems
- using available information, such as manufacturer/supplier instructions
- analysing records and data, such as incident and near miss reports.

If these checks are made on a regular basis then failures in controls can be identified as well as opportunities for improvement.

Maintaining effective controls

Several things need to be put in place to maintain controls and ensure they stay effective:

- review hazards and risk assessments regularly as these can change over time
- regularly review, test and maintain all engineering controls
- allocate responsibility and accountability for risks and their controls
- regular consultation with employees and other stakeholders such as insurance providers and emergency service representatives
- clear and effective communication about hazards and risk controls to all who may be affected by them
- regular training, including refresher training for administrative controls.

Attachment: example hazard and risk register

Note: This hazard register is appropriate for low risk businesses. High-risk or large businesses may need to adopt a more complex register.

Revision:		**Date:**		**Attendees:**	

No.	*Hazard*	*Potential harm*	*Risk assessment*			*Existing controls*	*What further controls are required?*	*Actions*		
			Consequence	*Likelihood*	*Risk rating*			*Action by*	*Due date*	*Date complete*

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