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# Draft guideline

Remediation and management of contaminated sites:  
Guidance for worker health and safety considerations

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Draft document for consultation  
May 2014

Cooperative Research Centre for **Contamination  
Assessment and Remediation of the Environment**

[www.crccare.com](http://www.crccare.com)

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Guidance for worker health and safety considerations**

May 2014



## Executive summary

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### **National Framework for Remediation and Management of Contaminated Sites in Australia**

The following guideline fits within the National Framework for Remediation and Management of Contaminated Sites in Australia. The Framework was developed to enable a nationally consistent approach to the remediation of contaminated sites.

The Framework provides the context, philosophy and principles underlying the remediation and management of contaminated sites in Australia. It also offers general guidance and links to further information to assist with remediation planning, implementation, review, and long-term management.

### **Remediation and management of contaminated sites: Worker health and safety considerations**

This guideline provides general guidance in relation to the health and safety of workers during the remediation and management of contaminated sites. It also provides references to a range of other potentially useful information.

The protection of the health and safety of members of the public, and the protection of the environment are also very important during the remediation and management of contaminated sites. Practitioners and other interested readers are referred to the guideline *Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns*.

While the aim of this worker health and safety guideline is to provide a practical and up-to-date resource that can be used at contaminated sites across Australia, it does not replace specific laws, regulations and guidance provided at a local level.

Practitioners are advised to consult with their state or territory government safe work agency and environment protection authority before commencing any remediation project to ensure that they are complying with specific local requirements.

Material in this guideline has been drawn from a range of government sources, with those sources being acknowledged in the reference sections located at the end of each section. With regard to material from Safe Work Australia, it should be noted that while this material can be copied, communicated and adapted for non-commercial purposes, credit for the work should be given—refer to <http://creativecommons.org/licenses/by-nc/3.0/au/>.

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# Government Safe Work Agencies and Environment Protection Authorities

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Government	Agency	Website
Commonwealth	Safe Work Australia	<a href="http://www.safeworkaustralia.gov.au">www.safeworkaustralia.gov.au</a>
	Department of Sustainability, Environment, Water, Population and Communities	<a href="http://www.environment.gov.au">www.environment.gov.au</a>
Western Australia	WorkSafe	<a href="http://www.commerce.wa.gov.au/WorkSafe/">www.commerce.wa.gov.au/WorkSafe/</a>
	Department of Environment Regulation	<a href="http://www.der.wa.gov.au">www.der.wa.gov.au</a>
South Australia	SafeWork SA	<a href="http://www.safework.sa.gov.au">www.safework.sa.gov.au</a>
	Environment Protection Authority	<a href="http://www.epa.sa.gov.au">www.epa.sa.gov.au</a>
Tasmania	Workplace Standards Tasmania	<a href="http://www.workplacestandards.tas.gov.au">www.workplacestandards.tas.gov.au</a>
	Environment Protection Authority	<a href="http://www.epa.tas.gov.au">www.epa.tas.gov.au</a>
Queensland	Workplace Health and Safety Queensland	<a href="http://www.deir.qld.gov.au/workplace">www.deir.qld.gov.au/workplace</a>
	Department of Environment and Heritage Protection	<a href="http://www.ehp.qld.gov.au">www.ehp.qld.gov.au</a>
Australian Capital Territory	WorkSafe ACT	<a href="http://www.worksafe.act.gov.au/health_safety">www.worksafe.act.gov.au/health_safety</a>
	Environment Protection Authority	<a href="http://www.environment.act.gov.au">www.environment.act.gov.au</a>
Northern Territory	NT WorkSafe	<a href="http://www.worksafe.nt.gov.au">www.worksafe.nt.gov.au</a>
	Environment Protection Authority	<a href="http://www.ntepa.nt.gov.au">www.ntepa.nt.gov.au</a>
New South Wales	WorkCover Authority of NSW	<a href="http://www.workcover.nsw.gov.au">www.workcover.nsw.gov.au</a>
	Environment Protection Authority	<a href="http://www.epa.nsw.gov.au">www.epa.nsw.gov.au</a>
Victoria	WorkSafe Victoria	<a href="http://www.worksafe.vic.gov.au">www.worksafe.vic.gov.au</a>
	Environment Protection Authority	<a href="http://www.epa.vic.gov.au">www.epa.vic.gov.au</a>

# Glossary

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<b>Contamination</b>	The condition of land or water where any chemical substance or waste has been added as a direct or indirect result of human activity at above background level and represents, or potentially represents, an adverse health impact.
<b>Decontamination zone</b>	An area where removal of contaminated field clothing and washing of field equipment and plant takes place.
<b>Environment protection authority</b>	The government agency in each state or territory that has responsibility for matters relating to contaminated sites.
<b>Exclusion zone</b>	An area where work is being carried out and access is limited to essential persons.
<b>Hazard</b>	A situation or thing that has the potential to harm a person. Hazards at work may include noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace.
<b>Health</b>	Freedom from disease or ailment.
<b>Health and safety representative</b>	A worker who has been elected by a work group under a Work Health and Safety Act to represent them on health and safety issues.
<b>Person conducting a business or undertaking</b>	A person conducting a business or undertaking alone or with others, whether or not for profit or gain. A person conducting a business or undertaking can be a sole trader (e.g. a self-employed person), each partner within a partnership, company, unincorporated association or government department of public authority (including a municipal council).
<b>Plant</b>	Includes any machinery, equipment, appliance, container, implement and tool, and includes any component or anything fitted or connected to any of those things. Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools and amusement devices.
<b>Public</b>	Refers to persons not covered under work health and safety laws who may be affected by remediation activities on a particular site, e.g. by dust, noise or potential damage to property.
<b>Risk</b>	The possibility that harm (death, injury or illness) might occur when a person is exposed to a hazard. In relation to contaminated sites, risk involves the probability in a

certain timeframe that an adverse outcome will occur in a person, a group of people, plants, animals and/or the ecology of a specified area that is exposed to a particular dose or concentration of a chemical substance, i.e. it depends on both the level of toxicity of the chemical substance and the level of exposure.

<b>Safety</b>	Freedom from injury or danger.
<b>Safe work agency</b>	The state or territory government body responsible for the enforcement (regulation) of work health and safety laws within that particular state or territory.
<b>Site</b>	The parcel of land where remediation activity is occurring.
<b>Site Safety Assessor</b>	A professionally qualified and experienced person who has specific responsibility for assessment of the risks and hazards associated with the investigation of any site and for the preparation of a site safety plan.
<b>Site-specific safety plan</b>	A plan to address identified risks and hazards on a potentially contaminated or contaminated site. The aim of a site-specific safety plan is to provide as safe an environment as is practicable.
<b>Support zone</b>	An area where field support activities are carried out.
<b>Work area</b>	An area affected by site activities. Includes the exclusion zone, decontamination zone and support zone.
<b>Work group</b>	A group of workers represented by a health and safety representative who, in many cases, share similar work conditions.
<b>Worker</b>	Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor, subcontractor, self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer', or volunteer.
<b>Workplace</b>	Any place where a worker goes or is likely to be while work is carried out for a business or undertaking. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water such as offshore units and platforms (that are not already covered under the Commonwealth's offshore Work Health and Safety laws).

## Abbreviations and short forms

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EPA	Environment(al) protection authority
GHS	Globally Harmonised System of Classification And Labelling Of Chemicals
HSIS	Hazardous Substances Information System
NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999
NEPM Schedule B (9)	National Environment Protection (assessment of Site Contamination) Measure 1999 Schedule B (9) Guideline on Protection of Health and the Environment during the Assessment of Site Contamination ( <i>REPEALED May 2013</i> )
NOHSC	National Occupational Health and Safety Commission (now Safe Work Australia)
PPE	Personal protective equipment and clothing
SDS	Safety data sheet
SWA	Safe Work Australia
SSSP	Site-specific safety plan
US EPA	United States Environmental Protection Agency
WHS Act	Model Work Health and Safety Act, adopted by governments across Australia with variations to suit local requirements
WHS Regulations	Model Work Health and Safety Regulations, adopted by governments across Australia with variations to suit local requirements

# 1. Introduction

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During the remediation and management of contaminated sites, the protection of the health and safety of all people working at, or otherwise using, the site is paramount. Protection of the health and safety of third party stakeholders, such as users of adjoining land, local residents, passers-by and sight-seers is also important.

This guideline aims to provide general guidance to practitioners as they consider the health and safety of workers during the remediation and management of site contamination. Information about further sources of assistance is provided throughout the document. Specific guidance regarding the health and safety of third party stakeholders is available in the guideline, *Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns*.

## 1.1 Purpose of guideline

The purpose of this guideline is to present guidance on the protection of health and safety during the remediation and management of site contamination so that risks to the health and safety of workers can be appropriately considered.

## 1.2 Scope of guideline

The consideration of the health and safety of workers is ongoing during all assessment, remediation and management activities that take place on a contaminated or potentially contaminated site.

This guideline aims to bring together relevant and existing information about specific issues that should be considered during the remediation and management of contaminated sites. While it is intended to be a stand-alone document, it does not prescribe precise safety rules or cover every single aspect of workplace health and safety.

Local safe work agencies each hold a substantial amount of guidance relating to work health and safety issues that must be addressed in all workplaces. As new guidance in the area of work health and safety is being developed on an ongoing basis by relevant authorities, practitioners should make regular contact with local safe work agencies to ensure they have access to the most up-to-date and useful information to support their work.

This synthesis of existing material relating to health and safety issues to be considered in relation to remediation activities includes information from a range of sources. These sources include government agencies—Commonwealth, state and territory—with specific legislative or regulatory responsibility for work health and safety and/or contaminated sites.

Prior to 2013, the premier guidance related to work health and safety on contaminated sites was contained within a schedule to the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM).

While *Schedule B (9) Guideline on Protection of Health and the Environment during the Assessment of Site Contamination* (NEPM Schedule B (9)) dealt specifically with the assessment stage, much of its guidance was relevant to any work occurring on a contaminated site. As a result, regulatory agencies referred practitioners to that document for guidance during remediation and management of contaminated sites.

The NEPM was updated in 2013 and the content of Schedule B (9) was repealed. This followed a period of review which recognised recent harmonisation of work health and safety laws across Australia.

Harmonisation in this context means that a set of *model* work health and safety laws, regulations and guidance are made available by a national body, Safe Work Australia, for adoption and implementation in each state and territory. To have legal effect in a particular state or territory, these model laws and guidance must undergo a process of official enactment or approval in that jurisdiction. Governments can, and do, make variations to these laws and guidance materials where required to address specific local concerns or processes. Each government is then responsible for the enforcement of the laws in their own jurisdiction.

This guideline incorporates a significant amount of material from the *model* work health and safety laws and guidance provided by Safe Work Australia. It is crucial that practitioners refer to their local safe work agency to make sure that any local variations are considered in the management of work health and safety on contaminated sites.

As stated, the NEPM Schedule B (9) as a guideline on the protection of health and safety no longer has legal standing and so is not available as a resource for practitioners. However, relevant and useful information from that Schedule has been adapted and updated and has been incorporated into this guideline.

Information has also been drawn from a range of other sources including published guidelines from South Australia, Western Australia and Victoria.

Every contaminated site is different. Depending on the specific activities being undertaken at the site, other legislation and associated guidance may need to also be considered, for example, that related to waste disposal, transport and storage, construction, and demolition.

This guideline provides summary information regarding issues relevant to all workplaces, but is particularly focused on issues that are likely to be of significance on contaminated sites. Where additional detailed advice and guidance is available, source details are provided at relevant places in this guideline.

## 2. Health and safety in the workplace

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### 2.1 Definition of reasonably practical

Australia's work health and safety laws reflect the understanding that all workplaces contain potential hazards and may pose some level of risk to human health or safety.

A guiding principle of the laws is that all people are given the highest level of health and safety protection from hazards arising from work, so far as is reasonably practicable. The term 'reasonably practicable' means what could reasonably be done at a particular time to ensure health and safety measures are in place.

In determining what is reasonably practicable, there is a requirement to weigh up all relevant matters including:

- the likelihood of a hazard or risk occurring
- the degree of harm that might result if the hazard or risk occurred
- what the person concerned knows, or ought to reasonably know, about the hazard or risk and ways of eliminating or minimising it
- the availability of suitable ways to eliminate or minimise the hazard or risk, and
- the cost of eliminating or minimising the hazard or risk.

Costs may only be considered after assessing the extent of the risk and the available ways of eliminating or minimising the risk. If the risk is particularly severe, a person conducting a business or undertaking will need to demonstrate that costly safety measures are not reasonably practicable due to their expense and that other less costly measures could also effectively eliminate or minimise the risk.

### 2.2 Duty of care

Under work health and safety laws, all persons conducting a business or undertaking must ensure, so far as is reasonably practicable, the health and safety of:

- workers engaged, or caused to be engaged by the person, and
- workers whose activities in carrying out the work are influenced or directed by the person

while workers are at work in the business or undertaking.

This primary duty of care requires duty holders to ensure health and safety, so far as is reasonably practicable, by eliminating risks to health and safety. If this is not reasonably practicable, risks must be minimised so far as is reasonably practicable.

Persons conducting a business or undertaking owe a similar duty of care to other people who may be at risk from work carried out by 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 legislation. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks to health and safety.

A self-employed person must ensure his or her own health and safety while at work, so far as is reasonably practicable.

## 2.3 The duties of workers

Workers in Australian workplaces also have specific obligations. While at work, a worker must:

- take reasonable care for his or her own health and safety
- take reasonable care that his or her acts or omissions do not adversely affect the health and safety of other persons
- comply, so far as the worker is reasonably able, with any reasonable instruction that is given by the person conducting a business or undertaking to allow the person to comply with this Act, and
- cooperate with any reasonable policy or procedure of the person conducting a business or undertaking relating to health or safety at the workplace that has been notified to workers.

## 2.4 The risk management process

A contaminated site contains hazards and risks specifically related to the remediation and management activities taking place. However, there are also general work health and safety issues that must be addressed.

Managing work health and safety risks is a day-to-day and ongoing responsibility in all workplaces, and is particularly important when any changes affect work activities.

A risk management process provides a framework to assist in decision-making relating to all aspects of work health and safety, including those dealing with the potential impact of remediation activity.

The risk management process is described briefly below, providing an introduction to key terms and concepts. The steps should be used to inform decision-making about any aspect of health and safety on the work site.

## 2.5 Steps in the risk management process

Risk management is a process and involves four steps (see Figure 2.1 below):

- Identify hazards—find out what could cause harm.
- Assess risks if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening.
- Control risks—implement the most effective control measure that is reasonably practicable in the circumstances.
- Review control measures to ensure they are working as planned.



**Figure 2.1** The Risk Management Process (*Safe Work Australia 2011, Model code of practice - How to manage work health and safety risks, SWA, Canberra, p. 6*)

Consultation with workers and their health and safety representatives is required at each step, providing the opportunity to share experience, knowledge and ideas before decisions are made.

Another requirement under work health and safety law is consultation, cooperation and coordination of activities if responsibility for a health and safety matter is shared among business operators. For example, if on-hire workers are engaged as part of the site workforce, a duty of care to these workers is shared with the business that provides them. In these situations, there must be discussion with the on-hire firm about the hazards and risks associated with the work and what precautions will be taken.

## 2.6 Identifying hazards

Hazards generally arise from the following aspects of work (and their interaction):

- physical work environment
- equipment, materials and substances used
- work tasks and how they are performed, and
- work design and management.

Hazard identification can be assisted by:

- regular inspection of the workplace

- Does the work environment enable workers to carry out work without risks to health and safety?
- How suitable are the tools and equipment for the task and how well are they maintained?
- Have any changes occurred in the workplace which may affect health and safety?
- consultation with workers
  - Ask workers about any problems they have encountered and any near-misses or incidents that have not been reported.
  - Survey workers to obtain information about matters such as workplace bullying, or aches and pains that can signal potential hazards.
- review of available information
  - Obtain information and advice about hazards and risks from regulators, industry associations, unions, technical specialists and safety consultants.
  - Obtain information from manufacturers and suppliers about hazards and safety precautions for specific substances (safety data sheets), plant or processes (instruction manuals).
  - Analyse records of health monitoring, workplace incidents, near-misses, worker complaints, sick leave and inspection results to identify hazards.

## 2.7 Assessing risks

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of it happening. A risk assessment can help determine:

- the severity of a risk
- whether any existing control measures are effective
- what action should be taken to control the risk, and
- how urgently the action needs to be taken.

A risk assessment can be as simple as a discussion with workers or can involve specific risk analysis tools and techniques recommended by safety professionals.

A risk assessment should be done when:

- there is uncertainty about how a hazard may result in injury or illness
- the work activity involves a number of different hazards and there is a lack of understanding about how the hazards may interact with each other to produce new or greater risks, and
- changes occur at the workplace that may impact on the effectiveness of control measures.

A risk assessment is mandatory under work health and safety laws for high-risk activities such as entry into confined spaces and live electrical work. Some hazards that have exposure standards, such as noise and airborne contaminants, may require scientific testing or measurement by a competent person to accurately assess the risk and to check that the relevant exposure standard is not being exceeded.

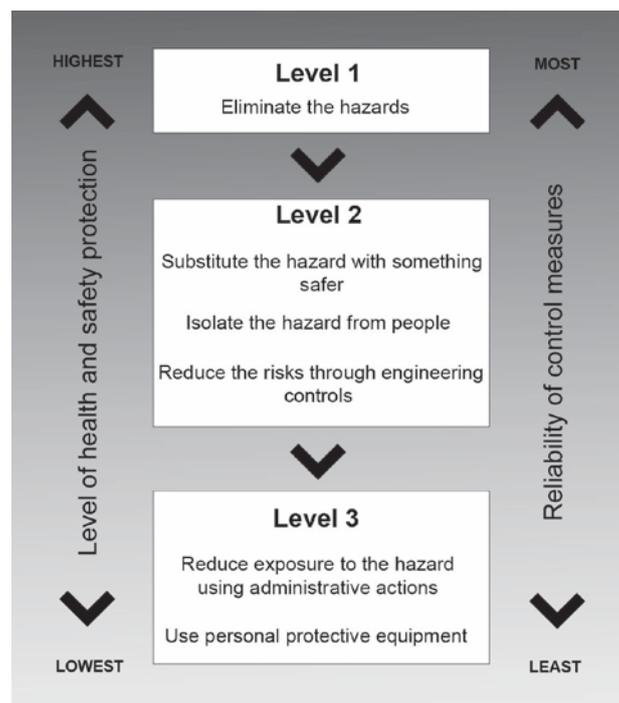
A risk assessment is not necessary where:

- legislation requires some hazards or risks to be controlled in a specific way—these requirements must be complied with
- a code of practice or other guidance sets out a way of controlling a hazard or risk that is applicable to the situation and those recommended controls are chosen. In those instances, the guidance can be followed
- there are well-known and effective controls that are in use in the particular industry that are suited to the circumstances. These controls can simply be implemented.

## 2.8 Controlling risks

The most important step in managing risks involves eliminating them so far as is reasonably practicable, or if that is not possible, minimising the risks so far as is reasonably practicable.

Work health and safety laws require duty holders to work through the hierarchy of risk control when managing risk in the workplace. The hierarchy ranks ways of controlling risks from the highest level of protection and reliability to the lowest as shown in Figure 2.2 below.



**Figure 2.2** The hierarchy of risk control (*Safe Work Australia 2011, Model code of practice - How to manage work health and safety risks, SWA, Canberra, p. 14*)

**Level 1 control measures** involve the elimination of the hazard and its associated risk. The best way to do this is by, firstly, not introducing the hazard into the workplace. For example, the risk of a fall from height can be eliminated by doing the work at ground level. If it is not possible to eliminate the hazard, then the aim should be to eliminate as many of the risks associated with the hazard as possible.

**Level 2 control measures** involve minimising risks if it is not reasonably practicable to eliminate the hazards and associated risks. This can be done using one or more of the following approaches:

- substituting the hazard with something safer, e.g. replacing solvent-based paints with water-based paints
- isolating the hazard from people, e.g. physically separating the source of harm from people by distance or using barriers
- implementing engineering controls, e.g. using a particular mechanical device or process.

**Level 3 control measures** do not control the hazard at the source. They rely on human behaviour and supervision and, used on their own, tend to be least effective in minimising risks. Two approaches to reduce risk in this way are:

- the use of administrative controls, e.g. work methods or procedures designed to minimise exposure to a hazard, such as a procedure on how to operate machinery safely, or signs to warn people of a hazard
- the use of personal protective equipment (PPE), e.g. ear muffs, respirators, face masks, hard hats, gloves, aprons and protective eyewear. PPE limits exposure to the harmful effects of a hazard but only if workers wear and use the PPE correctly.

Administrative controls and PPE should only be used:

- when there are no other practical control measures available (as a last resort)
- as an interim measure until a more effective way of controlling the risk can be used, and
- to supplement higher level control measures (as a back-up).

Information about suitable controls for many common hazards and risks can be obtained from:

- codes of practice and guidance material available from Safe Work Australia and local work health and safety agencies
- manufacturers and suppliers of plant, substances and equipment used in the workplace, and
- industry associations and unions.

If the available information is not relevant to the hazards and risks under consideration, it may be necessary to develop specific control measures. The control option chosen should be:

- one that provides the highest level of protection for people and is the most reliable—that is, a control located towards the top of the hierarchy in Figure 2.2 (see above)
- available—that is, it can be purchased, made to suit or be put in place, and
- suitable for the circumstance in the workplace—that is, will work properly given the workplace conditions, work process and the workers.

Implementing controls usually requires changes to the way work is carried out due to new or modified equipment or processes, new or different chemicals, or new PPE. It is usually necessary to support the control measures with:

- work procedures
- training, instruction and information, and
- supervision.

Ensuring that controls remain effective may be assisted by the following actions:

- accountability for health and safety—accountability should be clearly allocated to ensure procedures are followed and maintained. Managers and supervisors should be provided with the authority and resources to implement and maintain control measures effectively.
- maintenance of plant and equipment—this will involve regular inspection and testing, repair or replacement of damaged or worn plant and equipment.
- up-to-date training and competency—control measures, particularly lower level controls, depend on all workers and supervisors having the appropriate competencies to do the job safely. Training should be provided to maintain competencies and to ensure new workers are capable of working safely.
- up-to-date hazard information—information about hazards, such as plant and substances, may be updated by manufacturers and suppliers and should be checked to make sure controls are still relevant. New technology may provide more effective solutions than were previously available. Changes to operating conditions or the way activities are carried out may also mean that control measures need to be updated.
- regular review and consultation—control measures are more effective where there is regular review of work procedures and consultation with workers and their representatives.

## 2.9 Reviewing control measures

Control measures should be reviewed regularly to ensure they work as planned. Under work health and safety laws, there are certain situations where control measures must be reviewed and, if necessary, revised. A review is required:

- when the control measure is not effective in controlling the risk
- before a change at the workplace that is likely to give rise to a new or different health and safety risk that the control measure may not effectively control

- if a new hazard or risk is identified
- if the results of consultation indicate that a review is necessary
- if a health and safety representative requests a review.

## **2.10 Keeping records of the risk management process**

Keeping records of the risk management process demonstrates potential compliance with work health and safety laws. It also helps when undertaking subsequent risk assessments.

Keeping records:

- enables demonstration of the way decisions about controlling risks were made
- assists in targeting training at key hazards
- provides a basis for preparing safe work procedures
- allows easy review of risks following changes to legislation or business activities
- demonstrates to others (regulators, investors, shareholders, customers) that work health and safety risks are being managed.

The detail and extent of recording will depend on the size of the workplace and the potential for major work health and safety issues. It is useful to keep information on:

- the identified hazards, assessed risks and chosen control measures, including any hazard checklists, worksheets and assessment tools used in working through the risk management process
- how and when control measures were implemented, monitored and reviewed
- who was consulted
- relevant training records
- any plans for changes.

There are specific record-keeping requirements for some hazards, such as hazardous chemicals.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### ***2.10.1 More detailed and/or further information***

- Safe Work Australia has developed a series of interpretive guidelines to assist in the interpretation of key concepts within the Model WHS Act. These guidelines are available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

- Safe Work Australia 2013, Guide – How to determine what is reasonably practicable to meet a health and safety duty, SWA, Canberra, available at <<http://www.safeworkaustralia.gov.au>>.
- Safe Work Australia 2011, Model code of practice - How to manage work health and safety risks, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2012, Worker representation and participation guide, WSA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, Model code of practice - Work health and safety consultation, cooperation and coordination, WSA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

### **2.10.2 Useful standards**

- AS/NZS ISO 31000:2009, *Risk management – Principles and guidelines*
- ISO/IEC 31010:2009, *Risk management – Risk assessment techniques*
- HB 327-2010, *Communicating and consulting about risk* (Companion to AS/NZS ISO 31000:2009)
- HB 158-2010, *Delivering assurance based on ISO 31000-2009—Risk management—Principles and guidelines*
- AS/NZS 2161, *Occupational protective gloves—Series*
- AS/NZS 2210, *Occupational protective footwear—Series*

### **2.10.3 Sources of information for this section**

- Safe Work Australia 2011, *Model Work Health and Safety Act*, SWA, Canberra.
- Safe Work Australia 2012, *Guide to the Model Work Health and Safety Act*, SWA, Canberra.
- Safe Work Australia 2011, *Model code of practice - How to manage work health and safety risks*, SWA, Canberra.

## 3. Planning for health and safety on contaminated sites

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### 3.1 Site contamination

For the purposes of this guideline, site contamination refers to the condition of land or water where any chemical substance or waste has been added as a direct or indirect result of human activity at above background level and represents, or potentially represents, an adverse health impact.

The problems caused by site contamination can be substantial, affecting human health, plant and animal health, the integrity of building structures and services, utilities and the quality of water resources, soil, or the atmosphere. Some contaminants can migrate laterally and/or vertically from a contaminated site and affect adjacent ground, surface water or groundwater and the air.

People may be exposed to contaminants through inhalation, ingestion or skin absorption. The body absorbs chemicals mainly by:

- direct contact with the skin or eyes (includes exposure to dust)
- penetration through the skin (either damaged skin or intact skin)
- breathing in particles, dust, fibres or fumes and vapours
- swallowing soil particles or contaminated water, and
- ingesting contaminated food or drinking water.

Short or long-term health effects to people exposed to contaminants depend on:

- the type of contaminants at the site
- the quantity of contaminants present, and
- the amount of time a person is exposed.

Exposure to contaminants in soil and/or water or fumes in the air can cause harm quickly (acute effects) or cause illness long after exposure (chronic effects).

Adverse health effects caused by certain chemicals can include:

- headaches and nausea
- skin rashes
- breathing difficulties
- liver or kidney problems, and
- some types of cancer in the long term.

### 3.2 Remediation and management of contaminated sites

Remediation of a site is the activity undertaken to eliminate, contain, correct, control or remove any contaminant which poses risks to the environment or human health. Substantial remediation may be involved at a contaminated site, such as engineering

work. Wastes may be dug out, sealed or decontaminated and liquid and mud wastes may be extracted through drilling and/or pumping of wells.

At all stages of the remediation and management process, it is essential to consider and address the risks to the health and safety of all persons who may be affected by activities at the site.

People to be included in this consideration include:

- site users and occupants (if any)
- all workers on the site
- visitors to the site (for example, couriers)
- people travelling across the site or near the site
- site neighbours (as appropriate).

Monitoring of health and safety must be ongoing through all stages of assessment, remediation and management because known and unknown hazards can be encountered at any stage of site works.

Specific hazards arise from the presence of contamination in a particular site. Materials that can present a physical, chemical and/or biological risk may be in solid, liquid, vapour or dust form. They may be in the soil or groundwater. Contaminants include some forms of:

- metals (such as lead, cadmium and mercury), toxic elements and compounds
- hydrocarbons and chlorinated hydrocarbons
- pesticides
- toxic, explosive and asphyxiant gases
- combustible substances
- biologically active substances and micro-organisms
- hazardous wastes
- radioactive wastes
- other materials such as asbestos, synthetic mineral fibre and silica dust.

Other general hazards of concern on a contaminated site might include fires, explosions, confined spaces, underground and above-ground services (e.g. gas lines and electricity), plant, manual handling and slips, trips and falls.

While every contaminated site is different and may require different control measures to eliminate or minimise risks to health and safety, Table 3.1 provides some examples of typical control measures on sites where contamination has been identified.

**Table 3.1** Typical control measures on a contaminated site (**Worksafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria, p 18**)

Level of risk on site	Control measures recommended
1. No contamination above background levels identified in site assessment. Dusty processes/contact with soil. <i>Note: soil can contain harmful bacteria, spores and irritants, as well as some contaminants.</i>	Amenities with hygiene facilities, e.g. adequate washing facilities.
2. Site assessment indicates contaminants above background levels—but risk assessment indicates contaminants unlikely to pose risk to worker/public health.	Amenities with hygiene facilities, e.g. adequate washing facilities.
3. Risk assessment indicates contamination above background levels that pose some risk to worker/public health	<p>Eliminate risk by removing contaminated soil before work begins. Where elimination is not reasonably practicable, isolate workers from contamination or use engineering controls to reduce exposure.</p> <p>Where not reasonably practicable to use isolation or engineering controls, reduce exposure by:</p> <ul style="list-style-type: none"> <li>• using personal protective equipment and clothing</li> <li>• providing amenities with hygiene facilities</li> <li>• observing good hygiene practices, i.e. washing to remove any contaminants from hands/skin and no eating or smoking in contaminated areas.</li> </ul>
4. Risk assessment indicates significant levels of contamination that is a risk to worker/public health.	<p>Eliminate risk by removing contaminated soil before work begins. Where elimination is not reasonably practicable, isolate workers from contamination or use engineering controls to reduce exposure.</p> <p>Where it is not reasonably practicable to use isolation or engineering controls, reduce exposure by:</p> <ul style="list-style-type: none"> <li>• using personal protective equipment and clothing to protect skin, eyes and to prevent inhalation</li> <li>• use of serviced hygiene unit for removal and storage of contaminated work wear: sink troughs and showers in unit for removing contaminants, and clean room for storage of personal clothing</li> <li>• separate amenities on the “clean” side of the site for eating/personal habits</li> <li>• decontamination of mobile plant and equipment</li> <li>• restricted entry to site to protect other persons from exposure.</li> </ul> <p>On large sites, work zones around contaminated areas with boundaries and controlled entry for workers and plant.</p>

### 3.3 The Site Safety Assessor

Planning for the protection of the health and safety of workers begins prior to the assessment of a site suspected to be contaminated. A designated Site Safety Assessor has the responsibility to ensure that the risks to human health and the environment posed by the current site condition and the impact which might be expected to arise from physical disturbance of the site are adequately and appropriately addressed.

The Site Safety Assessor is generally a professionally qualified engineer, occupational hygienist or scientist with recognised experience in the field of contaminated land assessment, as well as knowledge of relevant legislation and guidelines across a number of contaminated site and health and safety topics.

Where significant risks to health and safety have occurred, or are considered likely, the Site Safety Assessor will find it useful to collaborate with relevant state or territory regulatory agencies and government authorities.

The requirements for the position of Site Safety Assessor should, in addition to professional qualifications and experience, include a specific requirement to have at least a working knowledge and understanding of the relevant federal legislation and applicable state or territory legislation. This legislation would cover the following topics:

- contaminated site assessment guidelines and codes of practice
- environmental legislation
- public and work health and safety legislation
- planning/land management/leasing legislation
- waste disposal and transport legislation
- dangerous goods legislation
- construction/demolition regulations.

Where the Site Safety Assessor's knowledge is not sufficient, advice should be sought from relevant experts such as work health and safety professionals and occupational health physicians to ensure risks to health and safety are appropriately addressed.

### 3.4 The site-specific safety plan

The Site Safety Assessor devises and implements a site-specific safety plan (SSSP) to address identified risks and hazards on the site. The aim of the SSSP is to provide as safe a working environment as is practicable.

The inclusion of an SSSP in site documentation is managed in different ways according to specific state and territory requirements relating to the regulation of contaminated sites. Sometimes the document may be known under a different name (e.g. Health and Safety Plan, Site Safety Plan). An SSSP may be required as a separate plan, or its content may be included as part of a larger remediation-related site plan (e.g. Site Management Plan, Remediation Action Plan).

The SSSP - developed to address specific work health and safety issues related to remediation - may also be incorporated into broader work health and safety planning

on a building or development site. This may be the case, for example, on a complex construction project, where work health and safety laws require the development of a comprehensive Work Health and Safety Management Plan.

The SSSP is generally prepared initially to address health and safety issues during the assessment phase. It becomes, however, the foundation of health and safety planning if the decision is made to remediate or otherwise manage contamination on a particular site. Because risks to health and safety can be expected to increase as more physical disturbance occurs, the SSSP is likely to be adapted and updated as the Site Safety Assessor considers all new information.

While the SSSP is, by name and nature, site-specific, a Site Safety Assessor may use a generic site safety plan to deal with straightforward situations. As with a more specific plan, the generic site safety plan should be made available to all workers and visitors via a formal site induction. Each type of plan tends to address similar issues, as described throughout this guideline.

Templates and other work health and safety planning resources are widely available on both a free and fee-paying basis, but practitioners should always consult first with their state or territory safe work agency and environment protection authority to ensure that their planning and documentation meets local requirements.

An example of layout and content for an SSSP is provided as **ATTACHMENT A**.

### 3.5 Legislation and guidance

Under work health and safety laws, the primary duty of care lies with the person conducting a business or undertaking. In practice, many of the systems and processes relating to work health and safety will be planned, implemented, monitored and reviewed by the Site Safety Assessor. The language used in this guideline reflects this practice (i.e. the guideline is directed towards the Site Safety Assessor), but it is important to remember that the person conducting a business or undertaking has ultimate responsibility. It is therefore vital that good communication processes are maintained between the Site Safety Assessor and the person conducting a business or undertaking.

Following the harmonisation of Australia's work health and safety laws, there is a consistency of approach across Australia through the adoption and implementation of model laws and guidance by all states and territories.

It is important to note, however, that:

- prior to adopting the model law package, state and territory governments have made minor variations in accordance with specific local requirements and processes, and
- the enforcement of the laws remains the responsibility of individual states and territories.

This guideline makes reference to information provided in the *model* laws and guidance material available through the national development body, Safe Work Australia.

Under the harmonised work health and safety laws, information and guidance about duties and obligations is presented to practitioners in a number of ways:

- a Work Health and Safety Act, based on the model Act but with local variations. This Act aims to:
  - protect the health and safety of workers and other people by eliminating or minimising risks arising from work or workplaces
  - ensure fair and effective representation, consultation and cooperation to address and resolve health and safety issues in the workplace
  - encourage unions and employer organisations to take a constructive role in improving work health and safety practices
  - assist businesses and workers to achieve a healthier and safer working environment
  - promote information, education and training on work health and safety
  - provide effective compliance and enforcement measures
  - deliver continuous improvement and progressively higher standards of work health and safety.

The Act holds to the principle that workers and other persons should be given the highest level of protection against harm to their health, safety and welfare from hazards and risks arising from work as is reasonably practicable.

For these purposes, 'health' includes psychological health as well as physical health.

- Work Health and Safety Regulations

The Regulations specify the way in which some duties under the Act must be met and prescribes procedural or administrative requirements to support the Act (for example, requiring licences for specific activities and the keeping of records).

- Codes of practice

Codes of practice provide practical guidance on how to meet the standards set out in the Act and the Regulations. Codes of Practice are admissible in proceedings as evidence of whether or not a duty under the work health and safety laws has been met, but only after the Code of Practice in question has been approved by the Minister responsible for work health and safety legislation in a particular state or territory. They can also be referred to by an inspector when issuing an improvement or prohibition notice.

It is recognised that equivalent or better ways of achieving the required work health and safety outcomes may be possible. For that reason compliance with codes of practice is not mandatory providing that any other method used provides an equivalent or higher standard of work health and safety than suggested by the code of practice.

- Interpretive guidelines

Interpretive guidelines are a formal statement on how work health and safety regulators believe key concepts in the Work Health and Safety Act operate and provide an indication of how the laws will be enforced.

It is crucial that the Site Safety Assessor consult with relevant local safe work agencies to clarify any different or additional requirements before commencing any health and safety planning or activity at a contaminated site.

### **3.6 Consulting with workers**

Work health and safety laws require that workers be consulted about a health and safety matter where they are, or are likely to be, directly affected by that matter.

This duty to consult is based on the recognition that worker input and participation improves decision-making about health and safety matters and assists in reducing work-related injuries and disease.

Consultation, as understood under work health and safety laws, requires that:

- relevant work health and safety information is shared with workers
- workers are given a reasonable opportunity to express their views and to raise health or safety issues
- workers are given a reasonable opportunity to contribute to the decision-making process relating to the health and safety matter at hand
- the views of workers are taken into account, and
- workers are advised of the outcome of any consultation in a timely manner.

It may be that a health and safety representative has been elected to represent a work group. If that is the case, consultation must involve that representative.

The Site Safety Assessor must consult with workers when:

- identifying hazards and assessing risks arising from the work carried out or to be carried out
- making decisions about ways to eliminate or minimise those risks
- making decisions about the adequacy of facilities for the welfare of workers
- proposing changes that may affect the health or safety of workers, and
- making decisions about procedures for consulting with workers, resolving health or safety issues, monitoring health of workers; monitoring the conditions at the workplace, and providing information and training for workers.

It may be useful to also consult workers about matters that are not listed above, for example, when conducting investigations into incidents or near-misses.

### **3.7 Consulting when duty of care is shared**

In situations where more than one person conducting a business or undertaking is operating on the site, each must, so far as is reasonably practicable, consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter.

What is reasonably practicable in relation to consulting, cooperating and coordinating activities with other duty holders will depend on the circumstances, including the nature of the work and the extent of interaction. For example, in some small-scale situations, direct discussions and planning may take place as part of everyday work, while in more large-scale situations, formal mechanisms such as written agreements and consultative committees might be needed.

After other duty holders have been identified, consultation should commence during the planning of work and should be part of an ongoing process that acknowledges changes in the working environment.

Talking to, and cooperating and coordinating activities with others who are involved in the work or things associated with the work will make the control of risks more likely and assist each duty holder to comply with their duty. It can also mean that health and safety measures are more efficiently undertaken.

The objective of **consultation** is to make sure that everyone associated with the work has a shared understanding of what the risks are, which workers are affected and how the risks will be controlled. Consultation should include:

- what each will be doing, how, when and where and what plant or substances may be used
- who has control or influence over aspects of the work or the environment in which the work is being undertaken
- ways in which the activities of each duty holder may affect the work environment
- ways in which the activities of each duty holder may affect what others do
- identifying the workers who are or will be involved in the activity and who else may be affected by the activity
- what procedures or arrangements may be in place for the consultation and representation of workers, and for issue resolution
- what information may be needed by another duty holder for health and safety purposes
- what each knows about the hazards and risks associated with their activity
- whether the activities of others may introduce or increase hazards or risks
- what each will be providing for health and safety, particularly for controlling risks, and
- what further consultation or communication may be required to monitor health and safety or to identify any changes in the work or environment.

**Cooperation** may involve implementing arrangements in accordance with any agreements reached during consultation with the other duty holder and involve not acting in a way that may compromise what they are doing for health and safety. It also means that, if approached by other duty holders wanting to consult on a health and safety matter, each duty holder should:

- not obstruct communication, and

- respond to reasonable requests from other duty holders to assist them in meeting their duty.

The **coordination** of activities requires duty holders to work together so that each person can meet their duty of care effectively without leaving any gaps in health and safety protection. This will include making sure that the measures each duty holder puts in place works effectively together to control the risks. This can happen by:

- identifying when and how each control measure is to be implemented
- ensuring that control measures complement each other.

### 3.8 Consulting with the public

When contamination is adjacent to public premises or residential or public areas, there is often considerable community concern. The public has a legitimate right to understand and to be involved in decisions that may affect them. It follows that high levels of involvement and communication are important to prevent undue concerns about the risks during remediation activities.

The development of an effective process of consultation and communication with people who may be affected by work on a contaminated site is something that should be considered well before remediation activities begin.

At a site where no community groups or individuals are potentially affected or concerned by the remediation activities, public involvement in the decision-making process may not be a significant issue. Similarly, a high level of public involvement may not be needed where the nature and extent of remediation (including the nature and characteristics of the chemical substances) is not a significant issue of concern.

Many health and safety concerns relating to members of the public will be addressed by the same control measures put in place to address hazards and risks to workers and others on contaminated sites. However, it is essential that the Site Safety Assessor consult with their local environment protection authority to ensure that specific local requirements, for example, around noise and other forms of pollution, are met. Further information is available in the guideline, *Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns*.

An effective risk communication strategy can go a long way in responding to the concerns of members of the public regarding real, potential or perceived threats to their health and safety.

Effective engagement with the local community may be of particular benefit in situations where:

- site activities may be a nuisance or affect the amenity of the locality, e.g. temporary noise, odour, emissions or dust—nuisances for short periods are generally more tolerable, but nuisance over periods of time can result in increased frustration
- a high level of contamination has the potential to affect the adjacent community, or where the contaminant types are controversial

- the site is near to residential areas, childcare centres, schools or nursing homes
- the site is in or near sensitive ecological areas
- the site or locality has a controversial history related to contamination
- the development of the site is controversial for political, economic or social reasons
- the characteristics or toxicity of the contamination may be controversial
- contamination has moved outside the site boundaries, and
- a remediation method may be proposed that is perceived as controversial or a nuisance or as likely to affect the amenity of the locality.

A consideration of the type of consultation that will be most appropriate for the site should involve:

- identifying the stages of the project when consultation is required
- establishing the project's area of impact
- identifying the various stakeholders who may be affected or would like to be consulted
- consulting with the relevant union or work group
- identifying statutory requirements in relation to consultation, such as required by a development approval or the development process
- determining appropriate notices
- identifying potential language barriers—interpreters may be necessary in some instances.

Any consultation strategy that is prepared when community involvement and consultation is considered necessary should:

- define requirements for community consultation and other stakeholder involvement
- plan for evaluation and feedback from all parties involved on the effectiveness of the consultation and communication so that improvements and modifications can be made
- document the goals and objectives, consultation and communication program (when) and action plan (techniques)
- ensure that the party undertaking the site works is involved so that promises are not made that cannot be kept
- demonstrates that the community is genuinely involved and not just advised.

Consultation should be ongoing through remediation and management of a contaminated site, and needs to be based on a commitment to seriously seek to understand public concerns and respond to them.

A complaints register should also be established for the project. This involves developing a system that effectively receives, records and responds to community complaints, providing staff with training in how to effectively deal with these complaints, and publicising the service to the local community.

An appropriately skilled community consultation consultant or facilitator may be necessary if consultation will be substantial.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### **3.8.1 More detailed and/or further information**

- Safe Work Australia 2011, *Model code of practice - Work health and safety consultation, cooperation and coordination*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2012, *Worker representation and participation guide*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2012, *Guide to the Model Work Health and Safety Act*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (8), Guideline on community engagement and risk communication, NEPC, Australia, available at <[www.scew.gov.au](http://www.scew.gov.au)>.
- WorkSafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria, available at <[www.worksafe.vic.gov.au](http://www.worksafe.vic.gov.au)>.
- WA Department of Environment 2002, *Community consultation, Contaminated sites management series*, DoE, WA, available at <[www.dec.wa.gov.au](http://www.dec.wa.gov.au)>, or <[www.der.wa.gov.au](http://www.der.wa.gov.au)>.
- WA Commission for Occupational Safety and Health 2005, *Guidance note: Occupational safety and health management and contaminated sites work*, COSH, Western Australia, available at <[www.commerce.wa.gov.au/worksafe](http://www.commerce.wa.gov.au/worksafe)>.
- An SSSP may be incorporated into a more comprehensive Work Health and Safety Management Plan in complex construction projects. A template for such a plan has been developed by WorkSafe Tasmania and can be viewed at <[www.worksafe.tas.gov.au](http://www.worksafe.tas.gov.au)>.

### **3.8.2 Sources of information for this section**

- WorkSafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria.

- SA EPA 2008, *EPA Guidelines for environmental management of on-site remediation*, EPA, Adelaide.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure, Schedule B (9)*, Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- WA Commission for Occupational Safety and Health 2005, *Guidance note: Occupational safety and health management and contaminated sites work*, COSH, Western Australia.
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, NEPC, Australia.
- Safe Work Australia 2012, *Codes of practice and guidance material*, information sheet, SWA, Canberra.
- Safe Work Australia 2012, *Guide to the Model Work Health and Safety Act*, SWA, Canberra.
- Safe Work Australia 2011, *Model code of practice - Work health and safety consultation, cooperation and coordination*, SWA, Canberra.
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (8), Guideline on community engagement and risk communication, NEPC, Australia.

## 4. Health and safety during remediation – general considerations

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### 4.1 Site access and security

Appropriate on-site security during remediation activities may be necessary to protect workers and the public from potential risks from earthworks (e.g. trenching, earthmoving operations and traffic), to limit exposure from contaminated soil and to protect equipment against vandalism. For these reasons, it is important to ensure that worker and public access to the site is controlled during and after working hours.

Restriction of access to particular areas of the site to certain specifically trained or equipped personnel may be required. For example, certain sites may, due to explosive vapour hazard, require restriction of vehicles to suitable vehicles and electrical equipment to intrinsically safe types. Where it is not practicable to have such equipment, the equipment should be used under a safe system of work providing equal or higher levels of safety than intrinsically safe equipment.

When planning appropriate site security, the Site Safety Assessor should consider:

- types and concentrations of chemical substances on site
- toxicity of chemical substances and other safety hazards
- types of operations to be carried out on site—e.g. excavations, use of plant machinery
- ease of public access
- public safety (all hours)
- vehicle access
- size of site
- fencing, and
- location of site.

Potential safety measures include:

- secure fencing to restrict access to the site and provide protection from physical hazards. In particular, unsupervised excavations (including boreholes) should never be left open or unfenced as they present a hazard to site personnel, visitors and animals
- a requirement that all visitors report to the site office upon arrival at the site
- site induction for all workers and visitors to the site
- records kept of all people attending the site, and
- signage.

The details of security will be site specific. However, it is normal practice to set up an exclusion zone around areas where work is being carried out and to limit access to this

area to essential personnel. The exclusion zone may be marked in many ways ranging from portable signs or bunting to full barriers and fencing. On small sites the entire site may be considered an exclusion zone. Appropriate signage warning of works in progress and the hazards present should always be deployed at any point where unauthorised access to the site from outside is considered likely. Signage, while important, is a relatively unsatisfactory way of communicating information to people about the site and should be used to complement other safety measures that are being considered.

Temporary relocation of occupants of the site may also need to be considered to diminish the potential for interference. Consideration should be given to timing remediation and management activities to coincide with periods when site occupants are absent, for example, with school sites, scheduling activities, if possible, to coincide with holiday periods.

Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **4.1.1 More detailed and/or further information**

- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.

#### **4.1.2 Sources of information for this section**

- SA EPA 2008, *EPA Guidelines for environmental management of on-site remediation*, EPA, Adelaide.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure, Schedule B (9)*, Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## **4.2 Hazard training for workers**

Training aims to ensure that workers:

- understand the hazards and risks associated with work on a contaminated site
- are not likely to cause harm to themselves or others, and
- know how to use any mobile plant and equipment and personal protective equipment and clothing.

The Site Safety Assessor should ensure that information, training and instruction provided to a worker is suitable and adequate having regard to:

- the nature of the work carried out by the worker

- the nature of the risks associated with the work at the time the information, training or instruction is provided, and
- the control measures implemented with regard to a particular hazard or risk.

As far as is reasonably practicable, information, training and instruction should be readily understandable by any person to whom it is provided.

The Site Safety Assessor should develop training procedures to ensure that:

- information on contaminants and all identified hazards at the site is provided to all workers to whom it is relevant.
- all workers know how to identify hazards and report them to a supervisor
- induction, information, instruction, training and supervision in safe procedures, including the use of personal protective clothing and equipment, are provided to all workers
- training is provided for workers who will work with hazardous substances. This should include information on the primary routes of exposure and health effects of contaminants on the site, control measures, correct use of protective clothing and equipment and details of health surveillance (when it is needed and what it will involve). In determining the training requirements, the Site Safety Assessor must consider the functions performed by the employees and the capacities in which they are employed, so that the training covers the requirements for the job to be performed
- records are kept of all induction and training undertaken for work with hazardous substances
- all workers are trained in emergency evacuation procedures
- all workers not fluent in English are provided with information in a language they understand, and increased supervision if necessary
- training is provided for spill clean-up, if workers are required to do this work
- people in supervisory positions have the skills, knowledge and authority to undertake the role
- work is monitored so that agreed safe work practices are followed, and
- training is ongoing, with regular revision of safe work procedures.

During training, all workers should be provided with:

- copies of the SSSP and the emergency plan
- copies of any safe work procedures
- information about symptoms of exposure to contaminants on the site
- information on personal hygiene and managing of tools and equipment to eliminate hazards
- information about what to do and who to contact in an emergency, and who to notify about an incident

- contacts for emergency response, including medical and incident notification.

Workers should have access to these documents at all times.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **4.2.1 More detailed and/or further information**

- Safe Work Australia/National Occupational Health and Safety Commission 1998, *Guideline – Integrating OHS competencies into national industry competency standards*, 2nd edition, (NOHSC:7025(1998), available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **4.2.2 Sources of information for this section**

- Safe Work Australia 2011, *Model Work Health And Safety Regulations*, SWA, Canberra.
- WA Commission for Occupational Safety and Health 2005, *Guidance note: Occupational safety and health management and contaminated sites work*, COSH, Western Australia.
- WorkSafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

### **4.3 Personal protective equipment and clothing**

Work on contaminated sites may require the use of a range of personal protective equipment and clothing (PPE).

PPE includes a wide range of clothing and safety equipment, such as boots, face masks, hard hats, ear plugs, respirators, gloves, safety harnesses, and high visibility clothing.

PPE is one of the least effective ways of controlling risks to health and safety and should only be used:

- when there are no other practical control measures available (as a last resort)
- as an interim measure until a more effective way of controlling the risk can be used
- to supplement higher-level control measures (as a back-up).

Where PPE is provided and used on the site, it is important to remember that:

- wearing PPE may adversely affect the performance of tasks (e.g. by restricting vision or mobility)
- PPE may be uncomfortable to wear and some workers may not be able to wear it (e.g. workers who are allergic to latex cannot wear rubber gloves)
- ongoing supervision is required to ensure the PPE is being used correctly, and
- PPE may create new hazards (e.g. some items of PPE can hinder the body's natural cooling mechanisms by preventing evaporation of perspiration).

If PPE has been identified as one of the control measures to minimise exposure to a risk, these items should be provided and kept in a fully operational condition and stored in clean facilities. Appropriate signs should be used to remind workers where PPE must be worn, and workers must be instructed and trained in how to use, maintain and store the PPE. It is important that PPE does not interfere with any medical conditions of the worker using the PPE.

PPE must be:

- selected to minimise risk to health and safety
- suitable for the nature of the work and any hazard associated with the work
- a suitable size and fit and reasonably comfortable for the person wearing it
- maintained, repaired or replaced so it continues to minimise the risk, and
- used or worn by the worker, so far as is reasonably practicable.

Selection of the particular level and type of PPE to be used will depend on the:

- type and amount of the contaminants on site
- nature of the work
- expected or potential exposure levels
- route of entry of the contaminants into the body, and
- actual performance of the PPE.

The selection of appropriate PPE is important as safety equipment that overstates the likely risk will result in increased body burden without any improvement in protection and may unduly alarm other personnel on the site and/or passers-by and neighbours. Similarly, selection of safety equipment that does not adequately address the likely risk will not provide adequate protection.

When choosing the right PPE for a particular activity, the selection process must involve consultation with users and health and safety representatives and should include:

- a detailed evaluation of the risk and performance requirements for the PPE
- compatibility of PPE items where more than one type of PPE is required (for example, ear muffs with a hard hat)

- consultation with the supplier to ensure PPE is suitable for the work and workplace conditions, and
- preference for PPE that complies with the relevant Australian Standard or equivalent standard.

A worker must, so far as reasonably able, wear the PPE in accordance with any information, training or reasonable instruction. The worker must also:

- not intentionally misuse or damage the PPE
- report any damage, defect or need to clean or decontaminate any PPE, and
- consult with their manager if the PPE is uncomfortable or does not fit properly.

The Site Safety Assessor may need to consult an occupational hygienist for advice on the selection of specialised PPE, and any specific training and supervision needed for staff using this equipment.

A program may be required to monitor the health of workers using PPE to ensure that the equipment is working effectively to prevent exposure.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### ***4.3.1 More detailed and/or further information***

- PPE frequently asked questions, public webpage, Safe Work Australia, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### ***4.3.2 Useful standards***

- AS/NZS 1715:1994 *Selection, use and maintenance of respiratory protective devices*
- AS/NZS 1716:1994 *Respiratory protective devices*
- AS/NZS 1270:2002 *Acoustics - Hearing protectors*
- AS/NZS 1269.3:2005 *Occupational noise management – Hearing protector program*
- AS/NZS 1269 *Occupational noise management Series*
- AS/NZS 1337 *Personal eye protection Series*
- AS/NZS 1801:1997 *Occupational protective helmets*
- AS/NZS 1800:1998 *Occupational protective helmets - Selection, care and use*
- AS/NZS 4501.1:2008 *Occupational protective clothing – Guidelines on the selection, use, care and maintenance of protective clothing*

## Sources of information for this section

- WorkSafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- PPE frequently asked questions, public webpage, Safe Work Australia, Canberra, viewed 2 July 2013, <[www.safeworkaustralia.gov.au/sites/swa/model-whs-laws/faqs/pages/faq-ppe](http://www.safeworkaustralia.gov.au/sites/swa/model-whs-laws/faqs/pages/faq-ppe)>.

## 4.4 Site hygiene facilities

On contaminated sites, personal hygiene should be considered a priority matter to mitigate possible exposure to contaminants. Workers should have ready access to clean work clothes, protective clothing, showers and adequate washing and laundry facilities.

Washing facilities, either mains-supplied or temporary, should be available. In the absence of immediate access to a water supply, wet-wipes may be useful in some circumstances, but are less effective at removing contaminants or microbial hazards, for example, from underneath fingernails. Many wet wipes also contain alcohol which could enhance skin absorption of some substances.

Eating, smoking and chewing gum should not be allowed in the exclusion zone. A separate support facility in a clean area sufficiently remote from the operations should be set aside for use during meal or rest breaks.

The availability of toilet facilities will be dependent upon the location and nature of the site, and any decision on whether a temporary local facility is required will form part of the SSSP. As a minimum, temporary toilet facilities should be provided at all sites.

Where there are significant levels of contamination, the risk management process may identify a need for additional hygiene measures and work procedures. Such measures may include a serviced hygiene unit or work zones to control exposure.

A serviced hygiene unit should be set up at the most convenient access and egress point to a contaminated area. This reduces the risk of workers coming in contact with contaminants after leaving the work area, and prevents others outside the work site being exposed to contaminants.

A recommended layout for a hygiene unit is:

- First stage – after exiting the ‘dirty zone’, an area for removal and storage of contaminated work wear, such as overalls, footwear and gloves
- Second stage – a washing area equipped with deep sink troughs for hand washing and showers for workers who have been in trenches or in dusty conditions
- Third stage – a clean room used for the storage of normal clothing.

The unit's toilets should be situated so that workers undergo the hygiene procedure before using these facilities.

A boot wash, with a brush to remove soil, should be situated at the entrance to the first stage of the serviced hygiene unit.

No eating or smoking should take place in the 'dirty' area. An amenity area for workers, which can only be entered from the 'dirty' zone by going through the serviced unit, may be installed on the clean side of the site.

On larger sites, work zones around contaminated areas may be needed with boundaries clearly marked, signposted and controlled to prevent exposure to unprotected workers. Workers (including sub-contractors) should not enter these zones unless they are equipped with the minimum PPE stipulated in the SSSP and trained in its use.

A recommended layout for work zones is:

- an exclusion zone where the work may involve exposure to contaminants and which is restricted to essential personnel who are trained and appropriately protected
- a decontamination zone on the boundary containing a serviced hygiene unit and facilities for washing mobile equipment and plant
- a support zone where support services are located and unprotected people can work with minimal exposure risk.

If these additional hygiene measures are required, an occupational hygienist should be consulted for further advice. Specific guidance should also be sought regarding decontamination procedures relating to asbestos.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **4.4.1 More detailed and/or further information**

- Safe Work Australia 2011, *Model code of practice – Managing the work environment and facilities*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Model code of practice - How to safely remove asbestos*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Model code of practice – How to manage and control asbestos in the workplace*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **4.4.2 Sources of information for this section**

- WorkSafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

### **4.5 Emergency procedures**

Under work health and safety laws, an emergency plan must be prepared that provides for:

- emergency procedures that include:
  - an effective response to an emergency
  - evacuation procedures
  - notification procedures to advise emergency services organisations at the earliest convenience
  - medical treatment and assistance
  - communication procedures between the person coordinating the emergency response and all persons at the workplace
- the testing procedures and how often this will be done, and
- how relevant workers will be provided with information, training and instruction about implementing the emergency procedures.

The emergency plan should be based on a practical assessment of hazards associated with the site, and the possible consequences of an emergency occurring as a result of those hazards.

In developing the plan, consideration should be given to the application of all relevant laws, including public health laws (for example, workplaces that are also public places) and state or territory disaster plans.

A comprehensive emergency plan should also include:

- a site map that indicates where hazardous chemicals are stored
- responsibilities of key persons in managing emergencies
- circumstances to activate the plan
- systems for raising the alarm and estimating the extent of the emergency
- alerting emergency services organisations to the emergency or a potentially dangerous occurrence
- procedures that account for all people at the workplace

- isolation of the emergency area to prevent entry by non-essential personnel
- roles of on-site emergency response teams (including first aiders and emergency wardens)
- detail about actions to contain any spillage
- the requirement for fire-water retention to ensure that contaminated fire-water cannot enter waterways, drains or groundwater
- disconnection of power supplies and other energy sources except when required to maintain safety of a critical operation or to run emergency equipment such as fire booster pumps
- prevention of hazardous chemicals or contaminated material of any kind from entering drains or waterways
- provision of relevant information and assistance to the emergency services authority, both in anticipation of emergencies and when they occur
- maintenance of site security throughout the emergency
- provision for dealing with the public and the press, and
- any site rehabilitation requirements in relation to the emergency.

Depending on the activities being undertaken at the site, additional information may be required in emergency plans. Examples of higher-risk workplaces include:

- workplaces with confined spaces
- workplaces that use fall arrest harness systems
- major hazard facilities and mines
- workplaces that handle or manage asbestos
- workplaces that store or handle hazardous chemicals, and
- workplaces that carry out demolition and refurbishment.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **4.5.1 More detailed and/or further information**

- Safe Work Australia 2012, *Fact sheet - Emergency plans*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Model code of practice – Managing the work environment and facilities*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2012, *Model code of practice – Managing risks of hazardous chemicals in the workplace*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

- Safe Work Australia 2011, *Model code of practice – How to manage and control asbestos in the workplace*, SWA, Canberra, available at <www.safeworkaustralia.gov.au>.
- Safe Work Australia 2011, *Model code of practice – Confined spaces*, SWA, Canberra, available at <www.safeworkaustralia.gov.au>.
- Safe Work Australia 2011, *Model code of practice – Managing the risk of falls at workplaces*, SWA, Canberra, available at <www.safeworkaustralia.gov.au>.
- Safe Work Australia 2012, *Model code of practice – Demolition work*, SWA, Canberra, available at <www.safeworkaustralia.gov.au>.
- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.

#### **4.5.2 Useful standards**

- AS 3745-2010, *Planning for emergencies in facilities*
- AS 1319-1994, *Safety signs for the occupational environment*

#### **4.5.3 Sources of information for this section**

- Safe Work Australia 2011, *Model Work Health And Safety Regulations*, SWA, Canberra.
- Safe Work Australia 2012, *Fact sheet - Emergency plans*, SWA, Canberra.
- Safe Work Australia 2011, *Model code of practice – Managing the work environment and facilities*, SWA, Canberra.

## **4.6 First aid**

First aid facilities and equipment on site should comply with work health and safety laws which include requirements to:

- provide first aid equipment and ensure each worker at the site has access to the equipment
- ensure access to facilities for the administration of first aid, and
- ensure that an adequate number of workers are trained to administer first aid at the site or that workers have access to an adequate number of other people who have been trained to administer first aid.

First aid requirements are site-specific, depending as they do on the nature of the work, the type of hazards, the site size and location, as well as the number of people at the site. These factors must be taken into account when deciding what first aid arrangements need to be provided.

#### **4.6.1 First aid facilities**

A risk assessment will help determine the type of first aid facilities needed. For example, a clean, quiet area within the workplace that affords privacy to an injured or ill person may be suitable and practicable for some workplaces.

Access to a telephone for contacting emergency services or an emergency call system should be provided as part of all first aid facilities.

Other options for first aid facilities include the following:

- A first aid room may be appropriate where the site is such that it would be difficult to administer first aid unless a separate room is available. Responsibility for maintaining a first aid room should be allocated to a trained occupational first aider, except where this room is part of a health centre or hospital.
- A health centre staffed by a registered health practitioner (a doctor or nurse) or paramedic can provide emergency medical treatment and cater to the types of hazards possible in high-risk workplaces.

#### **4.6.2 First aid equipment**

All workers must be able to access a first aid kit. This will require at least one first aid kit to be provided at their workplace.

The first aid kit should provide basic equipment for administering first aid for injuries including:

- cuts, scratches, punctures, grazes and splinters
- muscular sprains and strains
- minor burns
- amputations and/or major bleeding wounds
- broken bones
- eye injuries, and
- shock.

The contents of first aid kits should be based on a risk assessment. For example, there may be a higher risk of eye injuries and a need for additional eye pads in a workplace where:

- chemical liquids or powders are handled in open containers
- spraying, hosing or abrasive blasting operations are carried out
- there is any possibility of flying particles causing eye injuries
- there is a risk of splashing or spraying of infectious materials, and/or
- welding, cutting or machining operations are carried out.

Additional equipment may be needed for serious burns and at remote workplaces.

### **4.6.3 First aid personnel**

First aid in the workplace can be provided in a number of ways:

- training one or more workers to administer first aid
- arranging for another person to administer first aid to workers provided they have been trained to do so. These may be first aiders of other businesses who share the workplace or other persons who are qualified to administer first aid. This will involve consulting, cooperating and coordinating the access arrangements with the other persons and ensuring that access is available at the times when workers are carrying out work, e.g. taking into account any shift work.

First aiders should hold nationally recognised Statement/s of Attainment issued by a Registered Training Organisation for the nationally endorsed first aid unit/s of competency.

First aiders should attend training on a regular basis to refresh their first aid knowledge and skills and to confirm their competence to provide first aid. Refresher training in CPR (cardiopulmonary resuscitation) should be undertaken annually and first aid qualifications should be renewed every three years.

First aiders may also need to undertake additional first aid training to respond to specific situations at their workplace. For example, where workers have severe allergies, first aiders should be trained to respond to anaphylaxis if this topic has not been covered in previous first aid training.

The following ratios are recommended:

- low-risk workplaces—one first aider for every 50 workers, and
- high-risk workplaces— one first aider for every 25 workers.

### **4.6.4 First aid procedures**

The Site Safety Assessor should develop and implement first aid procedures to ensure that workers have a clear understanding of first aid in their workplace. The procedure should cover:

- the type of first aid kits available and where they are located
- the location of first aid facilities such as first aid rooms
- who is responsible for the first aid kits and facilities and how frequently they should be checked and maintained
- how to establish and maintain appropriate communication systems (including equipment and procedures) to ensure rapid emergency communication with first aiders
- the communication equipment and systems to be used when first aid is required (especially for remote and isolated workers). These procedures should contain information about how to locate the communication equipment, who is responsible for the equipment and how it should be maintained

- the work areas and shifts that have been allocated to each first aider. These procedures should contain the names and contact details of each first aider
- arrangements to ensure first aiders receive appropriate training
- arrangements for ensuring that workers receive appropriate information, instruction and training in relation to first aid
- seeking information when a worker commences work about any first aid needs that may require specific treatment in a medical emergency, such as severe allergies. Information about a worker's health must be kept confidential and only provided to first aiders with the worker's consent
- how to report injuries and illnesses that may occur in the workplace
- practices to avoid exposure to blood and body fluids
- what to do when a worker or other person is too injured or ill to stay at work, e.g. if they require assistance with transport to a medical service, home or somewhere else where they can rest and recover, and
- access to debriefing or counselling services to support first aiders and workers after a serious workplace incident.

First aid procedures can be incorporated into the site's emergency plan. If this is done, the plan should specify the role of first aiders according to their level of qualification and competence. In particular, first aiders should be instructed not to exceed their training and expertise in first aid. Other staff, including supervisors, should be instructed not to direct first aiders to exceed their first aid training and expertise.

#### **4.6.5 First aid record-keeping**

A record of any first aid treatment given should be kept by the first aider and reported to managers on a regular basis to assist reviewing first aid arrangements. The Site Safety Assessor should check with their state or territory government health department to ensure that any local record-keeping requirements are met.

#### **4.6.6 First aid information**

Workers should be given information about what to do and who to contact if they are sick or injured.

Information should be easy to understand, accessible and should take into account the language and literacy levels of workers. Information may be given using verbal methods (e.g. explanations and demonstrations) or visual methods (e.g. videos, DVDs and posters).

Information and instruction on first aid should include:

- the location of first aid equipment and facilities
- the names and location of persons trained to administer first aid, and
- the procedures to be followed when first aid is required.

This information and instruction should be provided as part of workers' induction training and when there are any changes, for example, in the location of first aid facilities or in the names, locations or contact details of first aiders.

#### **4.6.7 Reviewing first aid requirements**

The Site Safety Assessor should regularly review first aid arrangements in consultation with workers to ensure they remain adequate and effective. This may be done by:

- checking that the people who have responsibilities under the site's first aid procedures are familiar with them
- if the way work is performed is changed, or new work practices are introduced, measuring first aid procedures should against a risk assessment to ensure the arrangements are still adequate
- organising a mock first aid emergency to check that first aid is effective. This will involve checking that kits and first aid rooms are accessible and suit the hazards that are unique to the site
- if an incident has occurred that required first aid, evaluating the effectiveness of the first aid that was provided and making changes if necessary, and
- if new information is obtained about a previously unidentified hazard, reviewing the first aid measures currently in place.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **4.6.8 More detailed and/or further information**

- Safe Work Australia 2012, *Model code of practice – First aid in the workplace*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Model code of practice – Work health and safety consultation, cooperation and coordination*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **4.6.9 Sources of information for this section**

- Safe Work Australia 2012, *Model code of practice – First aid in the workplace*, SWA, Canberra.

## **4.7 Accident and incident reporting**

### **4.7.1 Reporting accidents and incidents**

Any direct contact with a potentially contaminated or known contaminated substance should be reported to the Site Safety Assessor. As the effects of contact with

contaminants upon a suspect site may not be immediately apparent, any ill effects noted following any site works should also be reported.

The Site Safety Assessor should set up and maintain records of accidents and incidents and implement and document any actions taken in response to these events. It is recommended that incidents are classified in terms of level of significance (ranging from minor to major) and reporting requirements are set out for each level. As a general guide, the reporting of major incidents should include the following information:

- nature and timing of events that occurred
- materials involved and amounts of each
- cause of the major accident
- effects of the major accident on people, property and the built or natural environment
- clean-up methods used
- effectiveness of emergency plans and procedures
- actions taken to prevent similar occurrences.

#### **4.7.2 Notifiable incidents**

Under work health and safety laws, there are certain types of workplace incidents that need to be notified to the local safe work agency after the person conducting a business or undertaking becomes aware of it. In general, a person conducting a business or undertaking 'becomes aware' of a notifiable incident at the time that any of their workers in supervisory or managerial roles become aware of that incident. For example, if a worker suffers a serious injury and notifies their immediate supervisor it is at this point that the person conducting a business or undertaking is considered to be aware of the incident. For that reason, it is essential that the Site Safety Assessor puts into place internal communication processes that ensure that safety incidents are promptly brought to the attention of the person who has been given responsibility for notifying the local safe work agency.

Only the most serious safety incidents are intended to be notifiable and they trigger requirements to preserve the incident site pending further direction from the regulator.

Notifiable incidents are:

- the death of a person
- a serious injury or illness
- a dangerous incident arising out of work carried out by a business, undertaking or a workplace.

A dangerous incident (which also may be known as a near-miss) is any incident that exposes a worker or any other person to a serious risk to a person's health or safety emanating from an immediate or imminent exposure to:

- an uncontrolled escape, spillage or leakage of a substance

- an uncontrolled implosion, explosion or fire
- an uncontrolled escape of gas or steam
- an uncontrolled escape of a pressurised substance
- electric shock:
  - examples of electrical shock that are not notifiable
    - shock due to static electricity
    - 'extra low voltage' shock (i.e. arising from electrical equipment less than or equal to 50V AC and less than or equal to 120V DC)
    - shock if due to defibrillators used deliberately to shock a person for first aid or medical reasons
  - examples of electrical shocks that are notifiable
    - minor shock resulting from direct contact with exposed live electrical parts (other than 'extra low voltage'), including shock from capacitive discharge
- the fall or release from a height of any plant, substance or thing
- the collapse, overturning, failure or malfunction of, or damage to, any plant, design or item that is required to be registered under work health and safety regulations
- the collapse or partial collapse of a structure
- the collapse or failure of an excavation or of any shoring supporting an excavation
- the inrush of water, mud or gas in workings, in an underground excavation or tunnel, and
- the interruption of the main system of ventilation in an underground excavation or tunnel.

For most hazards such as plant or a structure collapsing, a person will need to be in the immediate vicinity to be exposed to a serious risk to their health or safety. However, some hazards such as an uncontrolled leak of a hazardous gas or a fire can travel towards a person and expose them to a serious risk to health and safety away from the original source.

A dangerous incident includes both immediate serious risks to health or safety, and also a risk from an immediate exposure to a substance which is likely to create a serious risk to health or safety in the future, for example, asbestos or chemicals.

Only occurrences involving a 'serious risk' are notifiable taking into account the likelihood of a serious illness or injury occurring from the incident. This would include any situation which seriously endangers or threatens the health or safety of a person.

### 4.7.3 Information to collect

While states and territories may follow different processes once notification takes place, they have agreed that the following information should be collected as a minimum at the point of incident notification.

Table 4.1

<b>What happened: an overview</b>	<ul style="list-style-type: none"><li>• Provide an overview of what happened</li><li>• Nominate the type of notifiable incident—was it death, serious injury or illness, or ‘dangerous incident’ (as defined above)?</li></ul>
<b>When did it happen</b>	Date and time
<b>Where did it happen</b>	Incident address  Details that describe the specific location of the notifiable incident—for example section of the site or the particular piece of equipment that the incident involved—to assist instructions about site disturbance
<b>What happened: detailed description</b>	Detailed description of the notifiable incident
<b>Who did it happen to</b>	<ul style="list-style-type: none"><li>• Injured person’s name, salutation, date of birth, address and contact number</li><li>• Injured person’s occupation</li><li>• Relationship of the injured person to the entity notifying</li></ul>
<b>How and where are they being treated (if applicable)</b>	<ul style="list-style-type: none"><li>• Description of serious injury or illness—i.e. nature of injury</li><li>• Initial treatment of serious injury or illness</li><li>• Where the patient has been taken for treatment</li></ul>
<b>Who is the person conducting the business or undertaking (there may be more than one)</b>	<ul style="list-style-type: none"><li>• Legal and trading name</li><li>• Business address (if different from incident address), ABN/ACN and contact details including phone number and email</li></ul>
<b>What has/is being done</b>	Action taken or intended to be taken to prevent recurrence (if any)
<b>Who is notifying</b>	<ul style="list-style-type: none"><li>• Notifier’s name, salutation, contact phone number and position at workplace</li><li>• Name, phone number and position of person to contact for further information (if different from above)</li></ul>

If a notifiable incident escalates from a serious illness or injury to a death the local safe work agency must be separately and immediately notified of the death.

### 4.7.4 Preserving the incident site

The person with management or control of a workplace at which a notifiable incident has occurred must ensure, so far as is reasonably practicable, that the site where the incident occurred is not disturbed until an inspector arrives at the site or directs otherwise (whichever is earlier).

Requirements to preserve the incident site apply to any plant, substance, structure or thing associated with the notifiable incident. This means that any evidence that may assist an inspector to determine the cause of the incident is preserved.

An incident site may be disturbed:

- to assist an injured person
- to remove a deceased person
- to make the site safe or to minimise the risk of a further notifiable incident
- to facilitate a police investigation, or
- after an inspector has given a direction to do so either in person or by telephone.

The sooner the local safe work agency is notified, the sooner the site can be released, although an inspector may consider that it should remain undisturbed in order to facilitate investigation of the incident and may issue a non-disturbance notice.

Requirements to preserve a site only apply in relation to the immediate area where the incident occurred—not the whole workplace.

#### **4.7.5 Incident record-keeping**

A record of the notifiable incident must be kept for at least five years from the date of notification. These records should include any directions or authorisations given by an inspector at the time of notification (including authorisations to disturb incident sites) and any confirmation received from the local safe work agency that they were notified about the incident.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **4.7.6 More detailed and/or further information**

- *Incident reporting, public webpage*, Safe Work Australia 2013, Canberra, viewed 4 July 2013, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2012, *Fact sheet - Incident notification*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **4.7.7 Useful standards**

- AS 1885.1-1990, *Workplace injury and disease recording standard in the workplace*

#### **4.7.8 Sources of information for this section**

- Safe Work Australia 2012, *Fact sheet – Incident notification*, SWA, Canberra.

- *Incident reporting*, public webpage, Safe Work Australia 2013, Canberra, viewed 4 July 2013, <www.safeworkaustralia.gov.au>
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## 4.8 Monitoring the health of workers

### 4.8.1 Before work begins

When selecting team members for any particular site, a pre-placement medical examination may need to be performed to ensure the person is fit for work, particularly where the work could involve contaminants which may pose a risk to health, physical issues associated with personal protective equipment, or confined space entry. An occupational physician can provide advice on this matter.

The Site Safety Assessor should take into account the physical requirements of the work and ensure that they are within the capabilities of the appointed workers. For example, pregnancy may preclude certain activities. This is particularly important where there is potential for use of respiratory protective equipment. Workers should have undergone lung function testing if they will work with respiratory hazards such as irritants, allergens and fibrosing dusts, and if they will be required to work in confined spaces. They also need to confirm they can use respiratory protection equipment. Where there is a need for facial fit respiratory equipment, staff should be clean shaven or their facial hair should not interfere with the correct operation of the respirator.

Consideration should be given to any pre-existing condition which may lead to an increased risk from exposure to a site contaminant, for example, a person with asthma exposed to dust/fungal spores, or an immune-compromised person exposed to potentially pathogenic micro-organisms.

Workers should not work on any site when affected by prescribed or non-prescribed drugs, including alcohol, as these might reduce alertness or cause drowsiness.

### 4.8.2 The meaning of health monitoring

Health monitoring means monitoring of a person to identify changes in the person's health status because of exposure to certain substances. There are different types of health monitoring procedures used to assess exposure to hazardous chemicals, including:

- Interview questions—this involves asking the worker questions about previous occupational history, medical history, lifestyle, work practices and symptoms related to exposure.
- Medical examination— this involves the use of standard clinical and medical assessments, tests and techniques to assess the presence of early or long-term health effects, often at set intervals.

- Biological effect monitoring— this is the measurement and assessment of early biological effects before health impairment occurs in exposed workers, e.g. measurement of reduction of cholinesterase activity levels in workers exposed to organophosphate pesticides
- Biological exposure monitoring—this involves measurement and evaluation of the levels of a hazardous chemical or its metabolites (break-down products) in body tissues, body fluids, or in exhaled breath of an exposed person.

Health monitoring does not include air monitoring or other measures used to assess or control exposure to hazardous chemicals in the workplace.

Health monitoring must never be used as an alternative to putting in place effective control measures. However, it can be used to help identify whether existing control measures are working effectively or whether new or more effective control measures should be implemented. It also provides a valuable opportunity for feedback from workers on the effectiveness of control measures.

#### **4.8.3 When health monitoring must be provided**

Work health and safety laws state that health monitoring must be provided to a worker if the worker is carrying out ongoing work using, handling, generating or storing hazardous chemicals and there is a significant risk to the worker's health because of exposure to a scheduled chemical or asbestos. There are specific monitoring requirements for lead related to the frequency of biological monitoring and when and how workers must be removed from and returned to lead risk work.

Health monitoring should be provided:

- before commencing work with the hazardous chemical. This is known as baseline monitoring and it is done so changes to the worker's health can be identified during periods of potential exposure
- during periods of exposure to the hazardous chemical, particularly where excessive exposure occurs, e.g. following spills or loss of containment
- where the worker has concerns that may relate to exposure to the hazardous chemical, e.g. where relevant symptoms are identified, and
- at termination of work with the hazardous chemical.

The hazardous chemicals requiring health monitoring include:

- Acrylonitrile
- Arsenic (inorganic)
- Asbestos
- Benzene
- Cadmium
- Chromium (inorganic)
- Creosote

- Crystalline silica
- Isocyanates
- Lead (inorganic)
- Mercury (inorganic)
- 4,4'-Methylene bis(2-chloroaniline) (MOCA)
- Organophosphate pesticides
- Pentachlorophenol (PCP)
- Polycyclic aromatic hydrocarbons (PAH)
- Thallium
- Vinyl chloride.

Health monitoring must also be provided if the worker:

- is using, handling, generating or storing hazardous chemicals and there is a significant risk the worker will be exposed to hazardous chemicals other than scheduled chemicals and either:
  - valid techniques are available to detect the effect on the worker's health, or
  - a valid way of determining exposure is available and it is uncertain on reasonable grounds whether exposure has resulted in the biological exposure standard being exceeded.

Health monitoring must be carried out by or be done under the supervision of a registered medical practitioner with experience in health monitoring.

#### **4.8.4 The health monitoring report**

On receiving the health monitoring report, the Site Safety Assessor should check it contains:

- the name and date of birth of the worker
- the name, registration number and signature of the registered medical practitioner
- the name and address of the business or undertaking
- the date health monitoring was carried out
- any test results that indicate whether or not the worker has been exposed to a hazardous chemical; for lead, any test results that indicate the worker has reached or exceeded the relevant blood lead level under work health and safety regulations

- any advice that test results indicate the worker may have contracted a disease, injury or illness as a result of carrying out the work that triggered the requirement for health monitoring
- any recommendation that remedial measures be taken, including whether the worker can continue to carry out the type of work that triggered the requirement for health monitoring
- whether medical counselling is required for the worker in relation to the work that triggered the requirement for health monitoring.

The report should also contain:

- the date of sampling if blood, urine or other samples are taken
- results of biological monitoring and other tests carried out; for inorganic lead, the report must also contain the details of the pathology service used to carry out tests.

The health monitoring report should only contain information relating to the health monitoring program for the chemical(s) being used. It should not contain other confidential health information about workers.

As soon as practicable, a copy of the health monitoring report must be provided to:

- the worker
- all other persons conducting a business or undertaking who have a duty to provide health monitoring for the worker (e.g. an on-hire labour company)
- the local safe work agency if the report contains any of the following:
  - advice that the test results indicate the worker may have contracted a disease, injury or illness as a result of carrying out work with the chemical
  - recommendation that remedial measures be taken including whether the worker can continue to carry out work with the hazardous chemical that triggered the requirement for health monitoring
  - for lead risk work, test results that indicate the worker has reached a blood lead level at or above the relevant removal level.

#### **4.8.5 Acting on health monitoring recommendations**

The Site Safety Assessor should arrange for the worker to see the medical practitioner again if it is recommended in the health monitoring report and explain to the worker remedial measures that need to be taken. Treatment programs for adverse health effects should only be discussed between the worker and the medical practitioner.

If the report recommends a worker should not be exposed to a hazardous chemical for a specified period of time or should only work under conditions specified by the practitioner, these recommendations must be followed. For example, the worker may need to be assigned to alternative work or another location where exposure to the hazardous chemical will not occur. This should be done after consultation with the

worker and the practitioner. The worker must not return to that work until cleared to do so by the medical practitioner.

Work practices and procedures should be examined to determine whether tasks are being performed correctly and whether controls are being bypassed. If necessary, training programs should be reviewed and revised.

The Site Safety Assessor must review and, if necessary, revise the control measures for the hazardous chemical. This is also necessary if the report contains test results that indicate the worker has been exposed to the hazardous chemical and has elevated levels of the hazardous chemical or metabolites in his or her body for that chemical, or if there is advice that the test results indicate the worker may have contracted a disease, injury or illness from carrying out work with the chemical.

The Site Safety Assessor should continue to provide workers who have been removed from work with hazardous chemicals, or transferred to other work, with information concerning the results of workplace assessments and their health status.

#### **4.8.6 Health monitoring record-keeping**

Health monitoring reports for workers must be identified as a record in relation to that worker. These records should be kept separate from information obtained for other purposes, for example, records of examinations that are not connected with health monitoring.

Health monitoring reports and results must be kept as confidential records and must not be disclosed to another person without the worker's written consent, except where the records are required to be given under work health and safety laws to any of the following:

- the regulator (the local safe work agency)
- another person conducting a business or undertaking who has a duty to provide health monitoring for the worker
- a person who must keep the record confidential under a duty of professional confidentiality.

Health monitoring reports should be kept separate from normal workers' records like payroll or human resources data, to prevent the reports being accessed inadvertently by unauthorised people. The report cannot be used for any purpose other than for health monitoring. Similarly, blood or tissue samples, X-rays, questionnaires or other materials taken for health monitoring must not be used for any other purpose.

Health monitoring records for all workers must be kept for at least 30 years after the record is made, even if the worker no longer works at a particular workplace. For asbestos health monitoring, these records must be kept for at least 40 years, due to the long period of time it can take for asbestos-related disorders to develop.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

**More detailed and/or further information:**

- Safe Work Australia 2013, *Health monitoring for exposure to hazardous chemicals – Guide for persons conducting a business or undertaking*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2013, *Hazardous chemicals requiring health monitoring*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2013, *Health monitoring for exposure to hazardous chemicals – Guide for medical practitioners*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2013, *Health monitoring for exposure to hazardous chemicals – Guide for workers*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

**Sources of information for this section:**

- Safe Work Australia 2013, *Health monitoring for exposure to hazardous chemicals – Guide for persons conducting a business or undertaking*, SWA, Canberra.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## 5. Health and safety during remediation – specific considerations

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### 5.1 Contaminants found on site

Procedures should be developed for workers finding contaminants known to be on the site. These procedures could include the following steps:

1. Where there are risks of exposure to the contaminants, cease work activities and disturbance of the site
2. Secure the area against unauthorised entry
3. Consult the environmental consultant's report
4. Assess the amounts and toxicity of the hazardous substances and the potential exposure routes into the body
5. Consult local environment protection authority guidelines before containing drilling spoils and fluids
6. Review the work practices and control of the hazards based on information gained from the above steps and from conducting the risk management process
7. Amend work practices and procedures in consultation with workers, other duty holders and community members, as appropriate.

Workers may also find unidentified contaminants on site. Procedures should also be developed to anticipate this situation. Steps in these procedures could include the following:

1. Where there are risks of exposure to contaminants, cease all work activities and disturbance of the site
2. Secure the area against unauthorised entry
3. Contact the site manager
4. Obtain advice and information from the environmental consultant
5. Where appropriate, contact a competent person or a state or territory government agency or authority who can provide specialised information on the potential contaminants and contaminated sites work
6. Review the work practices, the sampling and analysis program (if applicable) and control of the hazards based on information gained from the above steps and from conducting the risk management process
7. Amend work practices and procedures, and the sampling and analysis program, in consultation with workers, other duty holders and community members, as appropriate.

#### 5.1.1 Sources of information for this section

- WA Commission for Occupational Safety and Health 2005, *Guidance note: Occupational safety and health management and contaminated sites work*, COSH, Western Australia.

## 5.2 Outdoor work

Outdoor workers should have access to shelter for eating meals and taking breaks, and to protect them in adverse weather conditions.

Workers carrying out work in extreme heat or cold must be able to do so without a risk to their health and safety so far as is reasonably practicable. Both personal and environmental factors should be considered when assessing the risk to workers' health from working in a particular environment. Personal factors include the level of physical activity, the amount and type of clothing worn, and duration of exposure. Environmental factors include air temperature, the level of humidity, air movement and radiant heat.

Access to shelter should be provided, for example, using sheds, caravans, tents, windbreaks or portable shade canopies. In some situations, vehicles or public facilities may provide appropriate short-term shelter.

Protection against solar ultraviolet (UV) exposure should also be provided for outdoor workers, for example:

- reorganising outdoor work if possible so that workers carry out alternative tasks, or work in shade when the sun is most intense, that is, between 10.00 am and 2.00 pm (11.00 am and 3.00 pm when there is daylight saving)
- providing PPE— wide brim hat, long-sleeved collared shirt, long pants, sunglasses and sunscreen.

The environmental conditions and physical well-being of workers should be monitored when work involves prolonged or repeated exposure to heat or cold.

Workers should be trained to recognise the early symptoms of heat strain or hypothermia, how to follow safe work procedures and to report problems immediately.

Symptoms of heat strain include dizziness, fatigue, headache, nausea, breathlessness, clammy skin or difficulty remaining alert.

Signs of hypothermia include numbness in hands or fingers, uncontrolled shivering, loss of fine motor skills (particularly in hands—workers may have trouble with buttons, laces, zips), slurred speech and difficulty thinking clearly, or irrational behaviour—sometimes a person will even begin to discard clothing.

Immediate assistance should be provided if any worker experiences any of the above signs or symptoms.

On many sites there may be a very real risk posed by the presence of animals such as dogs, cattle, venomous snakes or other potentially threatening species. In such instances, prior awareness of the risks is required and, where necessary, access to the site should be delayed until risks are mitigated to an acceptable extent. It is advisable to have more than one person present on such sites.

Biting or bothersome insects such as mosquitos, ticks and flies, and venomous spiders can present both a risk to health and a distraction from other dangers. Control measures including the use of insect repellent and suitable clothing may assist.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### **5.2.1 More detailed and/or further information**

- Safe Work Australia 2011, *Code of practice – Managing the work environment and facilities*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

### **5.2.2 Sources of information for this section**

- Safe Work Australia 2011, *Code of practice – Managing the work environment and facilities*, SWA, Canberra.
- WorkSafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## **5.3 Remote or isolated work**

Remote or isolated work is work that is isolated from the assistance of other people because of the location, time or nature of the work being done. Assistance from other people includes rescue, medical assistance and emergency services. In some situations, a worker may be alone for a short time. In other situations, the worker may be on their own for days or weeks in remote locations.

Working alone or remotely increases the risks in any job. The following factors should be considered when assessing the risks:

- the length of time the person may be working alone
- the time of day when a person may be working alone
- access to communication
- location of the work
- nature of the work, and
- skills and capabilities of the worker.

Special precautions should be observed when working on remote or isolated sites.

These might include:

- having at least two people at the site at all times when the site is operational
- having at least one first aider as well as fulfilling any specific work health and safety requirement for the presence of a trained first-aider
- studying weather forecasts to ensure adequate field clothing is available for anticipated weather conditions, and that spare clothing is available where extremes of weather or climate are predicted
- having constant access to a 2-way radio or telephone in case of emergencies

- ensuring all equipment, machinery and vehicles are fully operational and have undergone recent maintenance checks
- having emergency and contingency plans and supplies of food and water should workers become isolated
- preparation of a work plan prior to the start of on-site activities so that the schedule of expected events is known by a responsible liaison contact at a base station/office, and with whom telephone or radio contact is made at the start and end of each working shift and at other agreed times if necessary.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### **5.3.1 More detailed and/or further information**

- WA Commission for Occupational Safety and Health 2009, *Guidance note – Working alone*, WACOSH, Perth, available at <[www.commerce.wa.gov.au/worksafe](http://www.commerce.wa.gov.au/worksafe)>.

### **5.3.2 Sources of information for this section**

- Safe Work Australia 2011, *Code of practice – Managing the work environment and facilities*, SWA, Canberra.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## **5.4 Underground services or utilities**

Some of the major hazards associated with excavation or drilling during remediation activities are underground services, utilities or structures, including:

- electricity cables
- gas pipelines
- water pipelines and sewerage
- communications cables
- underground storage tanks
- basement voids, and
- mine shafts.

Before commencing excavation work, all reasonable steps must be taken to obtain current underground services information that relates to the site and areas adjacent to

the site. Every person carrying out the excavation must be given this information and it must be available for inspection by relevant authorities until the excavation is completed or, if there is a notifiable incident relating to the excavation, two years after the incident occurs.

Relevant information includes:

- the essential services that may be affected
- the location, including depth, of any pipes, cables or other plant associated with the affected essential services, and
- any conditions on the proposed excavation work.

General location of underground services or utilities, tanks, basements, shafts, sinkholes or similar can be determined by a number of different methods, including:

- contacting organisations that can assist in locating underground services (e.g. Dial Before You Dig—1100)
- examining the records and other information held by the site owners or from local utility companies, and
- anecdotal evidence from site workers or local residents.

Details of all known utilities on site, and contact numbers for the service providers, should be included in the SSSP.

In certain cases, excavation by hand or use of hand augers prior to the use of mechanical excavators and/or drilling equipment may be required where the exact location or depth of a service pipe or line, tank or other structure is uncertain. Ground-penetrating radar or soil probing may also provide useful information. In the event of uncertainty, underground electrical cables and certain types of metal pipe can often be located using specialist detection equipment.

If any suspect or unexpected structures are unearthed, the excavation should be halted until inspection is made by the Site Safety Assessor or representative, and until the item has been identified and isolated from the works if necessary.

If damage to a service occurs, the appropriate utility company or service provider must be advised as soon as possible, the excavation left open, suitably fenced, and appropriate warning notices posted.

If a gas pipe has been damaged immediate action should include the restriction of any activity which might provide a source of ignition, and the placement of an exclusion zone around the area until the utility company's representatives arrive on site.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.4.1 More detailed and/or further information**

- Safe Work Australia 2012, *Model code of practice – Construction work*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **5.4.2 Sources of information for this section**

- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- Safe Work Australia 2012, *Model code of practice – Construction work*, SWA, Canberra.

### **5.5 Ground stability**

The potential for subsidence should be addressed before allowing heavy plant on site. The presence of underground voids created by previous mining activity, excavation of pits or cellars, sub-surface combustion, corrosion of underground storage tanks or similar should be considered. Any such voids may also accumulate flammable or toxic gases or liquids.

Similarly, any areas previously occupied by lagoons, slurry pits, settling ponds or other potentially saturated areas may not provide good geotechnical support. Unsupported unconsolidated soil, sand or gravel walls or embankments may not be stable. The use of geofabrics may be of use for supporting equipment and reducing dust. The design and use of geofabrics for supporting equipment should be approved by a suitably qualified geotechnical engineer.

Excavations should be secured by fencing and people should not stand close to the edge of any excavation. For viewing or down-pit photography, the end of a test pit is generally more stable than the side wall.

Vibration from excavation and drilling, from plant, or from the movement of heavily laden trucks can sometimes result in the collapse of pits, or damage to foundations of adjacent structures or to underground services or utilities. This possibility should be addressed and any risks assessed prior to choice of excavation or drilling method.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.5.1 More detailed and/or further information**

- Safe Work Australia 2012, *Model code of practice – Excavation work*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **5.5.2 Sources of information for this section**

- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## 5.6 Excavations

Excavation work generally means work involving the removal of soil or rock from a site to form an open face, hole or cavity using tools, machinery or explosives.

The risks of excavation work include:

- a person falling into an excavation
- a person being trapped by the collapse of an excavation
- a person working in an excavation being struck by a falling thing, and
- a person working in an excavation being exposed to an airborne contaminant.

Excavation failures are particularly dangerous because they may occur quickly, limiting the ability of workers (and, in some cases, others in the vicinity) to escape, especially if the collapse is extensive.

The speed of an excavation collapse increases the risk associated with this type of work and the consequences are significant as the falling earth can bury or crush any person in its path. This can result in death by suffocation or internal crush injuries.

Examples of excavation-specific hazards include:

- underground essential services - including gas, water, sewerage, telecommunications, electricity, chemicals and fuel or refrigerant in pipes or lines. As previously noted, information about the location of these and other underground services, such as drainage pipes, soak wells and storage tanks, in and adjacent to the workplace, must be established before directing or allowing excavation work to commence
- the fall or dislodgement of earth or rock
- falls from one level to another
- falling objects
- inappropriate placement of excavated materials, plant or other loads
- the instability of any adjoining structure caused by the excavation
- any previous disturbance of the ground including previous excavation
- the instability of the excavation due to persons or plant working adjacent to the excavation
- the presence of or possible inrush of water or other liquid
- hazardous manual tasks
- hazardous chemicals (e.g. these may be present in the soil where excavation work is to be carried out)
- hazardous atmosphere in an excavation (e.g. using Methyl Ethyl Ketone (MEK) solvent for PVC pipes in poorly ventilated trenches)
- vibration and hazardous noise

- overhead essential services (powerlines) and ground mounted essential services (transformers, gas and water meters).

According to work health and safety laws, managing the risks of excavation work involves consideration of:

- the nature of the excavation
- the nature of the excavation work, including the range of possible methods of carrying out the work, and
- the means of entry into and exit from the excavation.

Following the identification of hazards and the assessment of associated risks, there is a range of control measures that can be considered. If the elimination of a hazard is not reasonably practicable, risks must be minimised by one or a combination of the following:

- substitution, e.g. by using an excavator with a rock breaker rather than manual method
- isolation, e.g. by using concrete barriers to separate pedestrians and powered mobile plant to reduce the risk of collision
- engineering controls, e.g. by benching, battering or shoring the sides of the excavation to reduce the risk of ground collapse
- administrative controls, e.g. by installing warning signs near the excavation, and
- providing and ensuring the use of suitable and well maintained PPE such as hard hats, hearing protectors and high visibility vests.

On a contaminated site, there are some general excavation-related issues that the Site Safety Assessor should keep in mind as they develop the SSSP.

Exposure to the atmosphere can quite rapidly release and change the characteristics of contaminants in soil sampling pits, and open pits can release contaminants. Samples and photographs should, therefore, be taken as soon as possible after opening sampling pits. Unless there is some specific reason to keep pits open, they should then be backfilled, either with clean material or by replacing the excavated soil. If the excavated soil is to be replaced into the pit it should be done stratum by stratum to minimise the potential for vertical spreading of contaminants.

Unsupervised excavations (including boreholes) should never be left open or unfenced such that they present a hazard to site personnel or to livestock. All test pits and boreholes should be backfilled or capped, or be appropriately fenced or barriered (e.g. temporary fencing, soil mounding) and clearly marked with warning signs and tape.

Unsupported excavations greater than waist depth should not generally be entered. Shoring or battering back of excavation walls to a natural angle of repose for entry to excavations at depths of greater than 1.2 m should be undertaken. Entry into shored trenches should be carried out using a ladder and not travelling in the bucket of an excavator.

Spoil should not be placed adjacent to the pit where entry is planned due to the potential for creation of unstable conditions by overloading the crest of the excavation.

Excavations where seepage is occurring should not be entered and caution should be exercised if highly structured/fissured clays are present. The advice of a geotechnical engineer should be sought where deep excavations are being considered adjacent to buildings, roadways and services.

Suitable clearance of excavations from foundations or footings of nearby structures must be provided to avoid damage or destabilisation.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.6.1 More detailed and/or further information**

- Safe Work Australia 2012, *Model code of practice – Excavation work*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2012, *Model code of practice – Construction work*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Model code of practice – Confined spaces*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **5.6.2 Sources of information for this section**

- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- Safe Work Australia 2012, *Model code of practice – Excavation work*, SWA, Canberra.

## **5.7 Confined spaces**

A confined space is determined by the hazards associated with a set of specific circumstances and not just because work is performed in a small space.

According to work health and safety laws, a confined space means an enclosed or partially enclosed space that:

- is not designed or intended primarily to be occupied by a person
- is, or is designed or intended to be, at normal atmospheric pressure while any person is in the space, and
- is or is likely to be a risk to health and safety from:
  - an atmosphere that does not have a safe oxygen level, or
  - contaminants, including airborne gases, vapours and dusts that may cause injury from fire or explosion, or

- harmful concentrations of any airborne contaminants, or
- engulfment.

Confined spaces are commonly found in vats, tanks, pits, pipes, ducts, flues, chimneys, silos, containers, pressure vessels, underground sewers, wet or dry wells, shafts, trenches, tunnels or other similar enclosed or partially enclosed structures, when these examples meet the definition of a confined space under work health and safety laws.

Confined spaces pose dangers because they are usually not designed to be areas where people work. Confined spaces often have poor ventilation which allows hazardous atmospheres to quickly develop, especially if the space is small. The hazards are not always obvious and may change from one entry into the confined space to the next.

The risks of working in confined spaces include:

- loss of consciousness, impairment, injury or death due to the immediate effects of airborne contaminants
- fire or explosion from the ignition of flammable contaminants
- difficulty rescuing and treating an injured or unconscious person, and
- asphyxiation resulting from oxygen deficiency or immersion in a free-flowing material, such as liquids, grain, sand, fertiliser or water.

Following the identification of hazards and the assessment of associated risks, there is a range of control measures that can be considered. In order to comply with the direction under work health and safety laws to eliminate risks so far as is reasonably practicable, the first question that should be asked is whether the work can be carried out without entering a confined space. If this is not possible, then risks must be minimised by implementing a safe system for working inside the space. The controls used will depend on the identified hazards but, in all cases, the following matters must be considered:

- The nature of the space and how it may contribute to the risks associated with it, e.g.:
  - whether the number, size and location of entrances and exits are adequate to enable the rapid exit and rescue of workers from the space
  - the temperature of the space so that it will not cause heat stress
  - adequate lighting, if there is poor visibility.
- The level of oxygen or airborne contaminants is a significant contributor to the risk of working in a confined space, so:
  - the level of oxygen should be maintained at a safe level and any airborne contaminants in the space minimised by ventilating prior to and/or during entry
  - any changes that may occur to oxygen or airborne contaminants should be determined by testing the atmosphere

- where the atmospheric conditions cannot be maintained at a safe level, appropriate respiratory protective equipment must be provided.
- Work processes should:
  - minimise the release of harmful airborne contaminants into the space
  - reduce the time spent in the space or the number of people who have to enter the space
  - eliminate the risk of engulfment.
- Effective emergency procedures must be put in place for raising the alarm and carrying out rescue operations should things go wrong in a confined space.

There are many specific requirements under work health and safety laws that must be met in relation to work undertaken in confined spaces.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.7.1 More detailed and/or further information**

- Safe Work Australia 2011, *Model code of practice – Confined spaces*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **5.7.2 Useful standards**

- AS 2865:2009, *Confined spaces*

#### **5.7.3 Sources of information for this section**

- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- Safe Work Australia 2011, *Model code of practice – Confined spaces*, SWA, Canberra.
- Safe Work Australia 2011, *Model Work Health And Safety Regulations*, SWA, Canberra.

## **5.8 Dust**

On contaminated sites, weather conditions and remediation activities may generate dust and also cause it to move off site. This can lead to concerns about potential health impacts for workers as well as for people in the surrounding community. Small particles can travel much greater distances than larger particles. Small particles can cause health problems by entering the lungs, while larger particles are generally caught in the

respiratory tract and might result in sinus congestion, sneezing or coughing.

Dust can also be a cause for community concern due to impacts on lifestyle and amenity of the area.

When assessing the hazards and risks associated with offensive or noxious odours, the Site Safety Assessor should consider the following:

- likely sources of dust generation
- toxicity of dust (e.g. silica, asbestos, and characteristics of the chemical substances within particulate matter)
- extent of the remediation area
- timing of the remediation works—remediation undertaken at the end of the rainfall season is likely to minimise dust exposure because of soil moisture content
- choice of remediation techniques
- remediation work methods and staging of works
- impact of dust generation
- distance to nearest sensitive receptors
- weather station monitoring (before and during remediation), and
- area/boundary monitoring for dust deposition, inspirable and respirable dust and respective contaminants.

Following the identification of hazards and the assessment of associated risks, there is a range of control measures that can be considered. Potential mitigation measures may include:

- good housekeeping—minimising traffic and its speed on exposed soils, minimising exposed working areas during remediation, and minimising loose soil
- light application of a water spray to dampen the soil but not saturate it, as potentially contaminated run-off from saturated soils entering adjacent sites, stormwater systems, or local waterways must be avoided (note: care should be taken when applying water onto soil that has recently been contaminated with volatiles or semi-volatiles, as this can result in a large increase in contaminant emissions from the soil)
- spraying binders and a hydro-mulch
- a continuous cover of mulch, coarse sand and dolomite (effective even if used very thinly)
- rolling the site, particularly when the soil is moist, to compact the surface
- vegetative cover—grassing (with native or introduced species) to effectively stop dust generation
- the use of groundcovers, such as tarps or geofabrics
- installation of screens to act as windbreaks

- fencing—solid fencing may have a limited effect on wind patterns and may also contain some of the dust that is generated
- undertaking dust-generating tasks during favourable weather conditions, e.g. low wind currents, favourable wind directions.

Stockpiles can represent a considerable source of dust, due to their height, uncompacted nature and (frequently) close proximity to sensitive receptors.

Management of stockpiles should include the following considerations:

- stockpiles should have a maximum height of about 3 m, or equal to or lower than the average height of surrounding structures
- stockpile height should reduce as it approaches the site boundary. Stockpile heights should be below fence lines when within about 5 m of the boundary
- stockpiles should be covered effectively. The contents of the stockpile will dictate the level of cover, i.e. complete enclosure or the formation of a crust layer
- stockpiles should have sufficient moisture content before being handled. Water can be applied the night before to allow it to infiltrate the stockpile.

An often overlooked hazard in contaminated site activities is the potential for dust build-up within the cabs of site vehicles, excavation plant and haulage trucks. Cabs should be inspected daily for dust build-up and, if necessary, vacuumed clean (preferably using a HEPA filter-equipped machine), or the dust wiped off using wet-wipes or similar. Rubber door-seals should be inspected periodically for wear or damage. In exceptional circumstances, air-filtered cabins on vehicles may be required.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **More detailed and/or further information**

- SA EPA 2008, *EPA Guidelines for environmental management of on-site remediation*, EPA, Adelaide, available at <[www.epa.sa.gov.au](http://www.epa.sa.gov.au)>.
- Safe Work Australia 2013, *Guide - Workplace exposure standards for airborne contaminants*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2013, *Guidance on the interpretation of exposure standards for atmospheric contaminants in the occupational environment*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- A current list of all declared national exposure standards can be found in the Hazardous Substances Information System (HSIS), available through the Safe Work Australia website at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- SA EPA 2008, *EPA Guidelines for environmental management of on-site remediation*, EPA, Adelaide, available at <[www.epa.sa.gov.au](http://www.epa.sa.gov.au)>.

- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (8), Guideline on community engagement and risk communication, NEPC, Australia, available at <www.scew.gov.au>.

### **5.8.1 Sources of information for this section**

- SA EPA 2008, *EPA Guidelines for environmental management of on-site remediation*, EPA, Adelaide.
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (2), Guideline on site characterisation, NEPC, Australia.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## **5.9 Offensive or noxious odours**

Many chemical substances, particularly those associated with petroleum hydrocarbons, gasworks wastes, organic solvents or putrescible wastes, may generate offensive odours or noxious vapours. The release of these to the air can cause varying types and degrees of impact, such as explosive conditions, toxic environments, unacceptable health risks (either acute or chronic), and objectionable odours.

Odours may also cause community concern because the public is likely to perceive odours as posing a health risk to the potentially affected community.

When assessing the hazards and risks associated with offensive or noxious odours, the Site Safety Assessor should consider the following:

- the volatility and toxicity of the chemical substance(s)
- typical and expected atmospheric and weather conditions
- naturally occurring volatiles, e.g. hydrogen sulphide
- odour thresholds and modelling
- location and extent of potentially affected areas
- distance to nearest sensitive receptors
- determination of acceptable off-site concentrations
- duration of potential exposure
- potential subsurface migration of volatile sources during remediation

- contingency planning for unexpected volatile emissions
- any local work health and safety and environment protection requirements
- whether monitoring airborne chemical substances on the site may be necessary.

If gaseous emissions are a possible concern on a remediation project, an assessment should be undertaken during the planning stage to determine the need for special measures to prevent and control the emissions.

When dealing with volatile pollutants, an assessment should be made of the need for the regular analysis of atmospheric levels of pollutants (e.g. benzene) on site and at site boundaries to ensure that workers and residents are not being exposed to unacceptable levels that may give rise to adverse health effects.

Following the identification of hazards and the assessment of associated risks, there is a range of control measures that can be considered. Potential mitigation measures may include:

- minimising the exposed surface area of odorous/noxious material, i.e. use a staged remediation strategy rather than a broad-scale approach
- timing excavation activities to minimise off-site nuisance
- undertaking work in favourable weather conditions, i.e. lower temperatures, favourable winds
- covering exposed surfaces overnight or during periods of low excavation activity
- not stockpiling odorous materials unless closely contained or covered
- completely covering the area of excavation (e.g. with a large tent) during all activities
- treating (using adsorption, thermal or filtration methods) all controlled emissions (e.g. during bioremediation, air sparging or product recovery)
- immediately and completely removing offensive odorous material off site.

In addition, site boundary and competent community monitoring of offensive odours should be regularly undertaken during remediation and management of problematic sites. Site work practices relating to odour-generating activities should be promptly amended or stopped and reassessed in response to the results of boundary and community monitoring.

Where excavation of odorous or noxious material is expected or planned as part of remediation activities, the public risk communication and engagement process developed during planning for health and safety on site will provide a medium by which affected and/or interested members of the community can:

- be advised of the expected duration of the operation
- be advised that the operation will last for a limited time only
- be advised whether or not the odours may pose any potential health risk
- be given reassurance with regard to mitigation measures being undertaken.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.9.1 More detailed and/or further information**

- Safe Work Australia 2013, *Guide - Workplace exposure standards for airborne contaminants*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2013, *Guidance on the interpretation of exposure standards for atmospheric contaminants in the occupational environment*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- A current list of all declared national exposure standards can be found in the Hazardous Substances Information System (HSIS), available through the Safe Work Australia website at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- SA EPA 2008, *EPA Guidelines for environmental management of on-site remediation*, EPA, Adelaide, available at <[www.epa.sa.gov.au](http://www.epa.sa.gov.au)>.
- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (8), Guideline on community engagement and risk communication, NEPC, Australia, available at <[www.scew.gov.au](http://www.scew.gov.au)>

#### **5.9.2 Sources of information for this section**

- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (2), Guideline on site characterisation, NEPC, Australia.
- SA EPA 2008, *EPA Guidelines for environmental management of on-site remediation*, EPA, Adelaide.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

### **5.10 Hazardous substances and dangerous goods**

During remediation activities, close consideration should be given to the way that chemicals and dangerous goods are managed. The Site Safety Assessor should also consider specific legislation concerning waste disposal and transport of hazardous substances and dangerous goods.

Under work health and safety laws, hazardous substances and dangerous goods are covered under a single framework that includes a hazard classification and communication system based on the United Nations' *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS).

Hazardous substances are those that, following worker exposure, can have an adverse effect on health. Examples of hazardous substances include poisons, substances that cause burns or skin and eye irritation, and substances that may cause cancer. Many hazardous substances are also classified as dangerous goods.

Substances that have been classified as hazardous are found in an online database called the Hazardous Substances Information System (HSIS). The HSIS database is not a comprehensive source of classification information for substances. If a substance is not included on the HSIS database, it does not necessarily mean that the substance is not hazardous. HSIS is updated periodically when new classification information is available from certain sources, namely from the European Union, Australia's National Industrial Chemicals Notification and Assessment Scheme (NICNAS) and the Department of Health and Ageing's Office of Chemical Safety and Environmental Health.

Dangerous goods are substances, mixtures or articles that, because of their physical, chemical (physicochemical) or acute toxicity properties, present an immediate hazard to people, property or the environment. Types of substances classified as dangerous goods include explosives, flammable liquids and gases, corrosives, chemically reactive or highly toxic substances. Many dangerous goods are also classed as hazardous substances.

In relation to chemicals, a hazard is a set of inherent properties of the substance, mixture, article or process that may cause adverse effects to organisms or the environment.

There are two broad types of hazards associated with hazardous chemicals which may present an immediate or long-term injury or illness to people. These are:

- **Health hazards** – These are properties of a chemical that have the potential to cause adverse health effects. Exposure usually occurs through inhalation, skin contact or ingestion. Adverse health effects can be acute (short-term) or chronic (long-term). Typical acute health effects include headaches, nausea or vomiting and skin corrosion, while chronic health effects include asthma, dermatitis, nerve damage or cancer.
- **Physicochemical hazards** – These are physical or chemical properties of the substance, mixture or article that pose risks to workers other than health risks, as they do not occur as a consequence of the biological interaction of the chemical with people. They arise through inappropriate handling or use and can often result in injury to people and/or damage to property as a result of the intrinsic physical hazard. Examples of physicochemical hazards include flammable, corrosive, explosive, chemically reactive and oxidising chemicals.

Many chemicals have both health and physicochemical hazards.

Work health and safety laws include specific requirements for the management of risks to health and safety associated with using, handling, generating and storing hazardous chemicals at a workplace. The duties include:

- correct labelling of containers and pipework, using warning placards and outer warning placards and displaying of safety signs
- maintaining a register and manifest (where relevant) of hazardous chemicals and providing notification to the safe work agency of manifest quantities if required
- identifying risk of physical or chemical reaction of hazardous chemicals and ensuring the stability of hazardous chemicals
- ensuring that exposure standards are not exceeded
- provision of health monitoring to workers
- provision of information, training, instruction and supervision to workers, including the use of PPE when appropriate
- provision of spill containment system for hazardous chemicals if necessary
- obtaining the current Safety Data Sheet (SDS) from the manufacturer, importer or supplier of the chemical
- controlling ignition sources and accumulation of flammable and combustible substances
- provision and availability of fire protection, fire fighting equipment and emergency and safety equipment
- preparing an emergency plan if the quantity of a class of hazardous chemical at a workplace exceeds the manifest quantity for that hazardous chemical
- stability and support of containers for bulk hazardous chemicals including pipework and attachments
- decommissioning of underground storage and handling systems, and
- notifying the safe work agency as soon as practicable of abandoned tanks in certain circumstances.

When managing the risks, regard must be had to the following factors:

- the hazardous properties of the hazardous chemical
- any potentially hazardous reaction (chemical or physical) between the hazardous chemical and another substance or mixture, including a substance that may be generated by the reaction
- the nature of the work to be carried out with the hazardous chemical
- any structure, plant or system of work that:
  - is used in the use, handling, generation or storage of the hazardous chemical
  - could interact with the hazardous chemical at the workplace.

Following the identification of hazards and the assessment of associated risks, there is a range of control measures that can be considered:

- eliminating the hazard, e.g. by not using a hazardous chemical or eliminating exposure by using nails instead of chemical-based adhesives, or by purchasing

pre-mixed or diluted chemicals instead of manually mixing or diluting chemicals at the site

- substituting a hazardous chemical with a chemical that is less hazardous and presents lower risks, e.g. using hazardous chemicals with a single hazard class rather than those with multiple hazards, or using a product in paste or pellet form rather than as a dust or powder
- isolating workers from chemicals, e.g. by placing a process, or a part of it, within an enclosure which may also be fitted with exhaust extraction to remove contaminants, or by distancing workers from hazardous chemicals and any potential hazards generated by their use
- isolating chemicals from other chemicals, e.g. by physically separating incompatible chemicals, achieved by distance, barriers, or a combination of barriers and distance
- implementing engineering controls, e.g. by using intrinsically safe electrical equipment in hazardous areas, or by using local exhaust ventilation to capture airborne contaminants close to their point of release
- implementing administrative controls, e.g. ensuring that only staff who are involved in the use, handling, storage or generation of hazardous chemicals are allowed access to high risk areas where there may be a greater risk of exposure
- providing and ensuring the use of suitable and well maintained personal protective equipment, e.g. gloves, breathing protection, aprons and protective eyewear.

On a contaminated site, there are some particular issues relating to hazardous substances and dangerous goods that the Site Safety Assessor should keep in mind as they develop the SSSP.

Danger can arise during excavation of soils containing high concentrations of volatile, flammable hydrocarbons. Sparks generated by plant hitting rocks may ignite volatile vapours in excavation holes which may pose a risk to personnel nearby.

In the case of contamination with flammable substances, a reliable and calibrated flammable gas detector should be regularly used to determine that the flammable vapours are, as a minimum, always below 10% of the Lower Explosive Limit (LEL) during activities on site.

There is a significant amount of detailed guidance available relating to meeting legal requirements and managing risks associated with hazardous chemicals in workplaces. This includes information about chemicals classified as hazardous under Australian laws, monitoring of site contaminant levels for chemicals with exposure standards, and the issues that can be addressed in a SSSP (see below).

Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### **5.10.1 More detailed and/or further information**

- Safe Work Australia 2012, *Model code of practice – Managing risks of hazardous chemicals in the workplace*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- United Nations 2009, *Globally harmonised system of classification and labelling of chemicals (GHS)*, Third revised edition, UN, New York & Geneva, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Labelling on workplace hazardous chemicals*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Preparation of safety data sheets for hazardous chemicals*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Guide - Workplace exposure standards for airborne contaminants*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>. These exposure standards are also available from the Hazardous Substances Information System (HSIS) on the Safe Work Australia website at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>. The HSIS database contains additional information and guidance for many substances. Although exposure standards may also be listed in Section 8 of the SDS, the Workplace Exposure Standards for Airborne Contaminants or HSIS should be used for confirmation.
- Safe Work Australia 2013, *Guidance on the interpretation of workplace exposure standards for airborne contaminants*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

### **5.10.2 Useful standards**

- NOHSC 1008:2004, *Approved criteria for classifying hazardous substances*
- AS 1940:2004, *The storage and handling of flammable and combustible liquids*
- AS 4976:2008, *Removal and disposal of underground petroleum storage tanks*

### **5.10.3 Sources of information for this section**

- Safe Work Australia 2011, *Model Work Health And Safety Regulations*, SWA, Canberra.
- Safe Work Australia 2012, *Model code of practice – Managing risks of hazardous chemicals in the workplace*, SWA, Canberra.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- Hazardous substances and dangerous goods, introductory webpage, Safe Work Australia, Canberra, ACT, viewed 27 July 2013,

<[www.safeworkaustralia.gov.au/sites/swa/whs-information/hazardous-chemicals/dangerous-goods/pages/hazardous-substances](http://www.safeworkaustralia.gov.au/sites/swa/whs-information/hazardous-chemicals/dangerous-goods/pages/hazardous-substances)>.

## 5.11 Asbestos

Until the mid 1970s asbestos was a commonly used construction and insulation material in buildings. Asbestos may be present as ‘bonded’ material such as asbestos bearing cement or linoleum or as friable fibrous lagging on pipe work and boilers.

No site work should commence on any site where asbestos is suspected until suitable precautions have been taken to deal with the health risks associated with respirable asbestos fibre.

The management and remediation of sites contaminated with asbestos from illegal dumping and demolition is a specialised task. In some instances, site remediation may entail removal of asbestos and asbestos-containing material from the site. In other cases this may not be practicable, and other management strategies should be used.

Engaging specialists who may include asbestos removalists is highly recommended for all but the most minor of non-friable contaminations.

The NEPM on assessment of site contamination sets out the general principles for practitioners working on sites contaminated with a number of hazardous materials including asbestos. The NEPM also provides information about appropriate competencies of specialists who may be engaged to advise on asbestos-related matters. While the NEPM deals with the assessment phase, it acknowledges close links to remediation, management and the protection of human health and is based in particular on asbestos-related guidance provided by the Western Australia Department of Health. In addition, a range of other detailed guidance about the safe management of asbestos contamination is available (see below).

Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### 5.11.1 More detailed and/or further information

- Safe Work Australia 2011, *Model code of practice – How to manage and control asbestos in the workplace*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2011, *Model code of practice – How to safely remove asbestos*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- WA Department of Health 2009, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*, WA DoH, Western Australia, available at <[www.public.health.wa.gov.au](http://www.public.health.wa.gov.au)>.
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (9), Guideline on competencies and acceptance of environmental auditors and related professionals, NEPC, Australia, available at <[www.scew.gov.au](http://www.scew.gov.au)>.

- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (1), Guideline on investigation levels for soil and groundwater, NEPC, Australia, available at <www.scew.gov.au>.
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (2), Guideline on site characterisation, NEPC, Australia, available at <www.scew.gov.au>.
- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.

### **5.11.2 Sources of information for this section**

- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- Safe Work Australia 2011, *Model code of practice – How to manage and control asbestos in the workplace*, SWA, Canberra.
- Safe Work Australia 2011, *Model code of practice – How to safely remove asbestos*, SWA, Canberra.

## **5.12 Collection and disposal of contaminated material**

Care should be taken in handling and disposing of all contaminated material, including water and excavation spoil. Before work with wastes proceeds, consideration should be given to the types and levels of contamination to ensure appropriate precautions are taken, such as:

- assessment of the life cycle of contaminants, and
- details of the particular packaging, handling and transport requirements.

All containers remaining temporarily on site, and containing potentially contaminated materials, should be labelled with appropriate hazard warnings and waste producer contact details.

Allowances should be made within site budgets for any necessary safe removal of a quantity of soil/fill from the site to an appropriate waste disposal or treatment facility.

Any transport and disposal of contaminated soil from the site should be carried out in accordance with relevant waste disposal and transport legislation.

Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### **5.12.1 More detailed and/or further information**

- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.

### **5.12.2 Sources of information for this section**

- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (2), Guideline on site characterisation, NEPC, Australia.

## **5.13 Contamination carryover to public areas**

Potential carryover of contamination to public roads and highways is an issue where excavation plant is operating on a site. Care must be taken to ensure that potentially contaminated material is not transported off site.

The risk assessment may identify a requirement for decontamination of mobile plant and equipment at the boundary of the site when leaving the area. Where this is required, contaminated plant and equipment should be thoroughly cleaned by washing wheels, underbody and wheel arches in particular. Vehicle washing systems should include facilities for handling and disposing of potentially contaminated wash water. The installation of 'rumble strips' to help dislodge dust and mud should be considered for installation at exits from sites where potential carry-over is perceived to be a problem.

Drivers should stay in the cabs of their plant until washing has been completed to avoid the spread of contaminants.

To prevent build-up of contaminants in excavator cabs, it may be necessary to vacuum cabs at the end of the day by using an industrial vacuum cleaner that meets the requirements of the relevant Australian Standard (see below).

Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### **5.13.1 More detailed and/or further information**

- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.

### **5.13.2 Useful standard**

- AS 3544:1988, *Industrial vacuum cleaners for particulates*

### **5.13.3 Sources of information for this section**

- WorkSafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## **5.14 Hazardous manual tasks**

Work health and safety laws consider hazardous manual tasks in the context of their impact on the musculoskeletal system of a worker. Musculoskeletal disorders may include conditions such as:

- sprains and strains of muscles, ligaments and tendons
- back injuries, including damage to the muscles, tendons, ligaments, spinal discs, nerves, joints and bones
- joint and bone injuries or degeneration, including injuries to the shoulder, elbow, wrist, hip, knee, ankle, hands and feet
- nerve injuries or compression, e.g. carpal tunnel syndrome
- muscular and vascular disorders as a result of hand-arm vibration
- soft tissue hernias, and
- chronic pain.

Musculoskeletal disorders occur in two ways:

- gradual wear and tear to joints, ligaments, muscles and inter-vertebral discs caused by repeated or continuous use of the same body parts, including static body positions, and
- sudden damage caused by strenuous activity, or unexpected movements such as when loads being handled move or change position suddenly.

Injuries can also occur due to a combination of these mechanisms, for example, body tissue that has been weakened by cumulative damage may be vulnerable to sudden injury by lower forces.

A hazardous manual task, as defined under work health and safety laws, is any task that requires a person to lift, lower, push, pull, carry or otherwise move, hold or restrain any person, animal or thing involving one or more of the following:

- repetitive or sustained force

- high or sudden force
- repetitive movement
- sustained or awkward posture, and
- exposure to vibration.

Following the identification of hazards and the assessment of associated risks, there is a range of control measures that can be considered, including:

- eliminating the risk, e.g. by automating the manual task by using remote controls
- substituting the hazard with something that gives rise to a lesser risk, e.g. replacing hand tools with power tools to reduce the level of force required to do the task
- isolating the hazard from any person exposed to it, e.g. isolating vibrating machinery from the user providing fully independent seating on mobile plant
- implementing engineering controls, e.g. using mechanical lifting aids
- implementing administrative controls, e.g. by rotating workers between different tasks
- providing and ensuring the use of suitable and well maintained personal protective equipment, e.g. gloves.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.14.1 More detailed and/or further information**

- Safe Work Australia 2011, *Model code of practice – Hazardous manual tasks*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2012, *Fact sheet - Hand-arm vibration*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Safe Work Australia 2012, *Fact sheet - Whole-body vibration*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **Sources of information for this section**

- Safe Work Australia 2011, *Model code of practice – Hazardous manual tasks*, SWA, Canberra.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## 5.15 Slips, trips and falls

Falls are a major cause of death and serious injury in Australian workplaces. Fall hazards are found where work is carried out at height, for example, loading and unloading a large truck. Falls can also occur at ground level into holes, for example trenches or service pits.

When considering the health and safety of workers on site, particular attention should be paid to tasks that are carried out:

- on any structure or plant being constructed or installed, demolished or dismantled, inspected, tested, repaired or cleaned
- on a fragile surface (e.g. cement sheeting roofs, rusty metal roofs, fibreglass sheeting roofs and skylights)
- on a potentially unstable surface (e.g. areas where there is potential for ground collapse)
- using equipment to work at the elevated level (e.g. when using elevating work platforms or portable ladders)
- on a sloping or slippery surface where it is difficult for people to maintain their balance
- near an unprotected open edge
- near a hole, shaft or pit into which a worker could fall (e.g. trenches or service pits).

A checklist may be useful to identify hazards and risks relating to falls. Key things to look for include:

- surfaces:
  - the stability, fragility or brittleness
  - the potential to slip
  - the safe movement of workers where surfaces change
  - the strength or capability to support loads
  - the slope of work surfaces, e.g. where they exceed 7 degrees.
- levels—where levels change and workers may be exposed to a fall from one level to another
- structures—the stability of temporary or permanent structures
- the ground—the evenness and stability of the ground for safe support of scaffolding or a work platform
- the working area—whether it is crowded or cluttered and the entry and exit from the area
- edges—protection for open edges of floors, working platforms, walkways, walls or roofs

- holes, openings or excavations—which will require guarding
- hand grip—places where hand grip may be lost.

In some situations, advice may be needed from technical specialists, such as structural engineers, to check the stability of structures or load bearing capacity.

Following the identification of hazards and the assessment of associated risks, the control measures to be implemented to manage the risk of falls are detailed under work health and safety laws. Specifically, where it is reasonably practicable to do so:

- the need to work at height should be avoided, i.e. carry out any risk-related work on the ground
- work should take place on solid construction, i.e. a building or structure that is used as an existing place of work and includes safe access and egress, e.g. flat roofs with permanently installed guard rails around the edges
- provide and maintain safe systems of work:
  - provide a fall prevention device (e.g. install guard rails) if it is reasonably practicable to do so, or
  - provide a work positioning system (e.g. an industrial rope access system) if it is not reasonably practicable to provide a fall prevention device, or
  - provide a fall-arrest system, so far as is reasonably practicable, if it is not reasonably practicable to provide a fall prevention device or a work positioning system.

In some cases a combination of control measures may be necessary, for example using a safety harness while working from an elevating work platform.

The control measures selected should not create new hazards, for example, electrical risks from contact with overhead power lines or crushing and entanglement from plant such as elevating work platforms.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.15.1 More detailed and/or further information**

- Safe Work Australia 2011, *Model code of practice – Managing the risk of falls at workplaces*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **5.15.2 Sources of information for this section**

- Safe Work Australia 2011, *Model code of practice – Managing the risk of falls at workplaces*, SWA, Canberra.

## 5.16 Equipment and machinery

Plant is a major cause of workplace death and injury in Australian workplaces. There are significant risks associated with using plant and severe injuries can result from the unsafe use of plant, including:

- limbs amputated by unguarded moving parts of machines
- being crushed by mobile plant
- sustaining fractures from falls while accessing, operating or maintaining plant
- electric shock from plant that is not adequately protected or isolated, and
- burns or scalds due to contact with hot surfaces, or exposure to flames or hot fluids.

Other risks include hearing loss due to noisy plant and musculoskeletal disorders caused by manually handling or operating plant that is poorly designed.

There are situations and activities that are regularly undertaken on contaminated sites which the Site Safety Assessor should keep in mind as they develop the SSSP.

General physical hazards which may be encountered during the remediation of site contamination include:

- vehicle and equipment clearance under low bridges, overhead pipes and power lines
- risk of being struck by vehicles moving around the site
- hazards from being close to or beneath operating plant or equipment.

Only persons trained and licensed to do so should operate site machinery. Caution must be observed when working close to equipment or machinery. Particular hazards include:

- reversing equipment or plant motor vehicles
- extension of hydraulic arms on a backhoe or excavator
- rotating equipment, particularly on drilling rigs
- auger equipment being used as part of the drilling process
- any compressed air equipment operating above 50 p.s.i.
- circumference of bodyswing of a tracked excavator
- suspended loads
- tall machinery and surveyors' poles making contact with overhead power lines
- blow-back from pressurised drilling equipment, and
- air blast from compressed air equipment.

Following the identification of hazards and the assessment of associated risks, there is a range of control measures that can be considered. In many cases, a combination of control measures will provide the best solution. Measures include:

- eliminating the risk, e.g. addressing a hazard in planning and purchasing stages of the project by purchasing machinery designed and built to produce low noise levels
- substituting the plant (or hazardous parts of it) with plant that is safer, e.g. using a cordless drill instead of an electric drill if the power cord is in danger of being cut
- isolating the hazard from any person exposed to it, e.g. constructing a booth from which the plant can be operated remotely or using concrete barriers to separate mobile plant from workers
- implementing engineering controls, e.g. installing guards to prevent contact with moving parts of machinery
- implementing administrative controls, e.g. installing a tag-out system to ensure that workers are aware that the plant is isolated from its power source and must not be operated while maintenance or cleaning work is being done
- providing and ensuring the use of suitable and well maintained personal protective equipment, e.g. gloves, hard hats, breathing protection, aprons and protective eyewear.

Specific controls are required for certain types of plant, such as:

- powered mobile plant
- plant that lifts or suspends loads
- industrial robots
- lasers
- pressure equipment
- scaffolds.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.16.1 More detailed and/or further information**

- Safe Work Australia 2012, *Model code of practice – Managing the risks of plant in the workplace*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

#### **5.16.2 Sources of information for this section**

- Safe Work Australia 2012, *Model code of practice – Managing the risks of plant in the workplace*, SWA, Canberra.
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)

## 5.17 Noise

Hazardous noise can destroy the ability to hear clearly and can also make it more difficult to hear sounds necessary for working safely, such as instructions or warning signals.

Hazardous noise affects the functioning of the inner ear, which may cause temporary hearing loss. After a period of time away from noise, hearing may be restored. With further exposure to hazardous noise, the ear will gradually lose its ability to recover and the hearing loss will become permanent.

Permanent hearing loss can also occur suddenly if a person is exposed to very loud impact or explosive sounds. This type of damage is known as acoustic trauma.

Usually, hazardous noise first affects the ability to hear high-frequency (high-pitched) sounds. This means that even though a person can still hear some sounds, conversation will start to sound 'muffled' and a person may find it difficult to understand what is being said.

Workers exposed to hazardous noise may also experience tinnitus (ringing in the ears or head), which could become permanent. When severe, tinnitus may disrupt sleep, reduce concentration, make people extremely irritable and lead to depression.

The degree of hearing loss that occurs is dependent on how loud the noise is, how long someone is exposed to it and, to some extent, individual susceptibility. The frequency or pitch can also have some effect on hearing loss, since high-pitched sounds are more damaging than low-pitched ones.

Noise from remediation activities can also be a nuisance to members of the public in the vicinity of a site. While control measures to minimise risks to workers will also have a protective effect for the public, for example, in the use of screens or noise baffles, it is important that all activities with a potential for noise generation are carried out in accordance with any relevant local requirements.

According to work health and safety laws, managing the risks of hearing loss associated with noise in the workplace involves:

- ensuring that the noise a worker is exposed to does not exceed the exposure standard for noise
- providing audiometric testing to a worker who is frequently required to use personal hearing protectors to protect the worker from hearing loss associated with noise that exceeds the exposure standard.

Following the identification of hazards and the assessment of associated risks, there is a range of control measures that can be considered. These include:

- eliminating the risk, e.g. by ceasing to use a noisy machine, changing the way work is carried out so hazardous noise is not produced, or by not introducing the hazard onto the site
- minimising the risk, e.g. by substituting the hazard with plant or processes that are quieter, using engineering controls to modify equipment or processes, isolating the source of noise from people by using distance, barriers, enclosures and sound-absorbing surfaces

- implementing administrative controls to reduce the time people are exposed to noise, e.g. by organising schedules so that noisy work is done when only a few workers are present, keeping workers out of noisy areas if their work does not require them to be there, sign-posting noisy areas and restricting access by workers and the public
- providing and ensuring the use of suitable and well maintained personal hearing protectors such as ear-muffs or ear-plugs by workers, visitors and any other people exposed to hazardous noise. If a worker frequently uses personal hearing protectors as a control measure for noise exceeding the exposure standard, then audiometric testing must be provided.

A noise management plan may help implement the chosen noise control measures effectively. The plan should be based on the results of any noise assessment and should also include:

- measuring noise levels to confirm that control measures are achieving expected attenuation
- specifications for purchasing or hiring plant
- a description of any training and supervision that may be needed
- control measures for temporary work areas and situations
- time frames for reviewing noise assessments and control measures.

More detailed and/or further information is available (see below). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

#### **5.17.1 More detailed and/or further information**

- Safe Work Australia 2011, *Model code of practice - Managing noise and preventing hearing loss at work*, SWA, Canberra, available at <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.
- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.

#### **5.17.2 Useful standards**

- NOHSC 1007:2000, *National standard for occupational noise*

#### **5.17.3 Sources of information for this section**

- National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as varied, Schedule B (2), Guideline on site characterisation, NEPC, Australia.

- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination, NEPC, Australia. (Repealed May 2013)
- Safe Work Australia 2011, *Model code of practice - Managing noise and preventing hearing loss at work*, SWA, Canberra.

## **5.18 Ongoing management of health and safety**

In some instances, ongoing post-remediation monitoring may be required to avoid problems associated with contamination rebound. It may also be required to assess the success of the remediation activity.

The development of an ongoing post-remediation monitoring program must include the risk management process to identify the hazards and assess and control the risks for workers carrying out the monitoring as well as members of the public.

Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding any specific local requirements.

### ***5.18.1 More detailed and/or further information***

- Reference re Remediation and management of contaminated sites: Guidance for public health and safety considerations and environmental concerns, details here when available.

### ***5.18.2 Sources of information for this section***

- WA Commission for Occupational Safety and Health 2005, *Guidance note: Occupational safety and health management and contaminated sites work*, COSH, Western Australia.

## 6. References

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### 6.1 Safe Work Australia

Safe Work Australia 2013, *Guidance on the interpretation of exposure standards for atmospheric contaminants in the occupational environment*, SWA, Canberra.

Safe Work Australia 2013, *Guide – How to determine what is reasonably practicable to meet a health and safety duty*, SWA, Canberra.

Safe Work Australia 2013, *Guide - Workplace exposure standards for airborne contaminants*, SWA, Canberra.

Safe Work Australia 2013, *Hazardous chemicals requiring health monitoring*, SWA, Canberra.

Safe Work Australia 2013, *Hazardous Substances Information System (HSIS)*, <[www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)>.

Safe Work Australia 2013, *Health monitoring for exposure to hazardous chemicals – Guide for medical practitioners*, SWA, Canberra.

Safe Work Australia 2013, *Health monitoring for exposure to hazardous chemicals – Guide for persons conducting a business or undertaking*, SWA, Canberra.

Safe Work Australia 2013, *Health monitoring for exposure to hazardous chemicals – Guide for workers*, SWA, Canberra.

Safe Work Australia 2012, *Codes of practice and guidance material, information sheet*, SWA, Canberra.

Safe Work Australia 2012, *Fact sheet - Emergency plans*, SWA, Canberra.

Safe Work Australia 2012, *Fact sheet - Hand-arm vibration*, SWA, Canberra.

Safe Work Australia 2012, *Fact sheet - Incident notification*, SWA, Canberra.

Safe Work Australia 2012, *Fact sheet - Whole-body vibration*, SWA, Canberra.

Safe Work Australia 2012, *Guide to the Model Work Health and Safety Act*, SWA, Canberra.

Safe Work Australia 2012, *Model code of practice – Construction work*, SWA, Canberra.

Safe Work Australia 2012, *Model code of practice – Demolition work*, SWA, Canberra.

Safe Work Australia 2012, *Model code of practice – Excavation work*, SWA, Canberra.

Safe Work Australia 2012, *Model code of practice – First aid in the workplace*, SWA, Canberra.

Safe Work Australia 2012, *Model code of practice – Managing risks of hazardous chemicals in the workplace*, SWA, Canberra.

Safe Work Australia 2012, *Model code of practice – Managing the risks of plant in the workplace*, SWA, Canberra.

Safe Work Australia 2012, *Worker representation and participation guide*, SWA, Canberra.

Safe Work Australia 2011, *Labelling on workplace hazardous chemicals*, SWA, Canberra.

Safe Work Australia 2011, *Model Work Health and Safety Act*, SWA, Canberra.

Safe Work Australia 2011, *Model Work Health And Safety Regulations*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice – Confined spaces*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice – Hazardous manual tasks*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice – How to manage and control asbestos in the workplace*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice - How to manage work health and safety risks*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice - How to safely remove asbestos*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice - Managing noise and preventing hearing loss at work*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice – Managing the risk of falls at workplaces*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice – Managing the work environment and facilities*, SWA, Canberra.

Safe Work Australia 2011, *Model code of practice - Work health and safety consultation, cooperation and coordination*, WSA, Canberra.

Safe Work Australia 2011, *Preparation of safety data sheets for hazardous chemicals*, SWA, Canberra.

Safe Work Australia/National Occupational Health and Safety Commission 1998, *Guideline – Integrating OHS competencies into national industry competency standards*, 2<sup>nd</sup> edition, (NOHSC:7025(1998)).

## **6.2 NEPM Materials**

National Environment Protection Council 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999, as varied*, NEPC, Australia.

National Environment Protection Council 2013, National Environment Protection (Assessment of Site Contamination) Measure 1999, as varied, *Schedule B (8), Guideline on community engagement and risk communication*, NEPC, Australia.

National Environment Protection Council 2013, National Environment Protection (Assessment of Site Contamination) Measure 1999, as varied, *Schedule B (2), Guideline on site characterisation*, NEPC, Australia.

National Environment Protection Council 2013, National Environment Protection (Assessment of Site Contamination) Measure 1999, as varied, *Schedule B (9), Guideline on competencies and acceptance of environmental auditors and related professionals*, NEPC, Australia.

National Environment Protection Council 2013, National Environment Protection (Assessment of Site Contamination) Measure 1999, as varied, *Schedule B (1), Guideline on investigation levels for soil and groundwater*, NEPC, Australia.

National Environment Protection Council 1999, National Environment Protection (Assessment of Site Contamination) Measure, *Schedule B (9), Guideline on protection of health and the environment during the assessment of site contamination*, NEPC, Australia. (*Repealed May 2013*)

### **6.3 Standards**

AS 1319-1994, *Safety signs for the occupational environment*

AS 1885.1-1990, *Workplace injury and disease recording standard in the workplace*

AS 1940:2004, *The storage and handling of flammable and combustible liquids*

AS 2865:2009, *Confined spaces*

AS 3544:1988, *Industrial vacuum cleaners for particulates*

AS 3745-2010, *Planning for emergencies in facilities*

AS 4976:2008, *Removal and disposal of underground petroleum storage tanks*

AS/NZS 1269 *Occupational noise management Series*

AS/NZS 1270:2002 *Acoustics - Hearing protectors*

AS/NZS 1337 *Personal eye protection Series*

AS/NZS 1715:1994 *Selection, use and maintenance of respiratory protective devices*

AS/NZS 1716:1994 *Respiratory protective devices*

AS/NZS 1800:1998 *Occupational protective helmets - Selection, care and use*

AS/NZS 1801:1997 *Occupational protective helmets*

AS/NZS 2161, *Occupational protective gloves—Series*

AS/NZS 2210, *Occupational protective footwear—Series*

AS/NZS 4501.1:2008 *Occupational protective clothing – Guidelines on the selection, use, care and maintenance of protective clothing*

AS/NZS ISO 31000:2009, *Risk management – Principles and guidelines*

HB 327-2010, *Communicating and consulting about risk (Companion to AS/NZS ISO 31000:2009)*

HB 158-2010, *Delivering assurance based on ISO 31000-2009—Risk management—Principles and guidelines*

ISO/IEC 31010:2009, *Risk management – Risk assessment techniques*

NOHSC 1007:2000, *National standard for occupational noise*

## 6.4 Jurisdictional guidance

SA EPA 2008, *EPA Guidelines for environmental management of on-site remediation*, EPA, Adelaide.

WA Commission for Occupational Safety and Health 2005, *Guidance note: Occupational safety and health management and contaminated sites work*, COSH, Western Australia.

WA Commission for Occupational Safety and Health 2009, *Guidance note – Working alone*, WACOSH, Perth.

WA Department of Environment 2002, *Community consultation, Contaminated sites management series*, DoE, Western Australia.

WA Department of Health 2009, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*, WA DoH, Western Australia

WorkSafe Victoria 2005, *Industry standard contaminated construction sites: construction and utilities*, Victoria.

Worksafe Tasmania 2013, *Template – WHS Management Plan*, Tasmania, <[www.worksafe.tas.gov.au](http://www.worksafe.tas.gov.au)>.

## 6.5 Other references

United Nations 2009, *Globally harmonised system of classification and labelling of chemicals (GHS)*, Third revised edition, UN, New York & Geneva.

## APPENDIX A.

### Site-specific safety plan – example content

This appendix provides an example of the content that may be covered in a site-specific safety plan (SSSP). Government safe work agencies and environment protection authorities in the relevant state or territory should be consulted regarding specific local requirements. The information in this example SSSP is based on guidance provided in WA Commission for Occupational Safety and Health 2005, *Guidance note: Occupational safety and health management and contaminated sites work*, COSH, Western Australia.

#### DEVELOPING THE SITE-SPECIFIC SAFETY PLAN

##### Sources of information and assistance

Useful sources of support include:

- Safework Australia and state/territory safe work authorities, and state/territory environment protection authorities—for legislation, guidance, and specialist advice
- local government authorities—for site history/underground infrastructure queries
- Dial Before You Dig (1100)—for queries about underground services and utilities
- competent persons—to advise on contaminants, contaminated sites work and previous activities on the site.

##### Consultation

People that must be consulted through all stages of remediation and management include:

- workers and their health and safety representatives
- other business operators who have work health and safety duties on site
- members of the public and other people who may be affected by activities on site.

## CONTENT OF THE SITE-SPECIFIC SAFETY PLAN

### General site and project information

Information in this section should include site maps and details about:

- history and previous uses of the site
- condition of the site
- location of chemical stores and results of any site assessments
- objectives and scope of the remediation work
- roles, responsibilities and supervision on site
- name and contact details of a site safety officer
- relevant legislation, guidelines and standards
- local safe work authority and environment protection agency contacts
- project arrangements, including plans for continuity of work and revision of safety and health planning when work is delayed.

### Risk management

Information in this section should include results from the risk management process (hazard identification, risk assessment and risk control):

- chemical hazards—location, exposure risks, control measures
  - procedures for workers finding contaminants known to be on site
  - procedures for workers finding unidentified contaminants
  - Safety Data Sheets and Material Safety Data Sheets for any hazardous substances used
- biological hazards—location, exposure risks, control measures
- radiological hazards—location, exposure risks, control measures
- physical hazards—location, exposure risks, control measures
- environmental hazards—location, exposure risks, control measures

The following issues may need to be addressed:

- health risk assessment, medical examinations and exposure monitoring
- health monitoring
- soil and dust management
- gases, fumes and air emissions management
- noise management
- rising water and other materials management
- ground stability checks for potential subsidence
- vibration management
- landfill and waste disposal
- site monitoring, including equipment and frequency of readings

## Safe systems of work

Information in this section should include details about:

- safe systems of work for the particular health and safety hazards identified on site
- prohibited activities on site
- instructions for adverse weather conditions
- permits required for particular work, e.g. welding and/or confined spaces
- underground and above-ground services clearance and isolation
- how site will be located so it is clear of hazards and not downwind from earthworks
- access, security and control of movement and work zones
- procedures for:
  - communication
  - working alone and/or in remote locations
  - use of personal protective equipment and clothing
  - drilling rig operation
  - well and bore construction
  - excavation and heavy machinery use
  - degassing and/or decommissioning of underground storage tanks
  - manual handling
  - decontamination of site, equipment and personnel
  - dismantling and disposing of buildings and structures
  - waste management and contamination control
- equipment and plant on site
- safe operation of plant and a schedule for regular safety checks
- sampling and analysis programs
- provision of clean amenities (e.g. toilets, lunchrooms and showers) and drinking water facilities
- backfill materials verification and assessment
- schedule for regular review of systems of work.

## Induction, training and supervision

Information in this section should include details about:

- training and qualifications required for work on site
- project-specific safety training for site entry, personal protective equipment and clothing, and cleaning procedures
- appropriate supervision in the presence of identified hazards
- training and supervision for work with hazardous substances
- induction program for all workers and visitors to the site
- checks that all procedures, and the safety plan, are understood by all workers.

## Preparing for emergencies

Information in this section should include details about:

- the emergency plan developed for the site, including evacuation and rescue procedures
- type and location of emergency equipment
- procedures for any unexpected problems that might arise from ground being disturbed, particularly for inactive sites
- precautions against fire or explosion
- details of first aid equipment, facilities and procedures
- contact details for the nearest medical centre, hospital, and emergency services.

## Reporting and record-keeping

Information in this section should include details about:

- reporting and record-keeping required for:
  - incident notification
  - first aid
  - induction and training
  - contaminants found on site
  - work activities such as movement of wastes on and off site
  - other activities and situations as advised by Commonwealth, state/territory and local government agencies
- a safety and health log book for recording all work activities, the weather, site monitoring data and notes on problems
- plans for the maintenance, control and preservation of all records.

## Providing health and safety information

Information in this section should include details about:

- the distribution of relevant and appropriate safety and health information to workers and members of the public
- access to appropriate documents for workers and visitors to the site, including emergency and first aid plans.