Occupational Health and Safety Act 1985

Code of Practice for

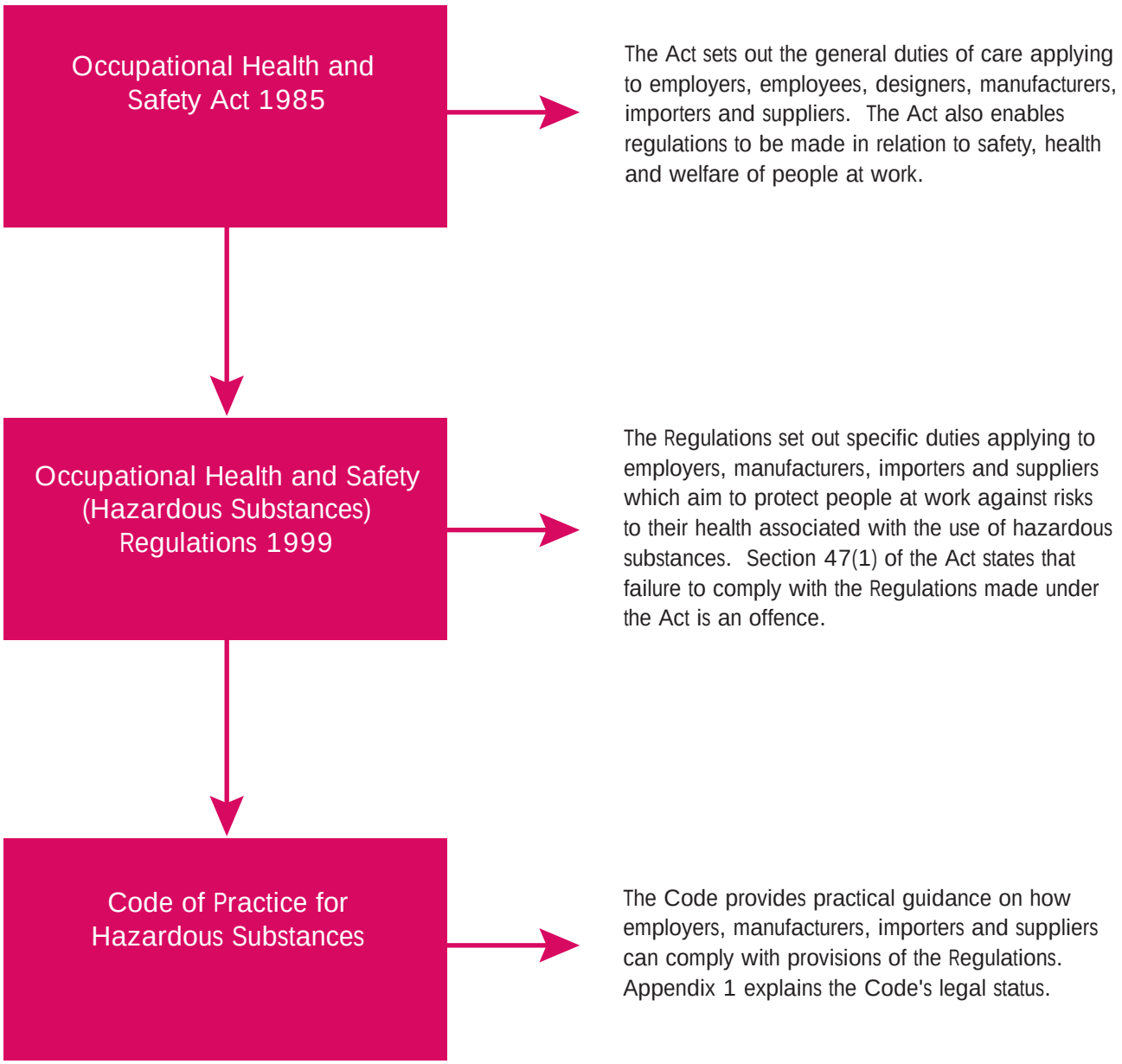
HAZARDOUS SUBSTANCES

No. 24, 1 June 2000

This code of practice is approved under section 55
of the Occupational Health and Safety Act 1985

Published December 1999

THE LEGISLATIVE FRAMEWORK



CONTENTS

APPENDICES

PART 1 – INTRODUCTION

1. What is the purpose of this Code?

The purpose of this Code of Practice is to help manufacturers, importers and suppliers of hazardous substances and employers using these substances, to meet the requirements of the *Occupational Health and Safety (Hazardous Substances) Regulations 1999* (the Regulations), so as to protect people at work against risks to health from using hazardous substances.

This Code of Practice is approved to take effect from 1 June 2000 – this being the date that the substantive duties of the Regulations commence. Appendix 1 provides an explanation of this Code's legal status.

2. Who should read this Code?

This Code of Practice should be read by:

- manufacturers and importers of hazardous substances;
- suppliers of hazardous substances;
- employers;
- health and safety representatives, employees and anyone else who has an interest in the risks to health and safety posed by the use of hazardous substances in workplaces.

Part 2 provides guidance for manufacturers, importers and suppliers of hazardous substances about their responsibilities. The duties of employers are explained in Part 3.

3. What are hazardous substances?

'Hazardous substances' are substances that have the potential to harm human health. They may be solids, liquids or gases; they may be pure substances or mixtures. When used in the workplace, these substances often generate vapours, fumes, dusts and mists. A wide range of industrial, laboratory and agricultural chemicals are classified as hazardous.

Hazardous substances may enter the human body in a number of ways, depending on the substance and how it is used (the nature of the work). The major routes of exposure to hazardous substances in the workplace are *inhalation* and *skin contact* or *absorption*. Less frequently, these substances may be *ingested*, or *injected into the body*. (See Figure 1).

Hazardous substances may cause immediate or long-term health effects. Exposure to these substances may result in poisoning, irritation, chemical burns, sensitisation, cancer, birth defects or diseases of certain organs such as the skin, lungs, liver, kidneys and nervous system. The severity of the health effects depends on the substance and the dose absorbed.

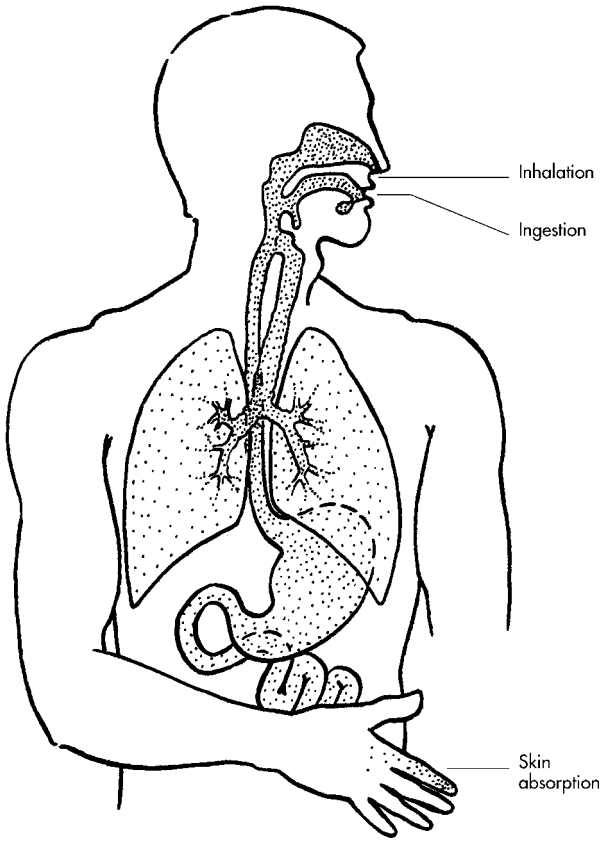


Figure 1: Routes of exposure

Examples of hazardous substances include: acute toxins such as cyanide; substances harmful after repeated or prolonged exposure such as mercury and silica; corrosives such as sulphuric acid and caustic soda; irritants such as ammonia; sensitising agents such as isocyanates; and carcinogens such as benzene and vinyl chloride.

The Regulations define a "hazardous substance" as one which:

(a) is listed in the *List of Designated Hazardous Substances*; or

(b) meets the criteria for a hazardous substance set out in the *Approved Criteria for Classifying Hazardous Substances*.

The List of Designated Hazardous Substances (The List) and *Approved Criteria for Classifying Hazardous Substances (The Approved Criteria)* are publications produced by the National Occupational Health and Safety Commission (NOHSC). They are intended for use by manufacturers and importers, *not* by employers and employees. Employers and employees using substances in the workplace should be able to identify a hazardous substance from the manufacturer's / importer's label and Material Safety Data Sheet (MSDS).

What is the difference between 'hazardous substances' and 'dangerous goods'?

Don't confuse hazardous substances with dangerous goods – they are classified according to different criteria. Hazardous substances are classified only on the basis of *health effects* (whether they be immediate or long term), while dangerous goods are classified on the basis of *immediate physical or chemical effects*, such as fire, explosion, corrosion and poisoning, affecting property, the environment or people.

Hazardous substances and dangerous goods are covered by separate legislation, each focusing on controlling the different risks described above. Since many hazardous substances are also classified as dangerous goods, the requirements of both pieces of legislation will apply in these cases. While there may be overlaps in the classification of many substances, each piece of legislation complements the other, effectively ensuring the comprehensive control of all risks.

4. Application of the Regulations to lead compounds

The application of the Regulations to lead compounds depends on the duty-holder and the type of compound.

If you are an employer, you have duties under these Regulations if organic lead compounds (such as lead alkyls) are used in your workplace and these compounds are classified as hazardous substances. However, the employer duties under the Regulations do not apply to you for substances containing inorganic lead, lead metal or lead alloys. The use of these types of substances is covered by other hazard-specific regulations made under the *Occupational Health and Safety Act 1985*.

If you are a manufacturer, importer or supplier, your duties under the Regulations apply to both organic and inorganic lead compounds that are classified as hazardous substances.

5. Exclusions

Substances not related to a work activity

The Regulations (and this Code) do not apply to the following substances where their use is not related to a work activity: food (including drink); therapeutic goods; cosmetics; tobacco, or products made of tobacco; and toiletries and toilet products. This means that products brought into the workplace by employees for their own personal use are not covered by the Regulations. However, the Regulations apply to these products if their use (including production) is part of a work activity and they are classified as hazardous.

Substances covered by other legislation

In addition, the Regulations (and this Code) do not apply to radioactive substances, cultures or preparations of pathogenic microorganisms or asbestos. Radioactive substances and microorganisms are covered by the *Health Act 1958*. Asbestos is covered by other substance-specific regulations made under the *Occupational Health and Safety Act 1985*.

Substances not covered by the Regulations

Even if a substance produced or used in your workplace is not covered by the Regulations (that is, not classified as hazardous), you still have general duties under the *Occupational Health and Safety Act 1985* (the Act). There may be risks associated directly with the use of the substance or with by-products generated under normal conditions of use. Your duties in relation to these substances are outlined in Appendix 2.

6. 'Use'

Under the Regulations, the 'use' of substances includes their production, handling, storage or disposal. This meaning should be kept in mind when reading the Regulations and the guidance in this Code.

Definitions or explanations for terms commonly used in this Code can be found in Appendix 3.

7. Competency of persons carrying out duties

You have a responsibility to ensure that people carrying out duties under the Regulations on your behalf have the appropriate competency to enable them to perform tasks correctly. The competency may be acquired through training, education or experience or through a combination of these.

PART 2 – MANUFACTURERS' IMPORTERS' AND SUPPLIERS' DUTIES

8. Introduction

This part of the Code provides guidance for those who manufacture or import hazardous substances and supply them for use in the workplace. When purchasers are making decisions about how to protect the health of employees using hazardous substances, they will rely on the information you provide, so it is vital that you comply with the Regulations.

If you manufacture[1] or import[2] a substance and supply it by way of exchange or sale, the Regulations require you to determine whether the substance is hazardous before it is first supplied for use at a workplace. If you determine that it is hazardous, you must also prepare and provide purchasers with a material safety data sheet (MSDS) and ensure that containers of hazardous substances are labelled appropriately (see Figure 2).

If you supply a hazardous substance to a workplace for exchange or sale, you must provide purchasers with a copy of the MSDS and ensure that containers are labelled with the manufacturer's or importer's label.

These duties do not apply for substances produced as wastes, intermediates or products, either during the process of manufacture of the hazardous substance, or when purchasers use the hazardous substance at a workplace (see Appendix 2 of this Code).

It is likely that you also have employees whose health will need to be protected during the production, handling, storage or disposal of hazardous substances in your workplace. As an employer, you should also read Part 3 of this Code.

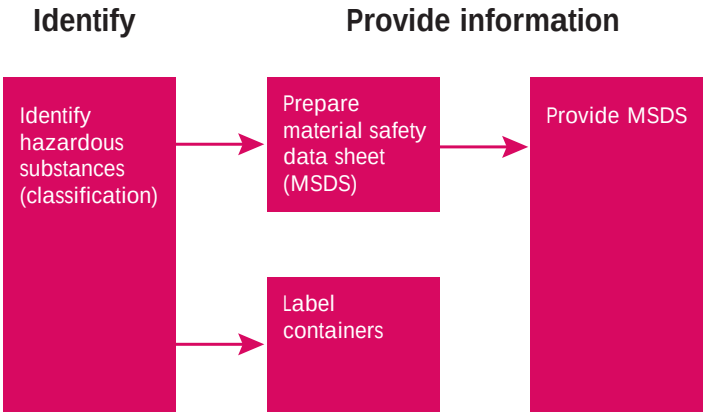


Figure 2: Duties of manufacturers and importers

9. Classifying substances

9.1 When do I have to classify substances?

If you are a manufacturer or importer, you have a duty to determine whether the substances you supply are hazardous. You must do this *before* first supplying the substance for use in a workplace.[3]

You do not need to classify substances supplied to a workplace for the purposes of scientific analysis or for determining whether they are hazardous. Nor do you need to prepare material safety data sheets (MSDS) or labels as prescribed by the Regulations in these circumstances.

If you are a manufacturer and you have already determined a substance to be hazardous under equivalent legislation, you do not need to make a determination under these Regulations or classify the substance again. If you import a substance into Victoria from another Australian jurisdiction, and it has already been classified according to equivalent legislation, you are not required to classify the substance again. Similarly, you do not need to prepare another MSDS or label under the Regulations if these have been prepared according to equivalent legislation. However, you do have obligations under the Regulations to ensure that the MSDS and label are provided when supplying the substance (see sections 10 and 13, respectively).

1 *The term "manufacturer" includes those who dilute or repackage a substance for commercial supply.*
2 *To "import" a substance means to bring it into Victoria from overseas or another Australian jurisdiction (ie. another Australian state or territory).*
3 *First supplied means the first time the hazardous substance is supplied on or after 1 June 2000.*

9.2 How do I classify hazardous substances?

The National Occupational Health and Safety Commission has published two references to assist manufacturers and importers in classifying hazardous substances:

- *The List of Designated Hazardous Substances (The List)*; and
- *Approved Criteria for Classifying Hazardous Substances (The Approved Criteria)*.

These documents classify substances as hazardous on the basis of their health effects. Note that they are updated from time to time.

Because the Regulations define a hazardous substance as one that is recorded in *The List* or meets the criteria set out in *The Approved Criteria*, you must use these documents to determine whether a substance is hazardous.

The List is an inventory of some common hazardous substances that provides a relatively quick and easy way of classifying some substances. You should refer to *The List* as the first step in the classification process.

The List also specifies concentration cut-off levels for the various health hazard categories. Concentration cut-off levels are the concentrations of the ingredients in a substance that determine whether the substance is hazardous. If concentration cut-off levels are not specified for a substance listed in *The List*, you will need to classify the substance using *The Approved Criteria*.

The List cannot be used to classify all substances. If a particular substance or its ingredients are not in *The List*, you must determine whether the substance is hazardous by using *The Approved Criteria*. The criteria in this document are set out in three parts:

(1) health effects criteria;

(2) concentration cut-off levels for the various categories of health effects; and

(3) formulae for classifying mixtures where the concentrations of each of the ingredients do not exceed the relevant concentration cut-off levels, but where there may still be additive effects for those ingredients.

Classifying a substance with only one ingredient

A substance consisting of only one ingredient (a pure substance) is classified as hazardous if:

(a) the substance is in *The List*; or

(b) the substance meets any of the health effects criteria in *The Approved Criteria*.

If the substance is found to be hazardous according to *The List*, its health hazard category or categories can be determined by referring to the relevant concentration cut-off columns in *The List*. If the substance is not in *The List*, the health hazard category or categories can be determined by comparing the health effects data for the substance with the health effects criteria in *The Approved Criteria*. Examples of health hazard categories are harmful, toxic, very toxic, irritant and corrosive. This information is then used when preparing a material safety data sheet (MSDS) and label for the substance.

Classifying chemical mixtures and formulations

A substance consisting of two or more ingredients is classified as hazardous if:

(a) the substance, as a whole, is in *The List* – for example, 'oil of turpentine'; or

(b) any of its ingredients are in *The List* and are present in a concentration at, or greater than, the concentration cut-off specified in *The List*; or

(c) the substance has been tested as a whole and it satisfies any of the health effects criteria in *The Approved Criteria*; or

(d) any of the ingredients of the substance meet any of the health effects criteria, and are present in the substance at a concentration which is at, or greater than, the relevant cut-off level specified for the hazard category in *The Approved Criteria*.

A mixture may still be hazardous if one (or more) of its ingredients meets the health effects criteria but is not present at a level that exceeds the relevant concentration cut-off level. If the mixture contains two or more ingredients with the same type of effect (eg. a number of corrosive ingredients), then their effects can combine so that overall, the mixture is hazardous. *The Approved Criteria* provides formulae to help you evaluate these additive effects.

Both *The Approved Criteria* and *The List* present the classification principles and illustrate their application through the use of examples. Refer to these documents for guidance on classifying hazardous substances.

10. Preparing Material Safety Data Sheets

10.1 What information do I have to include on a Material Safety Data Sheet?

The Regulations require you to prepare a Material Safety Data Sheet for all hazardous substances – though there are some exemptions, as detailed in section 9.1.

A Material Safety Data Sheet (MSDS) is a document that describes the identity, properties, health hazards, precautions for use and safe handling of a hazardous substance. The MSDS provides vital information for end-users of hazardous substances, who must know how to use these substances safely in the workplace.

MSDS must be written in English and include the following information:

- the date of preparation or, if the MSDS has been reviewed, the date it was last reviewed;
- the manufacturer's or importer's name and their Australian address and telephone number;
- telephone number for information in the event of an emergency;
- the product name of the hazardous substance, together with:
  - its chemical and physical properties;
  - the names of the individual ingredients in the substance;
  - the proportion or proportion ranges of the ingredient identified with a chemical or generic name;
  - any relevant health hazard information, including first aid information;
  - the Australian exposure standard (if any) for the hazardous substance or its ingredients;
  - information on the precautions for the safe use of the substance; and
- a statement that the substance is a hazardous substance.

The MSDS should be clear and easily understood by the lay person. Technical jargon should be avoided as much as possible or be accompanied by a simple explanation for the terms used – for example, "hepatocellular carcinoma (cancer of the liver)". Vague phrases such as "may be dangerous" or "safe under most conditions of use" are not acceptable, because they can be misleading. Where appropriate, standardised risk and safety phrases (eg. "may cause cancer by inhalation") should be used to minimise ambiguity.

Because "use" has a specific meaning under the Regulations, you must include information on the safe handling, storage and disposal of the substance when providing information on the precautions for the safe use of the hazardous substance.

When preparing an MSDS, you should follow the detailed guidance in the *National Code of Practice for the Preparation of Material Safety Data Sheets (National MSDS Code)*. Produced by NOHSC, this document contains guidance on a format that may be adopted and the information to be provided.

The Regulations only prescribe the minimum information that must appear on an MSDS and do not prescribe any particular style of presentation. You may adopt the format presented in the *National MSDS Code*, or use another format – as long as your MSDS clearly provides all the information prescribed by the Regulations.

10.2 Disclosing ingredients of hazardous substances on MSDS

As a manufacturer or importer, you are generally required to disclose the chemical name of a hazardous substance or the ingredients in a hazardous substance on the MSDS. There is some scope to claim commercial confidentiality for an ingredient in a hazardous substance, but this is limited.

The Regulations categorise the ingredients in a hazardous substance as Type I, Type II or Type III ingredients. It is not possible to claim commercial confidentiality for any Type I ingredient; the full chemical name of all such ingredients must be disclosed on the MSDS. However, if the identity of a Type II or Type III ingredient is commercially confidential, it may be identified by a generic name rather than by its chemical name. (A generic name describes the category or group of chemicals to which the substance belongs).

The Regulations follow the *National Model Regulations for the Control of Workplace Hazardous Substances* in defining Types I, II and III ingredients. Their meanings are provided below[4].

[4] *The definitions provided were sourced from the 1994 edition of National Model Regulations – that is, National Model Regulations for the Control of Workplace Hazardous Substances [NOHSC:1005 (1994)]. Because the National Model Regulations may be amended from time to time, the most recent edition of this document should always be consulted to find out the definitions for Type I, II and III ingredients.*

A **Type I ingredient** is one that –

(a) has been classified according to The Approved Criteria as carcinogenic, mutagenic, teratogenic, a skin or respiratory sensitiser, corrosive, toxic, very toxic, a harmful substance that can cause irreversible effects after acute exposure, or a harmful substance that can cause serious damage to health after repeated or prolonged exposure;

or

(b) has an exposure standard listed in the Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment –

and is present in a quantity that exceeds the lowest relevant concentration cut-off level specified in *The Approved Criteria*.

A **Type II ingredient** is one that:

(a) has been classified according to The Approved Criteria as a harmful substance due to its acute lethal effects; and

(b) is present in a quantity that exceeds the lowest relevant concentration cut-off level specified in The Approved Criteria.

A **Type III ingredient** is one that does not meet the criteria for either a Type I or a Type II ingredient as described above. Therefore, a Type III ingredient is one that:

(a) meets the criteria for a Type I or Type II ingredient, but does not exceed the relevant concentration cut-off level for these types of ingredients; or

(b) is classified only as an irritant, as defined by The Approved Criteria; or

(c) is not classified as a hazardous substance.

For a Type III ingredient, the MSDS must disclose the chemical name of the ingredient, or if the identity is commercially confidential, an appropriate generic name may be used. If the Type III ingredient is not classified as a hazardous substance, you are permitted to use the term 'other ingredients determined not to be hazardous' on the MSDS, rather than using a generic name. This can only be done if you believe that the generic name does not provide sufficient commercial protection and the Type III ingredient does not have known synergistic effects. If the Type III ingredient does have synergistic effects, the chemical or generic name must be used on the MSDS to identify that ingredient.

The *National MSDS Code* provides guidance on the selection of a generic name for use on the MSDS. You should follow this guidance if you wish to claim commercial confidentiality for a Type II or Type III ingredient.

11. Reviewing and revising MSDS

Manufacturers and importers of hazardous substances are required to review an MSDS as often as necessary to ensure the information remains accurate and current. For example, the MSDS for a product that is a hazardous substance would need to be reviewed:

(a) whenever there is a change in the formulation of a product;

(b) whenever new information on the health effects of the product or one of its ingredients becomes available.

In any event, you must ensure the MSDS is reviewed no later than five years after the last date of review.

If a review reveals that the MSDS does not contain accurate or current information, it must be revised. The MSDS should reflect the current state of knowledge about the substance. After any review or revision, the MSDS must be reissued with the review date.

12. Providing current MSDS

12.1 When must I provide an MSDS?

As a manufacturer, importer or supplier of a hazardous substance, you must provide a copy of the current MSDS on or before the first occasion that a hazardous substance is supplied for use at a workplace. The MSDS must be provided to any person to whom the substance is supplied and to any employer on request. An MSDS may be requested by an employer before the first supply of a hazardous substance to assist them with preliminary planning for its intended use.

An MSDS must also be provided to retailers and retail warehouse operators for hazardous substances that are either used or intended for retail sale at their premises.

There is no need to include an MSDS with every delivery. If the MSDS is reviewed, a copy must be provided to any person to whom the substance is supplied on or before the first occasion that the substance is supplied after the review, and to any employer on request. There is no requirement to send a copy of the revised MSDS to all previous purchasers of the hazardous substance.

12.2 Specific exclusions to the duty to provide MSDS

Fuel

You are not required to provide a copy of the MSDS where a substance is supplied to the fuel tank of a vehicle, to be consumed by that vehicle. This means that petrol station operators are not required to provide a copy of the MSDS for petrol or other fuels purchased by motorists.

Suppliers who are retailers or retail warehouse operators

If you are a retailer or retail warehouse operator, you are not required to provide an MSDS to people who purchase hazardous substances for use at a workplace in consumer packages. However, you may choose to act by arrangement with your suppliers to distribute MSDS. This would be particularly appropriate for trade sale outlets.

13. Labelling controls

The purpose of labelling is to ensure that the contents of a container can be readily identified by product name, and to provide basic information about the contents of the container – its ingredient(s), hazards and precautions for safe use.

13.1 What information must be included on the container label?

As a manufacturer or importer, you are responsible for ensuring that all containers of hazardous substances are correctly labelled before being supplied for use at a workplace. The Regulations require that, as a minimum, the label on a container of a hazardous substance be written in English and contain:

- the product name of the hazardous substance;
- the name, address and contact telephone number of the Australian manufacturer or importer of the substance;
- the chemical name for all Type I ingredients and the chemical or generic name for Type II ingredients. (A generic name may only be given for Type II ingredients for which commercial confidentiality has been claimed);
- relevant health and safety information about the substance, including its risk and safety phrases, except where the container is so small that it is not practical to provide such information; and
- the word "HAZARDOUS" clearly and prominently displayed, unless signal words have been provided in accordance with other relevant Australian legislation.[5]

The label must be firmly secured to the container. All information on labels must be legible and durable. If the container is so small that the label cannot be placed on the actual container, the label can be attached by other means, such as a string around the neck of the container.

Detailed guidance on labelling is provided in the *National Code of Practice for the Labelling of Workplace Substances (National Labelling Code)* produced by NOHSC. When preparing a label, follow the guidance in the *National Labelling Code* regarding data items required on labels under the Regulations.

[5] *"Signal words" are words such as "dangerous poison", "poison", "warning" or "caution" that must be clearly and prominently displayed on the label to indicate the relative severity of the hazard.*

13.2 Recognition of other labelling systems

Separate labelling is not required if containers have already been labelled according to equivalent hazardous substances legislation of other Australian jurisdictions, or are labelled in keeping with specified agricultural, veterinary or therapeutic goods legislation.

Hazardous substances imported into Victoria from overseas or interstate that are not labelled appropriately, do not have to be labelled in accordance with the Regulations until such time as the importer supplies them by way of exchange or sale for use at a workplace.

If you are an importer, you could choose to "overlabel" containers of hazardous substances to provide any information required under the Regulations that is not included on the original label. For example, if a container holding a hazardous substance complies with the Regulations in all respects except that it does not state the name of the Australian importer, the original label could be retained and an 'overlabel' added to provide the address and contact details of the importer as required.

13.3 Supplier's duty to ensure container is labelled

Suppliers are required to ensure that any container of a hazardous substance supplied for use at a workplace is labelled with the manufacturer's or importer's label.

PART 3 – EMPLOYER'S DUTIES

14. Introduction

This part is designed to assist employers in meeting the requirements of the Regulations. If you are an employer, you have duties to assess and control risks arising from the use of hazardous substances in your workplace, and to carry out where necessary, atmospheric monitoring and health surveillance. You also have duties to consult with health and safety representatives, and provide employees with information, instruction and training.

You only have to carry out these duties for substances used in your workplace that have been classified as hazardous by the manufacturer or importer. It is the responsibility of the manufacturer or importer to ensure that substances are classified and adequate information is provided to purchasers. You can tell if a substance has been classified as hazardous from the label on its container, and from the material safety data sheet (MSDS). Both the label and the MSDS for a hazardous substance must indicate that the substance is hazardous.

When reading the following guidance, keep in mind that a 'risk' associated with the use of a hazardous substance also includes any risk arising from consequential wastes, intermediates or products that may be generated by the use of the classified hazardous substance in the workplace (abbreviated below as 'substances generated through the use of hazardous substances').

15. Consultation

The Regulations require you, if practicable, to consult with the relevant health and safety representative(s) when assessing and controlling risks arising from the use of hazardous substances. It is also a good idea to consult directly with your employees. By drawing on the experience and knowledge of your employees, you are more likely to be effective in reducing risk. If practicable, consultation should occur:

- when identifying hazardous substances to establish priorities for assessment;
- during the assessment process (including a generic assessment);
- when determining which control strategies should be applied to eliminate or reduce risks associated with the use of hazardous substances;
- when reviewing the effectiveness of control measures.

Consultation should take place as early as possible when planning to introduce new hazardous substances into the workplace. When consulting, make sure that accurate and relevant information is made available to your employees and their health and safety representative(s). Provide participants with access to copies of material safety data sheets, incident records and any other information that may be relevant. Consider the needs of employees and their health and safety representatives who come from non-English speaking backgrounds[6]. And make sure that you allow enough time for health and safety representatives to confer with employees and feed their ideas back to you.

A range of mechanisms can be used to facilitate consultation, including direct discussion, toolbox meetings, quality circles, health and safety committee meetings, quality reports, hazard inspections, special working parties, or combinations of these.

[6] *Guidance on techniques for consultation in multilingual workplaces is provided in the Code of Practice for Provision of Occupational Health and Safety Information in Languages other than English.*

16. Material Safety Data Sheets (MSDS)

16.1 What is an MSDS?

Under the Regulations, manufacturers and importers are responsible for determining whether a substance they supply for use in a workplace is hazardous. If the substance is classified as hazardous, a material safety data sheet (MSDS) must be prepared and made available to purchasers of the substance. An MSDS is not to be confused with a product specification sheet, which provides information on the performance characteristics of the substance and directions for application.

The MSDS provides the information about the hazards (health effects) of the substance and how to use it safely. It also helps you to identify, assess and control risks associated with the use of the substance in your workplace.

An MSDS must be written in English and contain the following information:

- date of preparation or review;
- manufacturer or importer details, including Australian address and contact numbers;
- product name;
- chemical and physical properties of the substance;
- identity of the ingredients;
- proportion (or proportion ranges) of the ingredients in the substance;
- health hazard information;
- first aid information;
- precautions for safe use[7];
- exposure standard(s);
- a statement that the substance is a hazardous substance.

You have a right to expect that the information contained in an MSDS is current, accurate and easily understood by a lay person. It should take into account all the normal uses of the substance. If you are not happy with the MSDS provided, raise your concerns with the manufacturer or importer. The same or similar substance may also be available from a manufacturer or importer who does provide a good MSDS.

The Regulations do not prescribe the format (style or presentation) required for an MSDS. Figure 3 details the specific information you can expect to find on an MSDS.

16.2 Obtaining an MSDS

The Regulations require manufacturers, importers and suppliers of hazardous substances (subject to certain provisions applying to retailers and retail warehouse operators) to provide you with a copy of the current MSDS. The Regulations also require you to obtain the most recent version of the MSDS on or before the first time the hazardous substance is supplied for use in your workplace. Only the MSDS prepared by the manufacturer or importer of the substance are acceptable. Generic or third party MSDS are not acceptable.

It is good practice to ask for a current copy of the MSDS before the hazardous substance is first supplied, as this will enable you to begin planning for its safe use. Manufacturers, importers and suppliers have an obligation to provide you with a copy on request.

If an MSDS is not made available on the first supply of a substance, you should ask the manufacturer, importer or supplier whether the substance is classified as hazardous according to the Regulations. If the supplier informs you that a substance is not hazardous, it is advisable to obtain written confirmation.

Suppliers who are retailers or retail warehouse operators are not required to provide an MSDS for hazardous substances that are supplied in consumer packages. Therefore, if you purchase hazardous substances from a retailer, you need to obtain an MSDS from an upstream supplier such as the manufacturer or importer of the substance. (Note, their contact details should be on the label.)

If you are an employer operating a retail, or retail warehouse outlet

If you are a retailer or retail warehouse operator, you are required to obtain MSDS for hazardous substances used in your workplace and for hazardous substances intended for retail sale. MSDS for hazardous substances intended for retail sale are needed to enable your employees to deal with incidents such as accidental spillages and damaged consumer packages. However, you are not required to distribute MSDS to purchasers of hazardous substances.

[7] *Because "use" has a specific meaning under the Regulations, information on the precautions for handling and disposal of the substance should also be included in the MSDS. However, all this information may not appear together under the one heading.*

Figure 3: Sample MSDS

MATERIAL SAFETY DATA SHEET

Page x of total y (Shows the page number and total number of pages in the MSDS).

Date of Issue (Indicates the date of issue or review of the MSDS. An MSDS must be reviewed at least every five years – so it should not be more than five years old).

Statement of Hazardous Nature (It must contain a statement that the substance is hazardous).

Company Details

Company: Address: Telephone number: Emergency phone number:	Details, name and contact number of the manufacturer or importer. Important for seeking further information about the substance or its use.

Identification

Product name: Poisons schedule number: Use:	Identifies the substance by product name. Describes its use, appearance and form (ie. whether the substance is a solid, liquid or gas).
Physical description / properties: Appearance: Boiling point / melting point: Vapour pressure: Specific gravity: Flammability limits: Solubility in water: Other properties:	Indicates the properties of the substance, or its ingredients. The properties that are commonly described include: volatility (boiling point, vapour pressure and if known, evaporation rate), solubility (in water and / or other substances or solvents) and odour (level at which substance is detectable by smell). This information is useful in assessing the potential for exposure to the substance.
Ingredients – Chemical name: Proportion:	Identifies the ingredients contained in the substance and their proportions.

Health Hazard Information

Health effects ***Acute:*** Swallowed: Eye: Skin: Inhaled: ***Chronic:***	Describes the immediate and long-term health hazards of the substance for the different ways it can enter the human body (routes of exposure). If known, the level of exposure that may give rise to a particular health effect should be indicated. You need to be aware of the health effects and be able to recognise the symptoms of exposure.
First Aid Swallowed: Eye: Skin: Inhaled: First aid facilities: Advice to doctor:	Provides first-aid information for employers and medical practitioners. Be familiar with these procedures so that prompt action can be taken if an incident occurs.

Precautions for Use

Exposure standards:	States NOHSC exposure standard(s), if any, for the substance or its ingredients. You need to know this and ensure that employees' exposure does not exceed the standard.
Engineering controls: Personal protection:	Provides information about appropriate risk controls for the substance. Advice on controls should relate to the range of tasks that are normally performed using the substance (eg. decanting or spraying the substance). This information should not be limited to controls which rely on safe worker behaviour or the use of personal protective equipment; guidance on engineering controls such as ventilation should also be given. Where PPE is recommended it should specify the exact type. For example, if gloves are recommended, the type of gloves that are suitable (Viton, Nitrile, Rubber or PVC) should be specified, instead of just "impervious gloves".

Safe Handling Information

Storage and transport: Spills and disposal:	Provides information on storage, dealing with spills, and methods of disposal.

16.3 Providing employees with access to MSDS

The MSDS must be readily accessible to any employee who could be exposed to a hazardous substance.

Copies of MSDS should be kept in a location convenient to the work area in which the substance is used. Make sure that all employees likely to be exposed to a hazardous substance know where to find the MSDS. You should also provide your employees with information or training, so that they understand the purpose of MSDS and can use them effectively. (Section 23 of this Code provides guidance on information, instruction and training of employees about the use of hazardous substances).

Access to MSDS may be provided in a number of ways including:

- paper copy collections of MSDS;
- microfiche copy collections of MSDS with microfiche readers open to use by employees; and
- computerised MSDS databases.

You may wish to discuss these options with your supplier. In each case, the employer should ensure that:

- any storage or retrieval equipment is kept in good working order;
- employees know how to access the information; and
- there are means of obtaining a paper copy of information contained in a computerised database.

Commercially available computerised MSDS databases made available by another party are acceptable provided they contain the manufacturer's or importer's current MSDS. You need to ensure that the MSDS obtained from such a database is the authorised version prepared by the manufacturer or importer.

16.4 Ensuring that information in the MSDS is not altered

You must not alter information in an MSDS prepared by the manufacturer or importer. Additional information may be appended to the MSDS, but it must be marked clearly to indicate that it is not part of the original. Adding specific workplace information in this way does not constitute an alteration to the MSDS. Similarly, you may reformat or summarise the information contained in the MSDS, as long as it is appended to the original and clearly marked as a reformatted version.

16.5 Register of hazardous substances

You must make certain that all hazardous substances used in your workplace are identified and listed in a register. The register is simply a list of the product names of all hazardous substances used in the workplace accompanied by the current MSDS for each of these substances.

The register must be regularly maintained. Update the register when:

- new hazardous substances are introduced to the workplace;
- the use of existing hazardous substances is discontinued; and
- revised MSDS are provided by the manufacturer, importer or supplier.

Since manufacturers or importers are required to review, and where necessary, revise MSDS at least every five years, all MSDS in the register or otherwise accessible in the workplace should have issue dates within the last five years.

If the use of a substance is to be permanently discontinued, you should remove it from the register. Hazardous substances used periodically or seasonally do not need to be removed from the register.

The register must be readily accessible to any employee who may be exposed to hazardous substances in your workplace. Make sure your employees know where to find it. You may wish to keep it in a central location, or provide a copy of it to each work area.

Don't confuse a register with a manifest. A register is required for hazardous substances, while a manifest must be kept for certain quantities of dangerous goods under the *Dangerous Goods (Storage and Handling) Regulations 1989*. You should keep a register and a manifest. This may appear to duplicate information unnecessarily, but in fact, these documents are required for different purposes. The primary purpose of a manifest is to provide information (such as site maps and the types and quantities of dangerous goods stored) to the fire brigade in the event of an emergency. A register, on the other hand, provides you (and your employees) with a source of information to assist in the management of hazardous substances in the workplace.

17. Labels

Labelling allows containers of hazardous substances to be readily identified and provides some basic information on the hazards of the substance and precautions for use (including risk and safety phrases).

17.1 Ensuring that containers are labelled

As an employer, you must make sure that all containers of hazardous substances for use at your workplace are labelled with the manufacturer's or importer's label. The label supplied must be written in English and contain:

- the product name of the hazardous substance;
- name, address and telephone number of the Australian manufacturer or importer of the substance;
- information relating to its ingredients;
- relevant health and safety information about the substance (including risk and safety phrases), except where the container is so small it is not practical to provide such information[8];
- the word "HAZARDOUS" (or signal words such as "dangerous poison", "warning" or "caution" that indicate the severity of the hazard).

Containers must remain labelled until the contents have been removed and the container has been completely cleaned (free of the substance) or the contents have been neutralised, cured or chemically deactivated.

Labels for hazardous substances must not be removed from the container, defaced or altered. If a label on a container is illegible, incorrect or otherwise not in keeping with the Regulations, you should remove the container from use until it is appropriately labelled.

17.2 Labelling of decanted substances

Labelling requirements for hazardous substances decanted for use in the workplace depend primarily on whether or not the substance is to be consumed (used up) immediately.

A container into which a hazardous substance has been decanted does not need to be labelled if:

- the decanted substance is consumed immediately; and
- the container is cleaned, or the contents have been neutralised, cured or chemically deactivated immediately after use.

"Immediately" means "as soon as possible to do so". This means that labelling is not needed provided the container remains in the control of, or within sight of, the person using the decanted substance. That is, the container must not be left unattended.

However, a container into which a hazardous substance has been decanted must be labelled with the product name if:

- the decanted substance is not consumed; or
- the container is not cleaned or its contents neutralised, cured or chemically deactivated immediately after use.

You do not have to label the container with 'stick on' labels. Written or painted labels are acceptable, as long as they are legible and durable. Alternatively, you may be able to obtain spare copies of container labels from the manufacturer, importer or supplier of the hazardous substance. Where practicable, label the container with the appropriate risk and safety phrases. Refer to the *National Code of Practice for the Labelling of Workplace Substances* for further guidance on the information that may be included on labels.

Where labelling is required, but it is not practical to label the container into which the substance is decanted with the product name (for example, because the container is too small) you can use some other means to identify the contents of the container (for example, by a laboratory sample number). Inform employees likely to be exposed to the substance about the meaning of the identification method used.

[8] *Risk phrases briefly describe the hazard(s) of the substance - for example, "irritating to skin", "very toxic if swallowed", "toxic by inhalation". Safety phrases briefly describe the safety precautions to be taken when using the substance - for example, "keep container dry", "avoid contact with eyes", "wear eye/face protection".*

17.3 Unlabelled containers

If an unlabelled container of a hazardous substance is found in the workplace, it should be correctly labelled before the substance is used.

If the contents of a container are not known, a label such as '**CAUTION DO NOT USE: UNKNOWN SUBSTANCE**' should be affixed to the container. The container should be removed from use until its contents are identified. If you can identify the manufacturer or importer from the type of container, contact them for help in identifying the substance. If the substance cannot be identified with certainty, you should contact your local waste management authority to arrange for its safe disposal.

17.4 Identifying hazardous substances in systems

Sometimes a hazardous substance is contained in plant forming part of a manufacturing process – for example, a pipe or piping system, or a process or reactor vessel. In this case, you must ensure that the substance is identified so as to alert anyone who may be exposed to the contents. The purpose of this form of identification is to provide information in the event of an accidental rupture or spill, or when maintenance or cleaning of the system is required.

A system or plant dedicated to a particular hazardous substance may be identified by colour coding in keeping with a published technical standard such as Australian Standard (AS) 1319 - *Safety Signs for the Occupational Environment* or AS 1345 - *Identification of the Contents of Piping, Conduits and Ducts*. Whatever the system of identification used, make sure your employees know how to identify the contents from the coding.

18. Risk assessment

You must assess whether the use of a hazardous substance in your workplace poses a risk to health before the substance is used for the first time in the workplace. If the substance was supplied to your workplace before 1 June 2000, you have until 1 September 2000 to undertake a risk assessment on the substance.

18.1 What is risk assessment?

Risk assessment determines whether there is a risk to employees' health from using a hazardous substance in the workplace, and any substances that may be generated by its use[9]. Note that a risk assessment may be carried out for a work process and may cover more than one hazardous substance.

When carrying out a risk assessment, the Regulations require you to consider:

- each hazardous substance used;
- the information on the MSDS for each hazardous substance;
- the information on the manufacturer's or importer's label;
- the nature of the work involving the use of each hazardous substance;
- any information regarding incidents, illnesses or diseases associated with the use of the hazardous substance at the workplace.

From this information, you can determine the risk – the likelihood of employees suffering adverse health effects as a result of use of the substance in the workplace. Only by first assessing the risks to employees' health, can you then make decisions about appropriate risk controls.

It is important to remember that risks may extend to employees who have no direct involvement in the work activity. Make sure that health and safety representatives are consulted at all stages of the risk assessment process.

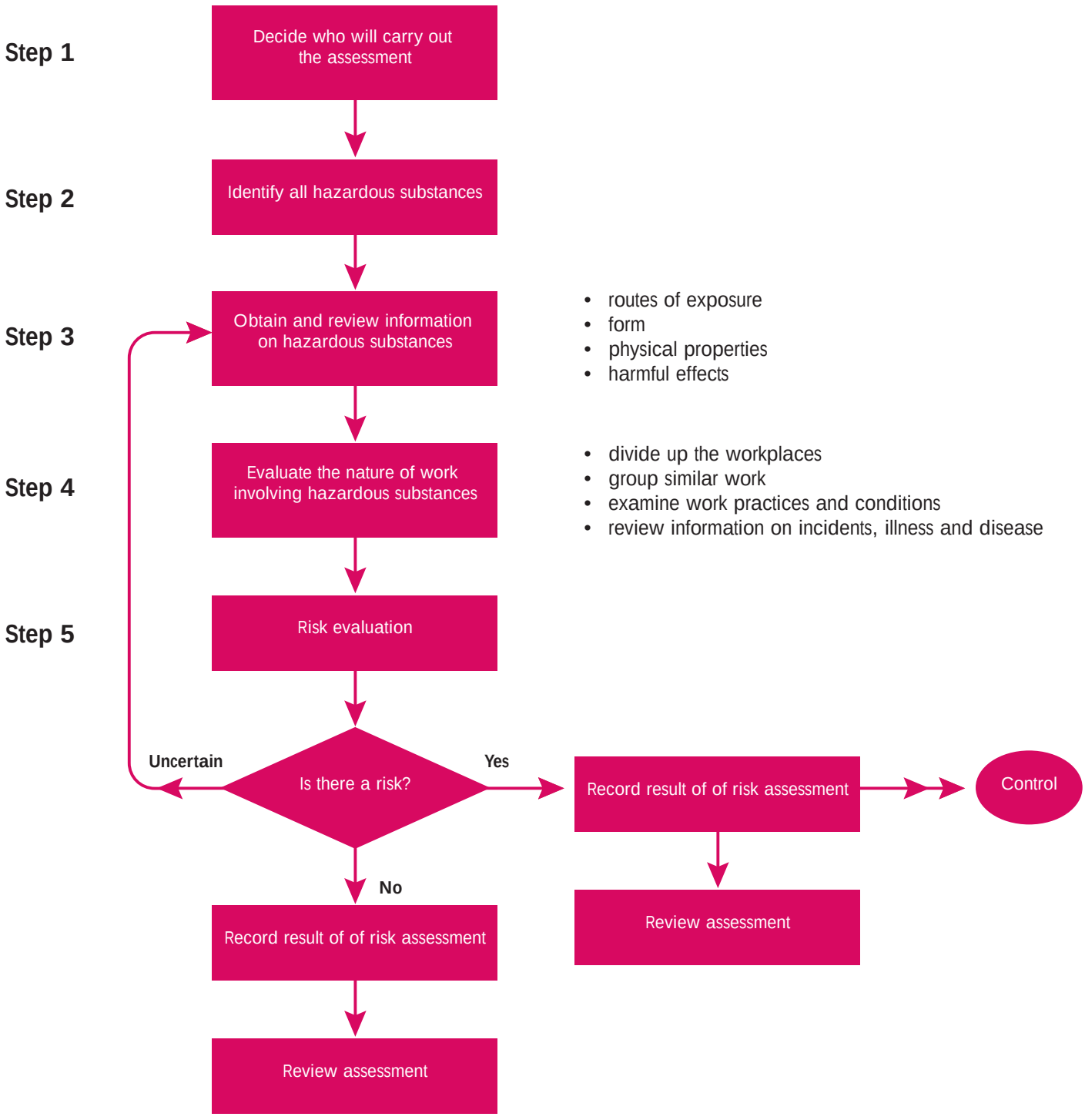
18.2 How do I carry out a risk assessment?

The following step-by-step guide is designed to lead you through the risk assessment process. It can be used in any workplace where hazardous substances are used. The flow diagram (Figure 4) provides a helpful summary of this process. NOHSC's *Guidance Note for the Assessment of Health Risks Arising from the Use of Hazardous Substances in the Workplace* also provides useful information for assessments.

[9] *Wastes or other products which may present a risk to health but which are generated during the course of work that does not involve the use of a hazardous substance fall outside the scope of the Regulations. However, you are still obliged under Section 21 of the Act to ensure, so far as is practicable, the absence of risks to health in connection with the use, handling, storage and transport of these substances. Appendix 2 of this Code provides guidance on your duties in relation to these substances.*

Figure 4:

AN OVERVIEW OF THE RISK ASSESSMENT PROCESS



Consultation with relevant health and safety representatives should occur throughout the risk assessment process.

Step1. Decide who should carry out the assessment

As an employer, the responsibility for the assessment lies with you.

For an assessment to be valid, it must be based on a thorough and practical understanding of what actually happens, or what might happen, in the workplace. Wherever possible, the assessment should be started in-house even if outside specialists are called in after a preliminary assessment is performed[10]. In any case, you should ensure that any person carrying out the assessment (or any part of it) is familiar with all the requirements of the Regulations and has a practical understanding of the work process.

A single person such as the works manager or works chemist may be suitably competent to perform simple assessments, while in more complex cases, several people representing a variety of skills will probably need to be involved in collecting and assessing the information.

Step 2. Identify all hazardous substances used

You should identify all hazardous substances used in the workplace and any substances generated through the use of hazardous substances that may present a risk to health. All of these substances must be considered in the risk assessment process.

Check the manufacturer's or importer's MSDS and label for each hazardous substance, as these will indicate whether the substance is hazardous. If you are still not sure whether the substance is hazardous, seek further information from the manufacturer, importer or supplier.

The MSDS should also identify any substances generated through the use of the hazardous substance (eg. decomposition products) that may present a risk to health. You can contact the manufacturer, importer or supplier of the plant or hazardous substance for technical information about these decomposition or breakdown products. For example, you might seek information such as:

- operating instructions for a petrol powered forklift, which may indicate that harmful concentrations of the breakdown product carbon monoxide may be generated if the forklift is used in poorly ventilated areas. (The MSDS should also contain this information); or
- directions for use of bleach, warning that harmful levels of chlorine may be generated if the substance is mixed with incompatible chemicals.

The List of Designated Hazardous Substances (The List) published by NOHSC may be another relatively quick way of identifying whether the substance is likely to be a risk to health. If you cannot identify whether the generated substance is likely to be harmful by consulting with the manufacturer / importer or referring to *The List*, consult with occupational health and safety professionals.

Step 3. Obtain and review information about hazardous substances

Obtain information

MSDS and labels for all hazardous substances supplied to the workplace should be reviewed to obtain information on the health hazards, precautions for use and safe handling requirements for the substance. Some products - for example, hazardous substances in retail packages - may have sufficient information on the consumer package label to cover most likely situations of exposure, such as the clean up and proper disposal of spills.

What to do if an MSDS for a substance is unavailable

If an MSDS and / or labels are not required under the Regulations, equivalent information on health hazards and precautions for use and safe handling should be obtained. The use of equivalent information will usually be limited to situations where the substance is generated in the workplace as a result of the use of a hazardous substance.

National Industrial Chemical Notification and Assessment Scheme (NICNAS) Summary Reports are a helpful source of equivalent information. NICNAS Summary Reports have been produced for every substance notified and assessed under the *Industrial Chemical (Notification and Assessment) Act 1989* (Commonwealth). These reports contain information including:

- the chemical's general uses, precautions and restrictions to be observed during manufacture, handling, storage, use and disposal;
- information on emergency procedures; and
- summaries of health and environmental effects data.

[10] *If you are considering contracting the services of external consultants, ensure that they have the resources in terms of staffing and equipment as well as the expertise and experience to do the job competently. Guidance on the selection and effective use of an occupational health and safety consultant can be obtained from the Victorian WorkCover Authority publication Selecting an Occupational Health and Safety Consultant - A Guide for Workplaces. Professional associations, such as the Australian Institute of Occupational Hygienists, may also be able to provide guidance on persons qualified to perform workplace assessments.*

You will also find an extensive list of sources providing information on hazardous substances in Appendix 1 of the *National Code of Practice for the Preparation of Material Safety Data Sheets*.

The following organisations may be able to provide further information on hazardous substances:

- Victorian WorkCover Authority (WorkCover)
- NOHSC Office (formerly known as Worksafe Australia)
- trade unions and employer associations
- occupational health and safety consultants.

Review the information

It is not sufficient just to know that a substance has been classified as hazardous. To assess the risks to health effectively, you must find out how the hazardous substance and any substances generated through its use may be harmful to the worker's health. Therefore, when reviewing the information about a substance, you should consider the following factors:

(a) The **routes of exposure** to hazardous substances, for example:

- *inhalation* (ie., breathing in the substance);
- *ingestion* (ie., swallowing, either directly or indirectly as a result of the substance settling on food, or from eating or smoking with contaminated hands);
- *absorption* through the skin or via the eyes, either from direct contact or from contaminated surfaces or clothing; or
- *injection* into the body by high pressure equipment or contaminated sharp objects.

(b) The **form** (including concentration) in which the substance may be present, such as solid, liquid or gas. For example, some substances may be virtually harmless in some forms (such as a block of metal) but may be very hazardous in another form (such as a fine dust or fume that can be readily inhaled).

(c) The **chemical and physical properties** of the substance. For example, gases or liquids with low boiling points or high vapour pressures can give rise to high airborne concentrations in most circumstances, whereas high boiling point liquids such as oils are only likely to create a hazardous airborne concentration if they are heated or sprayed. Substances with a very low or high pH (ie. acids and caustics respectively) are corrosive to the skin and eyes. Substances with a very low odour threshold can be easily detected by smell.

(d) The **health effects** for each route of entry or contact identified, such as whether:

- adverse health effects, either immediate or delayed, could occur from a single exposure to the substance (ie. acute exposure);
- adverse health effects could result from repeated, even low level, exposure over a period of time (ie. chronic exposure);
- the substance could cause sensitisation or allergic reactions;
- the substance could cause cancer;
- the substance could be harmful to human reproduction;
- any harmful effects due to the substance may be increased if exposure to the substance takes place in the presence of other substance (ie. synergistic effects).

Think about how these factors may vary for different substances. For example, silica and sodium hydroxide (caustic soda) are both hazardous substances, yet each has very different properties that make them hazardous.

Silica is considered hazardous principally because of the long-term, irreversible lung effects (such as silicosis), that may arise from repeated exposure to excessive concentrations. Its hazardous properties are associated with inhalation, so the evaluation of risk should be based on the potential for breathing in the silica dust rather than other routes of exposure (for example, contact with the skin).

In contrast, even brief exposures to high concentrations of sodium hydroxide may lead to immediate effects which include irritation or burning of the skin, eyes and respiratory tract. Its hazardous properties relate to exposure via skin or eye contact and inhalation. Evaluation of risks to health for caustic soda must therefore consider the potential exposure through all of these routes.

STEP 4. Evaluate the nature of work

The next step is to assess the nature of work in which hazardous substances are used. The following method should be suitable for all workplaces using hazardous substances, regardless of whether the use of such substances is a minor or major activity:

(a) Divide up the workplace

If it is not practicable for the workplace to be assessed as a whole, divide it into smaller units (departments, buildings, locations or processes) to make risk assessment more manageable. Walking through the workplace and looking at floor plans or process plans will help you decide how to divide up the workplace.

(b) Group similar work

Group employees performing similar work, using similar substances. Risk assessments can then be performed on selected employees where it has been established that their exposures are representative of their group. In this way, you can avoid having to repeat exposure assessments for each and every employee.

If the work involves a large number of different hazardous substances, they may be grouped on the basis of their form, properties and the way they are used or handled. This kind of grouping may be appropriate for example, where:

- a range of solvent-based paints containing a number of different solvents and additives are used in the same or similar way (eg. sprayed, brushed or applied with a roller);
- solvent-based liquid pesticides are used in the same or similar way (eg. decanted, mixed or sprayed).

(c) Examine work practices and conditions

Once you have divided the workplace into manageable units, you can then examine accident or incident information, the work practices and conditions (including the controls currently used to reduce exposure and their effectiveness), and estimate the level of exposure.

It is important to observe and consult with employees to find out how the job is actually done by employees. People do not always work 'by the book', and may devise their own methods of work. Also, find out what happens during cleaning, maintenance, breakdowns and during staff absences or shortages.

When examining the work you should consider the following.

Have any incidents, illnesses or diseases occurred?

You need to take account of any information about incidents, illnesses or diseases that may be related to the use of the substance. Check your accident / incident records. Ask those doing the work if they have experienced symptoms listed on the MSDS. This information will help you to determine exposure.

Under what conditions and circumstances can exposure to hazardous substances occur?

Keep in mind that employees can come in contact with a hazardous substance and any waste, intermediate or product generated from the use of the substance if they:

- work with it directly;
- are in the vicinity of where it is used or likely to be generated;
- enter an enclosed space where it might be present;
- disturb deposits of the substance on surfaces (for example, during cleaning) and make them airborne; and / or
- come into contact with contaminated surfaces.

Pay particular attention to:

- the specific tasks or processes (eg. decanting, spraying, heating) performed, and how they affect the routes of exposure;
- the quantity of the substance used;
- the risk controls in place and their effectiveness; and
- whether each employee's work technique, work posture or size has a significant bearing on their level of exposure.

Who could be exposed under each of the above circumstances?

You should consider all groups of people including:

- production employees;
- ancillary or support / services employees. (Be aware that cleaners, maintenance[11] and laboratory staff are often exposed to both the hazardous substances they use in the course of their work, such as cleaning products, and the hazardous substances used in the workplace (eg. production));
- contractors;
- visitors;
- supervisors and managers; and
- office workers.

How often is exposure likely to occur?

The total dose (amount) of a hazardous substance an employee is likely to receive increases with an increase in the duration or frequency of exposure. Estimations of the duration and frequency of exposure can be based on observation, knowledge and experience of the work. Again, seek information from your employees and their health and safety representatives. Consider:

- which work activities involve routine and frequent exposure to hazardous substances (for example, daily exposure) and who are the people performing these activities?
- what happens when non-routine work, production of one-off items or isolated batches, trials, maintenance or repair operations are performed?
- what happens when there are changes to employees' work practices in events such as cleaning, breakdowns, changes in volume of production, adverse weather conditions?
- are there differences between employees within a group? Anyone whose work habits or personal hygiene (eg. washing before eating, drinking or smoking) are significantly different should be considered separately.

What is the estimated exposure to hazardous substances?

You have investigated the substance, the quantities used, the frequency and duration of exposure, the effectiveness of the controls already in place, and whether employees are working directly with the substance. All of this information should be used to estimate the level of exposure. Note also:

- An estimation of the amount of exposure to hazardous substances can sometimes be obtained by observation. For example, you might look for evidence of fine deposits on people and surfaces, or the presence of dusts, mists or fumes visible in the air (for example, in light beams) or the presence of odours. However, you may find simple measurements more helpful.
- An indication of the airborne concentrations of hazardous substances can often be obtained by simple tests, such as indicator tubes or dust lamps (see Figure 5). However, in some cases the amount of exposure may vary throughout the day, so such tests may not establish employees' exposure with confidence and it will be necessary to undertake detailed air monitoring. Section 21 of this Code provides information on atmospheric monitoring.
- Biological monitoring may be a helpful means of assessing employees' exposure to a hazardous substance through all possible routes of absorption. Section 22 of this Code provides further detail on the role of biological monitoring in health surveillance.

Figure 5: A tyndall lamp produces a strong beam of light, enabling dust particles to be seen

[11] *Controls normally in place may not apply in these situations.*

STEP 5. Evaluate the risk: Is there a risk?

The final step in the risk assessment process is to work out whether or not an injury or illness is likely to occur as a result of exposure to the hazardous substance, or to any substance generated through its use. There are three possible outcomes:

No likelihood of injury or illness

Sometimes, even without taking measurements, you may have grounds for concluding that exposure to a hazardous substance does not present a risk to health and safety. But your conclusion must be supported by clear and valid evidence.

Here are some examples of situations in which it may be reasonable to infer that there is no likelihood of injury, illness or disease:

- the hazardous substance is used in a totally enclosed system;
- the quantity of the substance used is too small to constitute a risk, given foreseeable circumstances of use; or
- previous measurements of the process have confirmed that exposure does not present a risk to health, and the nature of the process and environmental conditions are not likely to change.

Remember that while routine day-to-day use may not cause a risk to health and safety (for example, an enclosed system), the failure of the control measures could result in serious risks (for example, the system releasing its contents). Your evaluation of the risk must anticipate the possible breakdown of control measures for any process, task or situation in which a hazardous substance is used.

In this case, results of the assessment should be recorded. No further control action should be necessary, but you should implement a maintenance program for existing controls.

Likelihood of injury or illness

If there is a likelihood of injury or illness, immediate measures for preventing or reducing exposure to the hazardous substance must be implemented. You may also need to undertake atmospheric monitoring or health surveillance.

Here are some examples of situations where there may be a risk to health:

- use of petrol driven vehicles in poorly ventilated work areas;
- activities which involve prolonged skin contact with hazardous substances that are either readily absorbed through the skin or that can directly affect the skin;
- handling of caustic or acidic substances where there is a potential for splashes onto the skin or eyes;
- where less effective control measures, such as the use of PPE or administrative controls, are relied upon to control exposure to substances that present serious or irreversible health effects;
- dry sweeping of fine particulates;
- manually cleaning printing screens or large printing rollers with large quantities of volatile solvents;
- persistent or widespread complaints of illness, discomfort, irritation, dizziness or excessive odour;
- processes for which monitoring results approach or exceed exposure standards;
- evidence of significant quantities of fine deposits on employees and surfaces;
- processes that generate fine mists or solid particulates (including fumes) within the breathing zones of employees;
- application of volatile substances over large surface areas; and
- prolonged exposure to visible dusts, mists or fumes.

These are examples only. To determine whether there is a risk in any particular circumstance, you would need to assess all of the factors described in Steps 2 – 4.

You must record the result of the assessment, and establish a maintenance program for the control measures.

Likelihood of injury or illness uncertain

If you are unable to determine whether or not there is a likelihood of injury, illness or disease, you will need to seek further information about the hazards of the substance(s), and the level of exposure. It may be necessary to carry out atmospheric or biological monitoring with the assistance of a professional occupational hygienist. Until you are certain about the risks of a hazardous substance, all possible steps must be taken to prevent, or if this is not practicable, reduce exposure.

Record the result of your assessment, along with a statement of the work required to determine whether or not the use of the substance presents a risk to health and safety. The final result or outcome would also need to be recorded once the additional work has been completed.

Case Study: Handling of powders in a ceramics workplace

Job description

Very fine silica powder and other dry solid compounds are used in the production of ceramic products. The bags containing the substances are cut open and then fed into a hopper. Some weighing of the substances also takes place to ensure precise proportions of ingredients are used. The empty bags are rolled up and placed in a bin for disposal. At the end of each day the area is swept clean.

One employee is involved in this job. Three batches are mixed per day. It takes approximately one hour to load the three batches. Sweeping of the area takes about 15 minutes.

Information about the substance (silica)

- The MSDS provided and the label state that crystalline silica is classified as a hazardous substance. The other substances (powders) are not classified as hazardous.
- The MSDS indicates that silica causes silicosis (loss of elasticity of the lungs that leads to difficulty in breathing) after prolonged exposure through inhalation.
- The recommended atmospheric exposure standard for crystalline silica, as indicated on the MSDS, is 0.2 mg / m^3.

Controls currently in place

- Long sleeved cotton overalls.
- A half-face disposable dust mask suitable for these types of dusts is provided. It is supposed to be worn when weighing the substances, feeding the hopper and sweeping up at the end of the day. However this dust mask is not worn very often.
- Local exhaust ventilation is not used.

Routes of exposure (depend on substance and task)

The MSDS indicates that significant exposure can occur through inhalation of the fine dust generated when handling the powder.

Is there a risk?

After considering the information on the substance, the nature of the work and the lack of controls in place, the employer (in consultation with the health and safety representative) concluded that there was a risk to health, because:

- The MSDS suggests local exhaust ventilation may be required. This was not in place.
- Clouds of fine dust were visible in the operator's breathing zone during weighing and more so when charging the hopper and disposing of the empty bags.
- Overalls became contaminated when handling the powders, rolling up the empty bags and sweeping. This was leading to further exposure of the operator.
- Dust mask provided was rarely worn.
- The recommended exposure standard of 0.2 mg / m^3 is quite low.
- Use of the substance was prolonged and repeated.
- Fairly large quantities of crystalline silica were used.

Additional case studies contained in Appendix 7 provide practical examples of the risk assessment process outlined here. You may find it helpful to refer to these.

18.3 Generic risk assessment

Often, a particular hazardous substance is used in the same or similar way in a number of different workplaces, or in work areas within the same workplace. Because the nature of the hazard and the risk in these cases may be similar, you are permitted to make a single assessment of one representative work situation and apply it to the other work areas or workplaces. By performing generic assessments, you can minimise the duplication of assessments, thereby streamlining the risk assessment process. As with risk assessments generally, you must, if practicable, consult with health and safety representatives when carrying out generic risk assessments.

As an employer, you are responsible for ensuring that the generic assessment is valid for each of the workplaces or work areas to which it is intended to apply. A generic assessment is valid if both the hazardous substances used and the nature of the work involving these substances are essentially similar. For example, if you were the owner of the chain of spray-painting workshops undertaking a risk assessment of worker exposure to solvents, you would need to make sure that ventilation systems, mixing and related operations, spray booth system, personal protective equipment and the work practices and conditions associated with them were similar in all the workshops to which you intend to apply the generic assessment. Similarly, if a generic assessment is undertaken by a trade association as a model to be used by a number of different employers with essentially identical workplaces, (for example, service stations, dry cleaners), the individual employer is responsible for ensuring that the assessment is valid for his or her own workplace.

If the situations are not similar and employees in different workplaces or areas of the same workplace may be subjected to different risks, a generic risk assessment cannot be performed.

18.4 Recording the outcomes of risk assessments

Outcomes of risk assessments must always be documented. Risk assessment records should include:

- name (s) of the assessor(s);
- date of the assessment;
- the workplace / unit / process;
- the substances for which the MSDS or equivalent information has been reviewed;
- the controls in place to prevent a risk to health;
- the degree of exposure or nature of risk identified;
- why decisions about the risk were made; and
- the results of any monitoring that may have been performed. (See sections 20 and 21 of this Code for information about atmospheric monitoring).

A record of the risk assessment should help you to identify appropriate risk control measures. It should also be of assistance when undertaking any subsequent risk assessments that may be necessary because of changes to the substances used, systems of work or work environment.

The record of the result of the assessment must be accessible to any employee who could be exposed to a hazardous substance to which the record relates.

An extensive record of the assessment is not required if you have identified that the use of a hazardous substance does not result in a risk to health.

18.5 Reviewing and revising risk assessments

A risk assessment must be reviewed and, if necessary, revised if the work activity or processes changes significantly or if there is evidence to indicate the assessment no longer adequately assesses the risk associated with the use of a hazardous substance. The assessment needs to be revised if:

- a new hazardous substance is introduced into the workplace;
- the process or plant is modified;
- new information on the hazards of the substance becomes available;
- health surveillance, biological monitoring and / or air monitoring indicates inadequate exposure control;
- accidents or near misses have occurred which may be due to inadequate control; or
- new or improved control measures become available or practicable.

Where it is known that circumstances will change, you may be able to prepare a risk assessment that takes the projected or known changes into account. In this way, you can ensure that the assessment will continue to deal with the risk adequately after the changes take place.

In any case, a risk assessment must be reviewed at intervals not exceeding five years. If the assessment remains valid (that is, adequately assesses the risk), simply record the date of review. If the assessment is no longer valid, it must be revised or a new assessment undertaken, depending on how much of the information recorded is still applicable. You must record the results of any revised assessment.

19. Risk control

19.1 What is risk control?

"Risk controls" are actions taken to control risks to the health and safety of employees. Under the Regulations, your primary duty is to eliminate any risk to health arising from the use of a hazardous substance. Where elimination of risk is not *practical*, you must reduce the risk, as far as practicable.

Risk controls should be considered in planning any new workplace or modifications to an existing workplace and should not be treated as something that can be added at a later time. This planning stage should be carried out in consultation with your employees, as their practical experience may assist in developing the most appropriate method(s) of control.

19.2 What does "practicable" mean?

"Practicable" does not just mean the cost in dollar terms to you! Actions to eliminate or reduce risk are practicable if they take into account:

(a) **severity of the hazard or risk**

How likely is it that employees will suffer adverse health effects from using the hazardous substance? How serious are the health effects likely to be, and how many people are likely to be affected? While the Regulations require you to control all risks, you should be able to recognise severe risks and treat them urgently.

(b) **state of knowledge**

What is known about the hazard or risk and the ways of controlling them? As an employer, you have a duty to ensure that the risk controls you put in place reflect the current state of knowledge. The "state of knowledge" is an objective test of the knowledge that a reasonable person in your position is expected to possess; it is not a matter of subjective opinion. Make sure that your knowledge of hazards, risks and controls is up-to-date by:

- following the guidance in this Code;
- reviewing the MSDS and/or consulting with the manufacturer, importer or supplier;
- contacting similar workplaces to your own and finding out how they control risks;
- seeking specialist advice from OH&S professionals or engineers;
- consulting with industry organisations and unions;
- obtaining information and advice from WorkCover and the National Occupational Health and Safety Commission.

(c) **availability and suitability of ways to remove or mitigate the hazard or risk**

Find out whether the risk controls identified are available. Risk controls need to be suitable for the workplace, the task and the employees involved.

(d) **the cost of removing or mitigating the hazard or risk**

Are the costs of the risk control commensurate with the benefits gained (severity of risk controlled)? Time and money invested in selecting and implementing risk controls should result in the elimination or significant reduction in risks from using hazardous substances.

19.3 Can the use of the substance be eliminated?

Eliminating the risk by eliminating the use of the hazardous substance that creates the risk is the most effective way of protecting the health of your employees. Wherever practicable, eliminate the use of any hazardous substance that is not essential. Begin by answering questions like these:

1. *Why is this hazardous substance used? (What is its purpose or function in the work process?)*
2. *Why is it necessary to carry out this function?*
3. *How could this function be achieved by doing things differently?*

Here are some examples of elimination:

- using a physical process rather than a chemical process to clean an object, for example, use of ultra-sound instead of a solvent;
- using a physical fastening system instead of a solvent-based adhesive.

Eliminating the use of highly toxic or carcinogenic substances is the safest option. It may also be the cheapest method of control in the long term.

19.4 The hierarchy of control

The Regulations set out a hierarchy of control (or ranking of risk controls) that must be observed when controlling risks associated with the use of hazardous substances. You must first consider using one or a combination of the following control measures to eliminate or reduce the risk associated with its use:

- ***Substitution***; or
- ***Isolation***; or
- ***Engineering controls***.

When you can demonstrate that these control measures have been applied to the extent practicable, you must reduce any remaining risk by using:

- ***Administrative controls.***

Once you have reduced the risk so far as practicable by one or a combination of the above measures, you must control any remaining risk by using:

- ***Personal protective equipment (PPE).***

Exclusive or primary reliance on administrative controls or PPE to control the risk of using a hazardous substance is not recommended. These measures depend heavily on human behaviour and supervision to be effective. As much as possible, make the workplace safer, rather than placing the onus on your employees to work safely in a hazardous environment.

Note that you may often need to use a number of risk controls in combination to effectively eliminate or reduce the risk.

The control measures in the hierarchy are explained in more detail below. A case study at the end of this section demonstrates how the hierarchy of control and the practicability test are applied to eliminate or reduce the risk posed by the use of a hazardous substance at a workplace.

Substitution

You may be able to use a less hazardous substance, or a substance in a less hazardous form. A substitute substance should not introduce a new or a higher degree of risk to health. Examples of substitution include:

- using a detergent in place of a chlorinated solvent for cleaning;
- using a water-based paint in place of a solvent-based paint;
- painting with a brush rather than spray-painting, which creates a mist;
- minimising vapour generation by using solvents with higher boiling points (and lower vapour pressure);
- purchasing hazardous substances in a less hazardous form – for example, pellet, paste or slurry form instead of a powder, or using a more dilute form of the substance.

Isolation

Isolation involves separating people from the substance by distance or barriers to prevent or reduce exposure. Examples of isolation include:

- closed systems such as those used during the processing and transfer of flammable liquids in petroleum refineries, or the use of glove boxes or glove bags;
- placing a process, or a part of it, within an enclosure which may also be fitted with exhaust extraction to remove contaminants;
- isolating operations in one room with access restricted to properly protected personnel;
- placing operators in a positive pressure cabin that prevents airborne contaminants entering; and
- distancing workers from hazardous substances and any substances generated by their use.

Where isolation is used as the major control measure it may be necessary to conduct air monitoring to detect any leaks either from the enclosures used to contain the hazard or into the enclosures used to protect employees.

Engineering controls

Engineering controls are physical controls (such as plant) that eliminate or reduce the generation of substances, suppress or contain substances, or limit the area of contamination in the event of spills and leaks. Engineering controls often entail partial enclosure, exhaust ventilation or automation of processes. Examples of engineering controls include:

- using robots to minimise operator exposure, for example, spraying in coating operations;
- partially enclosed and ventilated spray booths or fume cupboards;
- fully enclosed ventilation booth (see Figure 6);
- local exhaust ventilation to trap airborne contaminants close to their point of release, for example, open surface tanks (see Figures 7 and 8).

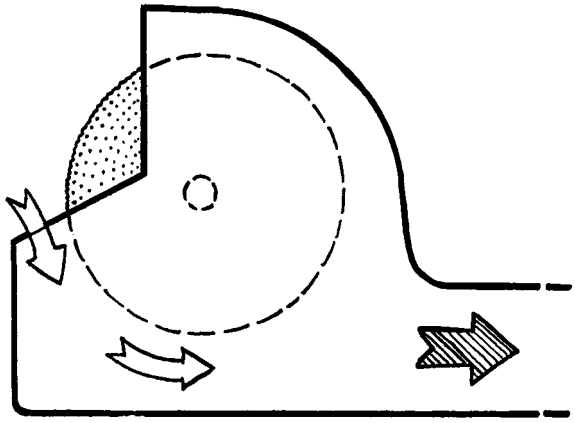


Figure 7: Enclosure around a grinding wheel

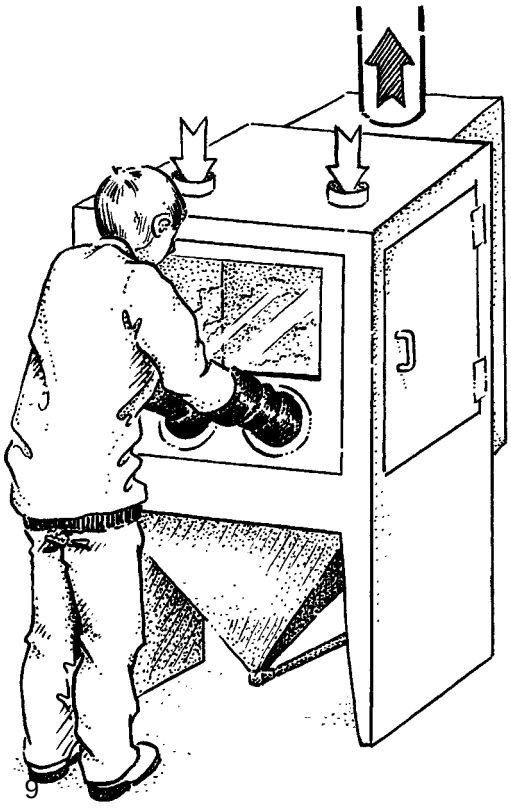


Figure 6: Abrasive blasting cabinet

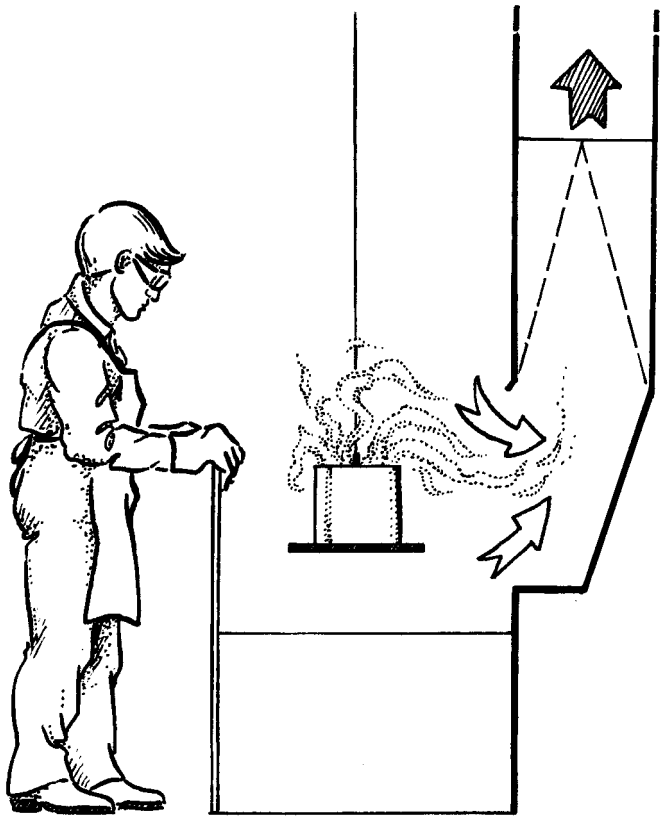


Figure 8: Side hood ventilation for an open surface tank

Local exhaust ventilation removes airborne contaminants from the working environment before they reach the breathing zone of the operator. The exhaust extraction shown in Figure 9 is a well designed system, while that shown in Figure 10 is poorly designed as it draws the contaminants across the operator's face.

The design of a local exhaust ventilation system should be undertaken by specialists such as engineers or occupational hygienists to ensure that the system operates effectively and efficiently.

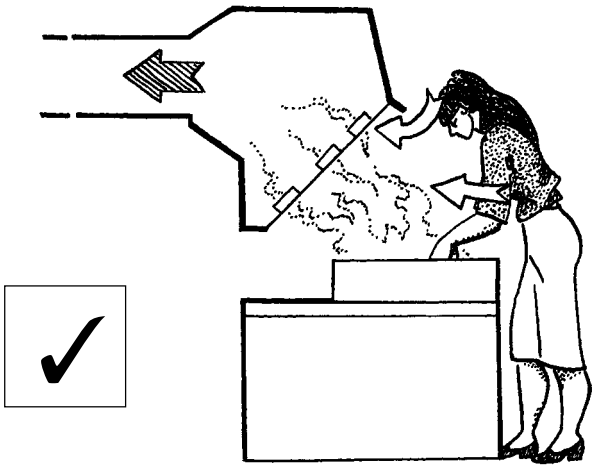


Figure 9: Good design carries contaminants away from the operator's breathing zone.

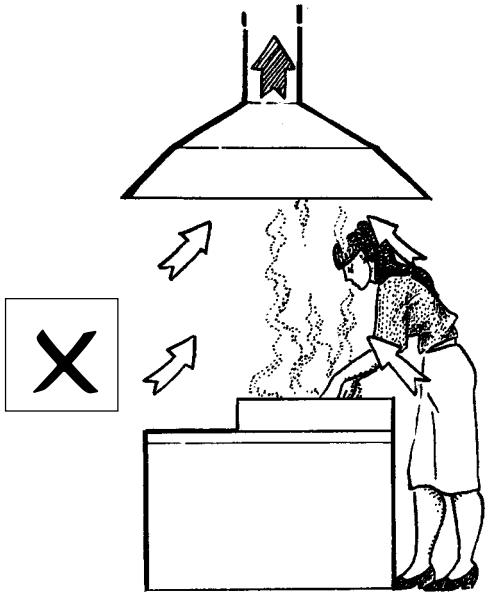


Figure 10: Poor design carries contaminants through the breathing zone

General or dilution ventilation has limitations and should only be considered for contaminants of low toxicity or nuisance odours. In addition, the quantity of contaminants generated should be relatively small otherwise the air volumes required for dilution become impractical.

Administrative controls

Administrative controls are systems of work or safe work practices which help to reduce employee exposure to hazardous substances and those substances generated by their use. Examples of administrative controls include:

- reducing the number of employees exposed to the substance (for example by performing the task out of normal work hours or by restricting employee access to certain areas);
- reducing the duration and / or frequency of employees' exposure through specific work procedures;
- reducing the period of time in which a substance could escape into the work area (for example, by minimising the time that mixers, reactors or ovens are open to the environment both during and after use);
- good housekeeping, including regular cleaning of work areas (see Figures 11 and 12);
- changing packaging material to reduce exposure during handling (for example purchasing liquids in ready to use packages instead of decanting from large containers);
- providing appropriate means for the safe interim storage of wastes containing hazardous substances;
- using vacuuming or wet sweeping methods to suppress dust that may be generated during dry sweeping;
- keeping containers of hazardous substances or rags soaked with these substances tightly lidded when not in use;
- cleaning up spills immediately;
- prompt cleaning of residues from empty containers that have held hazardous substances;
- prohibiting eating, drinking and smoking in potentially contaminated areas;
- providing suitable washing facilities.

Because the effective use of administrative controls relies on the full cooperation of employees, consultation is important during their development. Adequate supervision and training is paramount if work practices are to play an effective part in reducing employee exposure to hazardous substances and those substances generated by their use.

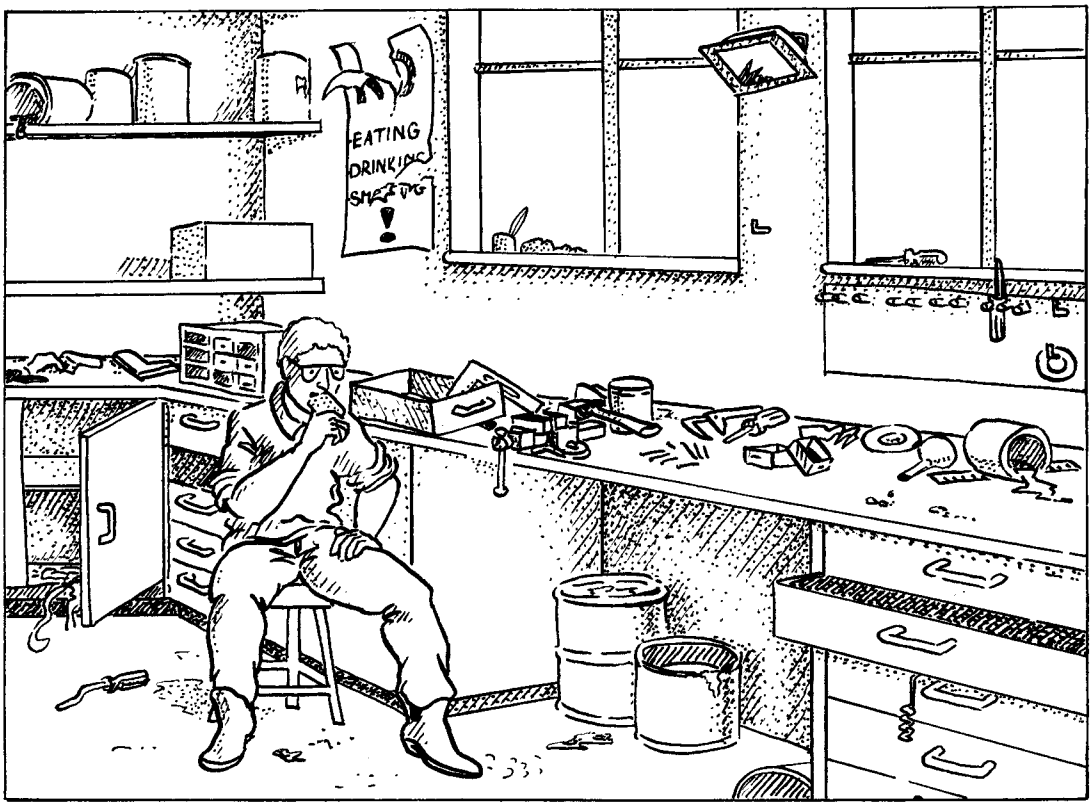


Figure 11: Poor housekeeping practices increase risk

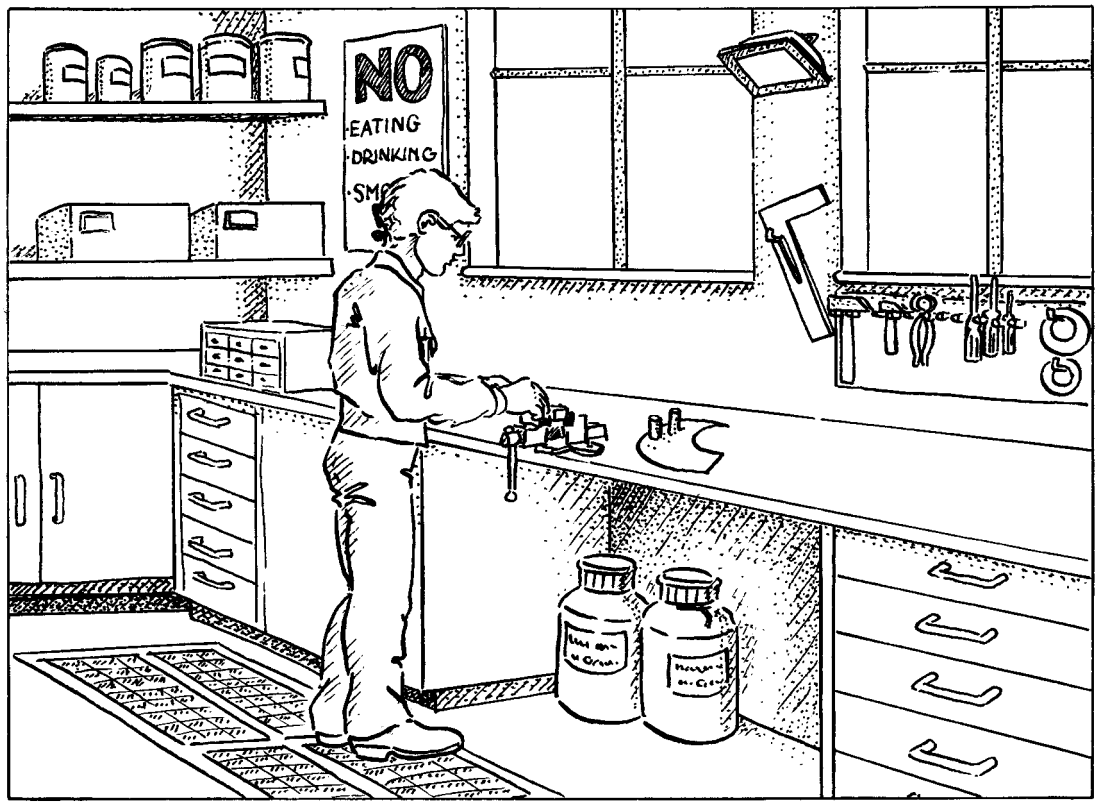


Figure 12: A safer work area

Personal protective equipment

Personal protective equipment (PPE) includes overalls, aprons, footwear, gloves, chemical resistant glasses, face shields and respirators.

It is not a good idea to depend on PPE to control risk, because it relies heavily on employees following instructions and procedures correctly. If PPE must be used for long periods, if dexterity and clear vision are needed for the task, or if employees have not been adequately trained on how to fit and use PPE properly, they may avoid using it. As a result, you may need to provide a greater level of supervision than is required by other risk controls to ensure that your employees use PPE correctly. In addition, PPE must accomodate a wide range of body types and be maintained regularly to ensure that it remains in good working condiiton.

For these reasons, you must control any risk arising from the use of hazardous substances, as far as practicable, by means other than PPE alone. PPE should be regarded as a temporary measure or a last resort to be used only where other risk controls do not adequately control exposure, or are not practicable. If PPE is being used for extended periods in your workplace, you may not be giving adequate consideration to alternative risk controls.

You should ensure that where PPE is used, employees have been trained to fit and use it properly. In addition, make sure that the equipment is:

- properly selected for the individual and task;
- readily available;
- clean and functional;
- correctly used when needed; and
- maintained by appropriately trained staff in keeping with relevant standards.

When may personal protective equipment be required?

PPE may be necessary:

- where it is not technically feasible to achieve adequate control by other means;
- where a new or revised assessment indicates PPE is necessary to reduce employee exposure to an acceptable level until such time as adequate control is achieved by other means;
- in emergencies where urgent action is required, and the only practicable control in the time available is the use of PPE - for example, a plant failure or chemical spill; or
- during some infrequent maintenance operations where the short duration of the task may make other control measures impracticable.

Selection of personal protective equipment

When choosing the most appropriate PPE, keep in mind:

(i) *The contaminant*

Consider the form of the substance (solid, liquid or gas), the physical and chemical properties of the substance and the possible routes of exposure.

When selecting respiratory protection, compare the highest likely airborne concentration (if known) with the occupational exposure standard to determine the level of protection required. This selection should also be based on whether there may be a lack of oxygen. A higher level of protection will be required when the exposure concentration is unknown or is extremely variable, such as in emergency situations. In these cases, the toxicity of the substance and its warning properties should also be considered. If a lack of oxygen may be encountered, only supplied air-type respiratory equipment is appropriate.

Protective gloves are made in a range of materials such as PVC, natural rubber, nitrile rubber and neoprene. There is no one type of glove that provides protection against all hazardous substances. The degree of protection offered by the various types of gloves (that is, their susceptibility to permeation and degradation by a substance) is largely dependent on the physical and chemical properties of the substance and duration of exposure.

(ii) *The task*

When selecting PPE, think about:

- the length of time that the operator will be exposed to the hazardous substance (that is, the wear time);
- the work rate required of the wearer;
- the required level of mobility or dexterity; and
- the need for clear vision and communication.

(iii) *The operator*

Important factors include the operator's size and build, the extra load the PPE will impose, the operator's medical condition and their level of training in the proper fitting and use of the equipment.

Proper consideration of all of the factors above should ensure that the equipment is properly used, performs to specifications and is reasonably comfortable for the wearer.

Appendix 5 includes a number of published technical standards that provide guidance on the selection, use and maintenance of PPE.

Case Study: Handling of powders in a ceramics workplace

A risk assessment for a task involving handling of silica powder and other dry solid compounds in a ceramics process is presented in Section 18.2. The assessment indicated a risk to health through inhalation for the employee performing the task.

A number of risk controls were considered:

- Elimination of the use of silica;
- Substitution of a less hazardous substance;
- Installation of a local exhaust ventilation system (engineering control);
- Use of respirator (PPE).

Then, risk controls were selected by applying the practicability test:

Severity of the hazard or risk

Silicosis is a very serous disease of the lungs that can develop over a period of approximately 10 years. For this reason, the use of fine silica powder requires a high level of control.

State of knowledge about the hazard or risk and ways of controlling the risk

The potential for silica to cause silicosis has been well established and effective means of controlling the risk are also known. The MSDS contains this information and the manufacturer recommends the use of local exhaust ventilation.

Availability and suitability of ways of reducing the hazard / risk

Suitable ways of controlling the risk are readily available.

Elimination of the use of silica or substitution of a less hazardous substance is not practicable because of the desired finish and performance of the final product.

Given the nature of the work, the most practicable method of controlling the risk is to install a local exhaust ventilation (LEV) system, enclosing the hopper on three sides. The scales can be placed inside this enclosure (booth) and the empty bags disposed of in a plastic bag fitted to a flanged hole cut out at the base of the booth. In this way, all the dusty operations can be carried out within the booth.

Installation of the ventilation system will control the inhalation risk and prevent the spread of contamination to the operator and the surrounding area. It will also eliminate the risk from exposure to silica when sweeping up. Once the system is installed, respiratory protection will not be needed.

Until then, the use of the respirator is to be strictly enforced. Information, instruction and training is to be provided to make sure the operator understands the hazards and risks – and therefore the reasons for wearing the dust mask.

Dry sweeping of the work area will be prohibited, and a vacuum cleaner fitted with a high efficiency filter used instead.

Cost of reducing the hazard or risk

Given the serious nature of silicosis, the cost of installing LEV is considered to be reasonable.

Installation of the LEV will also improve efficiency of the process and reduce the amounts spent on PPE and training programs.

19.5 Maintaining controls

As an employer, you have a duty to ensure that control measures are properly used and maintained. Control measures should be regularly reviewed. Where necessary, they should be improved, extended or replaced to ensure adequate control of employee exposure to hazardous substances.

The purpose of maintaining control measures is to ensure that they perform as originally intended and continue to prevent or adequately control exposure of employees to hazardous substances. Maintenance of control measures should include:

- frequent inspections;
- visual checks to ensure that they are being properly applied by employees;
- testing of equipment;
- preventive maintenance of engineering controls and PPE; and
- remedial work.

Periodic air monitoring may be used to ensure that engineering and administrative controls are being properly maintained.

Take prompt remedial action as soon as deficiencies in controls are observed. You should have a maintenance procedure in place to ensure that any defects in the control measures are detected as early as possible. Suitable records should be kept of all testing, maintenance and repairs.

20. Ensuring exposure standards are not exceeded

Employers must ensure that their employees are not exposed to an atmospheric concentration of a hazardous substance above the exposure standard (if any) for the hazardous substance used, or any of its ingredients where the substance is a mixture. Therefore, you should refer to the MSDS to determine if there is an exposure standard for the hazardous substance or any of its ingredients.

You could also refer to the *Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment (National Exposure Standards)* published by NOHSC. This publication contains a list of substances for which there are exposure standards.

20.1 What is an exposure standard?

Exposure standards represent airborne concentrations of substances in a person's breathing zone, which according to current knowledge, should neither impair employees' health nor cause them undue discomfort. The exposure standard for a hazardous substance recorded on the MSDS is that set for the substance in the *National Exposure Standards*.

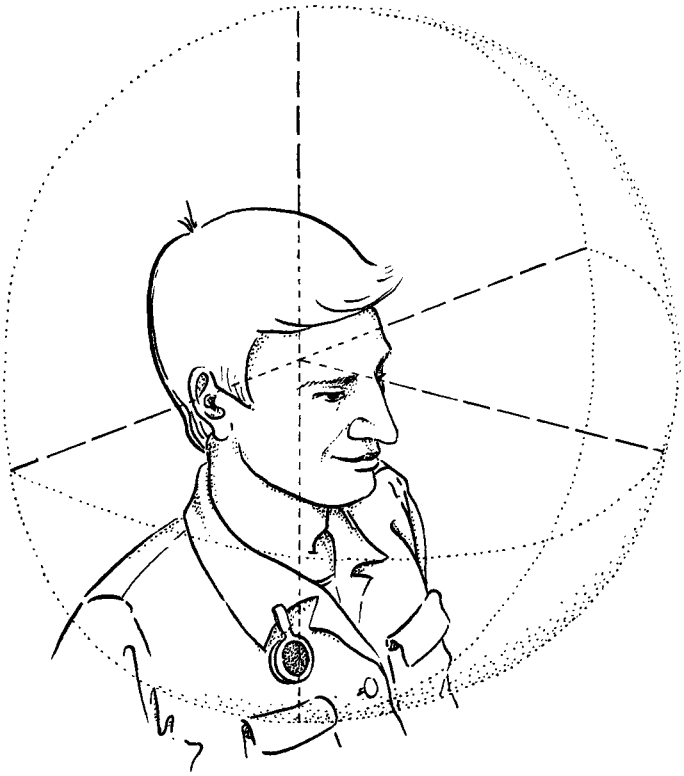


Figure 13: The breathing zone – a hemisphere of 300 mm radius extending in front of a person's face measured from the mid-point of an imaginary straight line joining the ears

There are essentially three different types of exposure standards[12]:

- *Time-weighted Average (TWA)*

  This standard represents an atmospheric concentration averaged over an eight-hour working day and applies to a 40-hour working week.

- *Short term Exposure Limit (STEL)*

  A short term exposure limit is an atmospheric concentration averaged over a 15-minute period. This standard is applied in cases where adverse health effects can be caused by relatively high short-term exposure.

- *Peak Limitation*

This standard represents a peak or maximum concentration that should not be exceeded at any time during a working day. This type of standard is applied to rapidly acting substances and irritants.

Exposure standards do not represent 'no effect' levels at which every worker can be guaranteed adequate protection, nor do they constitute a 'fine line' between satisfactory and unsatisfactory working conditions. Given the range of individual susceptibility, it is inevitable that a very small proportion of workers who are exposed to concentrations at or below the exposure standard may suffer mild and transitory discomfort. An even smaller number may exhibit symptoms of illness. Exposure standards are also amended (reduced) from time to time.

The Regulations state that an employee's exposure must not exceed the exposure standard. At the same time, the risk associated with use of a hazardous substance must be eliminated or, if this is not practicable, reduced so far as is practicable. This means that, if it is practicable, you must reduce exposure further, even if employee exposure is below the exposure standard.

20.2 What if there is no exposure standard for the substance?

Even if a hazardous substance does not have a specific national exposure standard, it may still present a risk to health when used in the workplace. If there is no NOHSC exposure standard, exposure must be controlled to the lowest practicable level. In these circumstances, overseas exposure standards may be used as a guide, if available.

21. ATMOSPHERIC MONITORING

21.1 What is atmospheric monitoring?

Atmospheric monitoring involves the use of suitable and valid sampling and analytical techniques to obtain an estimate of the level of airborne contaminants (gases, vapours, dusts, fumes and mists) inhaled by employees. The results of the monitoring are then compared with the *National Exposure Standards* to determine if an employee's exposure to substances is excessive.

Results of atmospheric monitoring can only be directly compared to the exposure standards if personal monitoring was performed in the breathing zone of the employee for an appropriate period of time, and the sample is considered representative of exposure. Therefore, you should monitor by taking personal samples in the breathing zone of an employee.

The results of static or fixed position monitoring should not be used as an indicator of actual employee exposure to a substance. However, in certain circumstances static or fixed position monitoring help you to design or assess the effectiveness of risk controls.

Be aware that atmospheric monitoring only tests for exposure through inhalation, and may not always represent a worker's total exposure to a substance, particularly where skin absorption or ingestion are significant routes of exposure.

21.2 When is monitoring required?

The Regulations require you to perform atmospheric monitoring when there is an exposure standard for the hazardous substance and -

- there is uncertainty as to whether the exposure standard may be exceeded or;
- monitoring is required to determine if there is a risk to health through inhalation under the particular conditions of work.

In other words, atmospheric monitoring is needed if you are not sure whether the exposure standard may be exceeded, or if you cannot determine the risk to health with confidence by simply reviewing the information about the substance and examining the nature of the work.

Here are some examples of situations in which atmospheric monitoring may be needed because of uncertainty about the level of exposure or whether there is a risk:

- it is not clear whether new or existing risk controls are effective;
- the risk to health is largely controlled through the use of respiratory protection, respiratory equipment has not been correctly selected, used, fitted, maintained or stored, and employees have not been adequately trained in its use;

[12] *Where a skin 'Sk' notation appears as part of the exposure standard, it indicates that the substance can also be readily absorbed through intact skin. If the substance is used in such a way that skin absorption is a major route of exposure, then absorption through the skin is likely to contribute significantly to an employee's total exposure. Substances with a skin notation are not necessarily harmful to the skin.*

- the risk to health is largely managed through administrative controls (ie. safe work practices or systems of work), and employees do not always follow these practices – perhaps due to lack of training or supervision;
- symptoms have been reported which may be related to the use of the substance;
- there is evidence (such as fine deposits or strong odours of the substance in the work area) that the risk controls (such as engineering controls) have deteriorated as a result of poor maintenance;
- process modifications or changes in work practices have occurred that may adversely affect employee exposure.

Where it is not practicable to eliminate the risk associated with the use of a hazardous substance, the Regulations require you to reduce the risk as far as is practicable. If it is obvious that there is a risk to health, priority should be given to controlling the risk, rather than carrying out atmospheric monitoring just to confirm the presence of that risk. However, once controls have been put in place, you may need to check their effectiveness by performing atmospheric monitoring.

Periodic or continuous monitoring may also be needed if failure or deterioration of risk controls may result in serious adverse health effects. Atmospheric monitoring may also help you to work out the type and level of risk control needed.

Atmospheric monitoring is not required for a hazardous substance if health surveillance, which includes biological monitoring, is also required by the regulations for that substance. This is because biological monitoring (see section 22) takes into account all routes of exposure while atmospheric monitoring only considers exposure through inhalation. Therefore, health surveillance through biological monitoring is considered the more appropriate method of assessing employees exposure.

For further information about atmospheric monitoring, refer to relevant documented standards, technical journals or publications issued by WorkCover and NOHSC. You may wish to consult with professionals, such as occupational hygienists, engineers and chemists, or the manufacturers / suppliers of hazardous substances. Other employers in the industry could also be approached for advice.

21.3 Who should undertake atmospheric monitoring and interpret the results?

Atmospheric monitoring and the interpretation of the results (including comparison with the relevant exposure standards) should be undertaken by a competent person, such as an occupational hygienist or safety professional, who has the appropriate qualifications, knowledge, skills and experience.

Remember that atmospheric contaminants in a workplace are rarely evenly distributed and are likely to vary from day to day. Figure 14 shows how the concentration of an atmospheric contaminant can vary over an eight-hour working day.

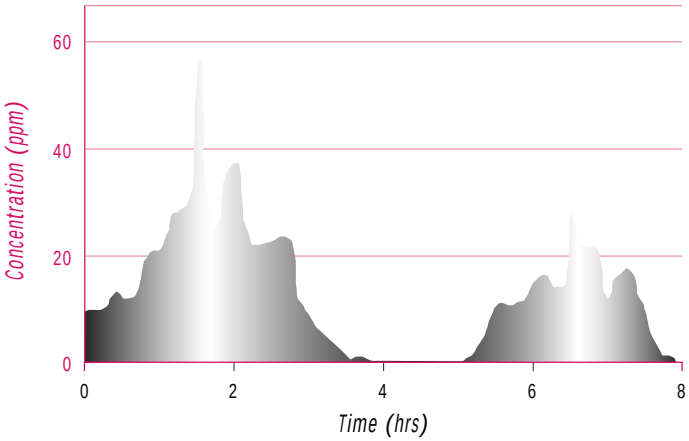


Figure 14: Variation in concentration of an atmospheric contaminant over time

Factors which impact on the level of exposure include the layout of the workplace and the location of the particular workstation, the way individual workers operate, ambient conditions such as temperature and general ventilation, and variations in rates of production. To obtain the most useful information in the most efficient way, the following questions should be considered:

- How and where to sample?
- For how long should air samples be collected?
- Whom to sample? How often? Under what conditions? (Should you test for the worse case?)
- Who should do the monitoring and interpret the results?

Interpretation of the results of monitoring requires a good understanding of exposure standards, and why the relevant exposure standard has been set. The interpretation process may also have to take into account working shifts longer than eight hours, the potential for skin absorption and exposure to other substances[13].

[13] *In relation to working shifts longer than eight hours, NOHSC has recommended the Brief and Scala model. This is considered to be the most conservative model which involves a simple calculation and does not require a detailed knowledge about the substance. This adjustment only applies to an eight hour time weighted average (TWA). No adjustment is required for Peak Limitation or Short Term Exposure Limit (STEL) standards.*
NOHSC has not excluded the use of Pharmacokinetic Models (eg Hickey and Reist) but these are less conservative and should only be used by people with appropriate expertise, such as toxicologists and occupational hygienists.

The interpretation and intended use of exposure standards is described in NOHSC's *Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment.*

21.4 Action required after atmospheric monitoring

If monitoring results indicate that control measures have deteriorated or are not effective, you must take prompt action to reduce employee exposure to hazardous substances and any substances generated by their use. Control measures should be restored or improved as soon as possible. This may involve providing portable or temporary ventilation, adopting modified work practices, providing personal protective equipment or ceasing work while normal control measures are restored to the required level of effectiveness.

If the results of atmospheric monitoring show that the level of exposure is below the recommended exposure standard, you still need to consider whether it is practicable to reduce exposure further.

The Regulations require you to provide the results of atmospheric monitoring to all employees on whom personal monitoring was conducted and to any employee who has been, or has the potential to be, exposed to the substance(s). It is important that all monitoring results are communicated to the employees involved, regardless of whether the results indicate excessive or minimal employee exposure to the substance(s).

21.5 Keeping records of atmospheric monitoring

As an employer, you are required to keep the results of all monitoring for 30 years unless WorkCover specifies a lesser period. If a lesser period is determined to be appropriate for a particular hazardous substance, this information will be posted in the Victorian Government Gazette.

The records of monitoring may be kept in any form, as long as the information contained in them is readily retrievable, easy for employees to access, and presented in plain English. Records should be kept in such a way that the results can be compared with any health records required under the health surveillance requirements of the Regulations.

You should ensure that the record of results of monitoring contains sufficient detail to determine:

- the substances concerned;
- when the monitoring was done and by whom;
- what type of monitoring was done, (ie. personal or static sample, full-shift, short-term or grab sample), and the duration of monitoring;
- sampling techniques / equipment and analytical methods used;
- where samples were taken, the operations in progress at the time and, in the case of personal samples, the names of those individuals concerned, details of the tasks performed and the duration of these tasks;
- what the results were and whether the results reflected normal operating conditions; and
- conclusions about the effectiveness of any control measures and where necessary, any action that may have been taken as a consequence of the monitoring results.

Case Study 1 in Appendix 7 provides an example of the application of atmospheric monitoring in the workplace.

22. Health surveillance

22.1 What is health surveillance?

Health surveillance is the process of monitoring the health of employees exposed to certain hazardous substances for which there are known and acceptable health surveillance procedures. The main purpose of health surveillance is to detect adverse changes to health due to occupational exposure to substances or excessive absorption of substances. Health surveillance can help you to evaluate the risk to health from hazardous substances. It can also help you to evaluate the effectiveness of risk controls. However, it should never be used as an alternative to the implementation and proper maintenance of risk controls.

Types of health surveillance

The types of health surveillance procedures used may include the following:

- biological monitoring – for example, determination of the presence of substances or their metabolites in blood, urine or expired air;
- medical tests, such as lung function tests;
- medical examinations;
- a review of present and past medical and work histories; and
- a review of medical records and occupational exposure.

These procedures are not mutually exclusive and the results from one procedure may indicate the need for additional or different procedures.

Tests must be valid; they must be sensitive and specific enough to detect adverse effects, and to enable these effects to be linked to the degree of exposure. Health surveillance procedures should be safe, easy to perform, acceptable to employees and where possible, non-invasive. There should be criteria for interpreting the data obtained.

Guidance on methods of health surveillance is provided in the NOHSC publication *Guidelines for Health Surveillance*. This publication provides a set of guidelines for particular substances. The Australasian Faculty of Occupational Medicine's brochure entitled *Health Assessment for Work - A Guide*, may also be of assistance in determining appropriate health surveillance.

Biological monitoring

Biological monitoring involves measurement of the levels of a substance or its metabolite(s) in body fluids, such as urine or blood, or in exhaled breath. Biological monitoring considers all the different routes of exposure. Therefore, for a limited number of substances, biological monitoring can also be particularly useful in detecting the degree of skin absorption and identifying unknown or unexpected exposures that cannot be predicted from atmospheric monitoring alone. However, biological monitoring does have limitations, particularly in regard to the collection and preservation of samples and the interpretation of results. There is limited knowledge of suitable and definitive biological tests for most substances.

22.2 When is health surveillance required?

The Regulations require you to provide health surveillance (at your own expense) for your employees when:

- they are exposed to a "scheduled" hazardous substance; and
- there is a reasonable likelihood of an adverse health effect occuring under the particular conditions of use.

A "scheduled" hazardous substance is a substance listed in Schedule 3 to the *National Model Regulations for the Control of Workplace Hazardous Substances* (except asbestos) or a substance determined by WorkCover to require health surveillance. At the time of publication, no substance had been gazetted by WorkCover. However, there were 15 substances on Schedule 3:

- acrylonitrile;
- inorganic arsenic;
- benzene;
- cadmium;
- inorganic chromium;
- creosote
- isocyanates;
- inorganic mercury;
- 4,4' – methylene bis 2–chloroaniline (MOCA);
- organophosphate pesticides;
- pentachlorophenol (PCP);
- polycyclic aromatic hydrocarbons (PAH);
- crystalline silica;
- thallium; and
- vinyl chloride.

However, you should note that the Schedule is amended from time to time.

Here are some examples of situations where health surveillance may be needed:

- the risk to health is largely or primarily controlled through, what are considered to be less effective controls, such as the use of personal protective equipment or administrative controls (ie. safe work practices or systems of work);
- symptoms have been reported which are likely to be related to the use of the substance;
- incidents or near misses (such as those involving spillages or leakages) have occurred when using the hazardous substance;
- there is evidence that control measures have deteriorated significantly as a result of poor maintenance.

Where a risk assessment clearly indicates that there is a risk to health, your primary duty is to eliminate the risk or, where elimination is not practicable, to control the risk (ie. reduce the risk to as low a level as practicable). Therefore provided effective controls are promptly put in place, health surveillance may not be required.

In addition to the requirements under the Regulations, health surveillance may be used to check the results of a risk assessment or test the effectiveness of risk control measures. Periodic health surveillance may also be appropriate in cases where failure or deterioration of the control measures may result in serious adverse health effects.

22.3 What must I do when carrying out health surveillance?

You must ensure that a registered medical practitioner supervises the health surveillance, either by directly carrying out the health surveillance program or by supervising a program carried out by a suitably qualified person such as an occupational health nurse. Normally, the medical practitioner should be appropriately trained in occupational medicine. The medical practitioner should also have an understanding of the employees' work activities. When undertaking health surveillance of employees you should:

- provide the medical practitioner with access to a list of the scheduled substances for which employees are required to have health surveillance and a copy of the MSDS for those hazardous substances;
- permit the medical practitioner to have access to any relevant assessment reports;
- explain to employees why health surveillance is being performed and what is involved. Make sure that they are aware that surveillance reports are confidential;
- make acceptable arrangements for employees to participate in the health surveillance program.

You must ensure that a report of the health surveillance is prepared by the medical practitioner and that you are given a copy of the report. The report must identify any indications of adverse health effects that may have been caused by the use of the hazardous substance. It must also include an interpretation of the results.

If the report recommends that an employee should not be exposed to a substance for a specified period of time or should only work under conditions specified by the medical practitioner, you should follow these recommendations. For example, you may need to assign the employee to alternative work or another location where exposure to the substance will not occur. This should be done after consultation with the employee, the relevant health and safety representative and the medical practitioner.

If the report includes any recommendations relating to measures to ensure employees are not exposed to the substance for a specified time, you must submit a copy of the health surveillance report to WorkCover.

You must make sure that employees are given a copy of their health surveillance report as soon as reasonably possible after you receive it. Health surveillance reports may only be released to a third party (other than WorkCover), if the employee to whom the report relates gives written permission to do so.

If the medical practitioner reports a health surveillance result that may be related to exposure to a hazardous substance in the workplace, you must review and, where necessary, revise risk controls for that substance. The revision of risk controls must either eliminate the risk or if this is not practicable, reduce the risk as far as practicable. Further guidance on risk controls can be found in section 19 of this Code.

Health surveillance reports must be kept for 30 years, unless a lesser period has been specified by WorkCover and posted in the Victorian Government Gazette.

23. Information, instruction and training of employees

23.1 Why is information, instruction and training necessary?

The purpose of information, instruction and training is to provide employees with the skills and knowledge they need to perform their work in a manner that is safe and without risks to health. It should enable them to follow health and safety procedures and use risk controls set in place for their protection. It should also give them an appreciation of the nature of the hazardous substances used in the workplace and the risks associated with their use, and the reason why risk controls are used. The mix of information, instruction and training provided will depend on the severity of the hazards and risks, and how much the employee already knows about the hazardous substance and its use.

23.2 Who should be trained?

The Regulations require you to provide information, instruction and training to any employee who uses a hazardous substance in the course of his or her work, or to any employee who is likely to be exposed to a hazardous substance in the workplace. Employees supervising other employees who use hazardous substances should also receive training.

When developing and providing training programs, you should consider any special needs the employees being trained may have. Special needs may include specific skills, work experience, gender, physical disability (including injury), intellectual disability, ethnicity and first language, literacy and age. These special needs should be taken into account in the structure, content and delivery of the training. Consider using oral or visual training methods, or conducting training where appropriate, in languages other than English. Refer to the *Code of Practice for Provision of Occupational Health and Safety Information in Languages other than English* for guidance on training in multilingual workplaces.

23.3 Outcomes of information, instruction and training

The type of information, instruction and training will depend on the target group and work environment. In any case, employees should be able to demonstrate an understanding of:

- the labelling of containers of hazardous substances, the information included on each part of the label, and why the information is provided;
- how to locate and use an MSDS, and the information contained in each part of the MSDS;
- information about hazardous substances to which employees are, or may be exposed, (including hazards, the routes of entry of the substances into the body, and potential risks to health from excessive exposure);
- the work practices and procedures to be followed in the use of hazardous substances, including the handling, processing, storage methods, cleaning up and disposal of hazardous substances;
- the measures used to control exposure to hazardous substances, including any information that the employee requires for the correct use and maintenance of risk controls;
- the proper use and fitting of personal protective equipment where it is used;
- emergency procedures, including any evacuation procedures or special decontamination procedures;
- first aid and incident reporting procedures to be followed in case of injury or illness;
- the reasons for air monitoring (if required), the type of monitoring used, and how to find out about the results of monitoring;
- the reasons for health surveillance (if required), and type of surveillance used.

23.4 Reviewing and evaluating information, training and instruction

Changes often occur in the workplace, affecting the health of employees. To ensure that information, training and instruction remain effective, review them regularly to identify further training needs. Further training should be provided when:

- there is a change in the nature of hazards and associated risk – for example, the use of new hazardous substances in the workplace;
- there are changes in the work practices or control measures for the hazardous substance; and / or
- new information on the health hazards of a substance is made available (for example, a revised MSDS), that warrants re-training.

You should evaluate information, instruction and training to ensure that the content is clearly understood by employees. Evaluation could take the form of on-the-job observation. Refresher training should be provided as required and induction training for all new employees should take place.

23.5 Limitations of training

Although training plays an important part in ensuring effective risk control, it is not part of the hierarchy of risk control. (If you have trouble recalling the hierarchy, refer to section 19.4 of this Code to refresh your memory). Employees who are likely to be exposed to a risk from using a hazardous substance should be aware of the nature of the risk and the role that specific control measures play in risk prevention. However, you should not rely on safe worker behaviour alone. High levels of training and instruction cannot substitute for effective and proper measures to control the risk.

APPENDIX 1: WHAT IS A CODE OF PRACTICE?

The *Occupational Health and Safety Act 1985* (the Act) empowers the Minister to approve codes of practice.

What are they?

An approved code of practice gives practical guidance on how to comply with a general duty under the Act or a specific duty under the Regulations. Compliance with the provisions in an approved code of practice, where relevant, may constitute compliance with the provisions of the Act or Regulations to which the code is giving practical guidance.

Generally, an approved code of practice contains various courses of action which are designed to achieve health and safety standards required by the Act and Regulations. Codes usually contain a number of options for meeting standards.

Who do they apply to?

Codes of practice may be written to provide practical guidance for any person placed under obligation by the Act or its Regulations, for example, employers, manufacturers and employees.

Each approved code of practice will state the persons for whom the guidance is intended.

What is their legal status?

The provisions in a code are not mandatory. That is, a person may choose to comply with the relevant provision of the Regulations in some other way, provided that the method used also fulfils the requirements of the Regulations. A person or company cannot be prosecuted simply for failing to comply with an approved code of practice.

However, in legal proceedings, failure to observe a relevant approved code of practice can be used as evidence that a person or company has contravened or failed to comply with the provisions of the Act or Regulations. If a person has not adopted the method described in the code, it is up to that person to show that the legal requirement has been met by an alternative method. Therefore, an approved code of practice should be followed, unless there is an alternative course of action that would also fulfil the requirements of the Act or Regulations.

A WorkCover inspector may cite an approved code of practice as a means of remedying alleged non-compliance when issuing an Improvement Notice or a Prohibition Notice. Similarly, a health and safety representative may cite an approved code of practice in a Provisional Improvement Notice when providing directions as to how to remedy an alleged non-compliance.

APPENDIX 2: YOUR DUTIES UNDER THE OCCUPATIONAL HEALTH AND SAFETY ACT 1985

You have general duties under the *Occupational Health and Safety Act 1985* (the Act) where substances are used in the workplace. The *Occupational Health and Safety (Hazardous Substances) Regulations 1999* (Hazardous Substances Regulations) are made under the Act and set out specific duties in relation to certain types of substances – that is, hazardous substances. Section 27 of the Act provides that, where a person complies with a regulation which relates to a general duty in the Act, that person is "deemed" to have complied with the statutory duty to the extent that the regulation relates to it. So, if someone manufacturing a hazardous substance for use at a workplace complies with the duties under the Hazardous Substances Regulations by preparing MSDS and labels, he / she is considered to have fulfilled the general duty under the Act, to provide adequate information about any conditions necessary to ensure the substance will not pose risks to health when properly used.

If a substance is not covered by the Hazardous Substances Regulations or by any other substance-specific Regulations (for example, those relating to lead and asbestos) then you must comply with the general provisions under the Act that apply to substances.

Just because a substance is not classified as hazardous under the Hazardous Substances Regulations, it does not mean that there are no risks associated with its use. Risks to health may be either directly related to the substance itself, or to its by-products (such as decomposition products) generated under normal conditions of use.

Duties of manufacturers, importers and suppliers under the Act

Section 24(3) of the Act places general duties on persons who manufacture, import or supply any substance for use at a workplace. If you are such a person, you must ensure so far as is practicable, that any substance you manufacture, import or supply for use at a workplace is safe and without risk to health when properly used. To this end, the Act requires you to carry out any tests that may be necessary to ensure the safety of the substance when properly used. Adequate information regarding the results of these tests and safe use of the substance must be made available to purchasers.

While there is no duty under the Act to classify substances, you are still required to provide adequate information regarding their safe use. This would include information about the identity of the substance, its properties, health hazards associated with it, and precautions for safe use.

Substances to which the duty to provide information under the Act applies, include –

1. Substances not classified as hazardous as defined by the Hazardous Substances Regulations

   Examples include: acetone; LPG; inert gases such as argon; methane; acetylene; nitrogen; carbon dioxide; wood-dust created by cutting treated timber; and MDF (particle board). This duty also applies to substances such as carbon monoxide produced by LPG powered vehicles and decomposition products (eg. fumes) from heating articles such as welding rods.

2. Any waste, intermediate or by-product produced when a substance is used at a workplace;

3. Substances that you manufacture or import and supply to a workplace for the purpose of scientific analysis or for determining if the substance is a hazardous substance;

4. Substances that you manufacture or import for use in your workplace (ie. not intended for commercial supply to other workplaces).

Duties of employers under the Act

If you are an employer, you have a duty under the Act to provide and maintain, so far as is practicable, a working environment that is safe and without risks to the health of your employees.[14] You are specifically required to make arrangements for ensuring, so far as is practicable, the safety and absence of risks to health in connection with the use, storage and transport of substances.[15]

You also have a responsibility under the Act to provide information, instruction, training and supervision, and to monitor both the health of employees and the conditions in the workplace. Information and records relating to the health and safety of your employees must be kept. (You should refer to the Act to find out all of your duties.)

[14] *Section 21(1).*
[15] *Section 21(2)(b).*

Examples of situations where these duties apply, include –

1. There is a risk to health arising from the use of substances not classified as hazardous according to the Hazardous Substances Regulations;

   For example, the following substances are not defined as hazardous (although some of them are classed as dangerous goods): acetone; LPG; inert gases (such as argon); methane; oil-mist; biological substances or microorganisms.

2. There is a risk to health associated with the wastes, intermediates or by-products generated during the use of a substance that is not classified as hazardous;

   These substances may include: welding fumes; wood dust; carbon monoxide generated from LPG driven vehicles[16]; fumes produced from thermal cutting or melting of plastics; dust / silica generated during concrete cutting operations; formaldehyde associated with the use of MDF (particle board); ozone produced by photocopiers or UV lamps used for curing certain printing inks; or substances such as hydrogen sulphide (rotten egg gas) arising from the decomposition of natural waste products.

3. The substances themselves are not considered to affect health, but their use may give rise to a dangerous situation.

   Examples of such situations include the displacement of oxygen by inert gases such as argon, nitrogen or carbon dioxide in poorly ventilated workplaces.

   In these circumstances, in order to obtain information to assist compliance with duties under the Act, you could contact the manufacturer, importer or supplier of the substance and ask them to provide you with information about the substance and its use. Further information can be sought from MSDS produced by parties other than the manufacturer or importer, scientific literature, industry associations, unions and WorkCover.

[16] *Carbon monoxide generated from petrol-driven vehicles is covered by the Regulations, because petrol is classified as a hazardous substance.*

APPENDIX 3: GLOSSARY OF COMMONLY USED TERMS

In this Code of Practice there are a number of commonly used terms.

Act means the *Occupational Health and Safety Act 1985*.

Administrative controls is a term defined in the Regulations, and means systems of work or safe work practices designed to prevent or minimise exposure to hazardous substances.

Atmospheric monitoring is defined in the Regulations and means a procedure whereby air is sampled within the breathing zone of the worker to evaluate personal exposure to airborne contaminants.

Breathing zone is defined in the Regulations and means a hemisphere of 300 mm radius extending in front of a person's face measured from the mid-point of an imaginary straight line joining the ears.

Carcinogen means a substance capable of causing cancer.

Corrosive means capable of causing damage to living tissue.

Employee is defined in the Act and means a person employed under a contract of employment or under a contract of training.

Employer is defined in the Act and means a person who employs one or more other persons under contracts of employment or under contracts of training.

Engineering controls is a term defined in the Regulations, and means physical controls designed to prevent or minimise employee exposure to hazardous substances either by suppressing or containing the substances at the source, or by minimising the airborne level of the substances in the work environment.

Equivalent legislation is defined in the Regulations and means legislation of another Australian jurisdiction relating to the use of hazardous substances at a workplace.

First supply or **first used** are defined in the Regulations and mean the first time the hazardous substance is supplied or used on or after 1 June 2000.

Hazard is defined in the Regulations and means the potential to cause an injury, illness or disease.

Importer – in relation to a substance, an importer in the Regulations is a person who imports that substance (from overseas or another Australian jurisdiction), for sale or exchange for use at a workplace.

Manufacturer – in relation to a substance, a manufacturer in the Regulations is a person who manufactures that substance for sale or exchange for use at a workplace.

Material safety data sheet means a document providing information about the identity, properties, health hazards, precautions for use and safe handling of a hazardous substance. The material safety data sheet provides information to those who use the hazardous substance so that they can take adequate precautions when using the substance in the workplace.

MSDS stands for material safety data sheet(s).

Mutagen means a substance capable of causing genetic damage.

National Exposure Standards means the *Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment* declared by the National Occupational Health and Safety Commission, as amended or published from time to time.

National Labelling Code means the *National Code of Practice for the Labelling of Workplace Substances* declared by the National Occupational Health and Safety Commission, as amended or published from time to time.

National MSDS Code means the *National Code of Practice for the Preparation of Material Safety Data Sheets* declared by the National Occupational Health and Safety Commission, as amended or published from time to time.

NOHSC stands for the National Occupational Health and Safety Commission.

Practicable is defined in the Act and means practicable having regard to-

(a) the severity of the hazard or risk in question;

(b) the state of knowledge about that hazard or risk and any ways of removing or mitigating that hazard or risk;

(c) the availability and suitability of ways to remove or mitigate that hazard or risk; and

(d) the cost of removing or mitigating that hazard or risk.

Respiratory sensitiser means a substance that – following initial exposure – is capable of producing a marked increase in response on subsequent exposure. This also applies to skin sensitisers.

Risk is defined in the Regulations and means the likelihood of injury, illness or disease arising from exposure to a hazardous substances.

Risk phrase is defined in the Regulations, and means a phrase that briefly describes the hazard(s) of a substance as provided in Appendix I (Risk Phrases (Health Effects only)) of *The List*.

Safety phrase is defined in the Regulations, and means a phrase that describes the precautions to be taken for safe use of the substance as provided in Appendix III (Safety Phrases) of *The List*.

Supplier – in relation to a substance, a supplier in the Regulations is a person who supplies that substance for sale or exchange for use at a workplace.

Teratogen means a substance capable of causing abnormalities to the foetus.

The Approved Criteria means the *Approved Criteria for Classifying Hazardous Substances* declared by the National Occupational Health and Safety Commission, as amended or published from time to time.

The List means the *List of Designated Hazardous Substances* declared by the National Occupational Health and Safety Commission, as amended or published from time to time.

Use in relation to a substance, is defined in the Regulations as including the production, handling, storage or disposal of the substance.

WorkCover stands for the Victorian WorkCover Authority.

Workplace is defined in the Act and means any place, whether or not in a building or structure, where employees or self-employed persons work.

APPENDIX 4: PUBLICATIONS INCORPORATED IN THIS CODE

The following table provides details of publications cited in this Code to provide additional guidance on the classification of hazardous substances and the preparation of MSDS and container labels for hazardous substances. The table identifies the subject about which the document provides guidance, the title and code number of the document.

Subject for guidance	Title of incorporated document
Classification of hazardous substances	National Occupational Health and Safety Commission, *List of Designated Hazardous Substances* [NOHSC:10005], Australian Government Publishing Service, Canberra.
Classification of hazardous substances	National Occupational Health and Safety Commission, *Approved Criteria for Classifying Hazardous Substances* [NOHSC: 1008], Australian Government Publishing Service, Canberra.
Preparation of material safety data sheets	National Occupational Health and Safety Commission, *National Code of Practice for the Preparation of Material Safety Data Sheets* [NOHSC:2011], Australian Government Publishing Service, Canberra.
Preparation of labels	National Occupational Health and Safety Commission, *National Code of Practice for the Labelling of Workplace Substances* [NOHSC:2012], Australian Government Publishing Service, Canberra.

What is the effect of incorporating documents in a code of practice?

Incorporation of a published document in a code of practice has the effect of making that document form part of the code. The National Standards listed in the above table provide guidance for manufacturers and importers of hazardous substances on how to comply with their regulatory duties to classify substances and prepare MSDS and labels. However, as with the Code generally, provisions of an incorporated standard are not mandatory; alternative measures may be used in order to comply with the duties under the Regulations.

It is important to note that the National Standards themselves have not been written specifically as guidance on how to comply with the duties under the Regulations. Rather, they provide guidance on how to comply with the *National Model Regulations for the Control of Workplace Hazardous Substances*. While the Victorian Regulations are based on the National Model Regulations, there are some differences between the two. As such, following the provisions of an incorporated document may not constitute full compliance with the relevant duties under the Victorian *Occupational Health and Safety (Hazardous Substances) Regulations 1999*. Also, the published documents listed in the Code may contain provisions expressed in a mandatory manner; that is, they may state that a person "shall" do some action. Appropriate judgement needs to be exercised in such circumstances and the latter Regulations should be consulted to determine the regulatory requirements in Victoria.

APPENDIX 5: SOURCES OF FURTHER INFORMATION

The documents listed below are not incorporated into this Code of Practice. However, you may wish to consult them as a useful source of further information.

Risk assessment:

National Occupational Health and Safety Commission, *Guidance Note for the Assessment of Health Risks Arising from the Use of Hazardous Substances in the Workplace* [NOHSC: 3017], Australian Government Publishing Service, Canberra.

Atmospheric monitoring:

National Occupational Health and Safety Commission, "Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment" [NOHSC: 3008], in *Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, Australian Government Publishing Service, Canberra.

Personal protective equipment (Australian Standards (AS)):

AS 1336	Recommended Practices for Eye Protection in the Industrial Environment
AS 1337	Eye Protectors for Industrial Applications
AS 1715	Selection, Use and Maintenance of Respiratory Protective Devices
AS 1716	Respiratory Protective Devices
AS 2161	Protective Gloves and Mittens
AS 2210	Occupational Protective Footwear
AS 2919	Industrial Clothing
AS 3765	Clothing for Protection against Hazardous Chemicals

Safety signs and systems of identification (Australian Standard (AS)):

AS 1319	Safety Signs for the Occupational Environment
AS 1345	Identification of the Contents of Piping, Conduits and Ducts

APPENDIX 6: RELATIONSHIP OF THE REGULATIONS TO THE COMMONWEALTH AGVET SCHEME

The Commonwealth's *Agricultural and Veterinary Chemicals (Administration) Act 1994* gave effect to an agreement reached between the Commonwealth, states and territories for the uniform regulation and control of agricultural and veterinary chemicals. The National Registration Authority (NRA), in keeping with this Act, registers agricultural and veterinary chemicals for use in Australia. Prior to registration, new agricultural and veterinary chemicals are assessed for their efficacy, maximum residue limits for agricultural produce and occupational health and safety implications. A requirement to place detailed information (safety precautions and directions for use) on the label of agricultural chemicals is part of this process.

It should be noted that the NRA labelling provisions cover agricultural and veterinary chemicals only. There may be some hazardous substances used by the agricultural industry that are not subject to the NRA assessment.

The NRA pre-registration assessment is intended to ensure that a chemical can be used safely under "typical" conditions. The risk to health associated with the use of a particular substance or chemical depends on factors such as the method of mixing or decanting, the method of application or equipment used, the concentration of the substance being applied, the duration and frequency of exposure and the condition of any personal protective equipment used. Since there are many variables that affect the risk to health, the Regulations require you to tailor the risk assessment to the particular conditions and circumstances that apply to your workplace. The Regulations also require that an assessment be undertaken in consultation with relevant health and safety representatives, if practicable.

The Regulations require you to provide employees with more information than is required by the NRA process. The NRA provisions require labels of agricultural or veterinary chemicals to include some occupational health and safety information. However manufacturers and importers are obliged under the Regulations to provide additional information such as detailed information on the ingredients of the substance and their health effects, precautions for use, dealing with spills, and exposure standards (if any). This extra information must be provided in the form of a material safety data sheet (MSDS). You must make MSDS available to your employees so that they are fully informed of all the risks to their health arising from the use of hazardous substances and the control measures required.

The information on the labels of agricultural or veterinary chemicals often focuses on the use of personal protective equipment (gloves, respirator etc) to control any risk to health. There is a duty under the Regulations to consider other control measures such as elimination, substitution, isolation and administrative controls before relying upon PPE. PPE is considered to be the least effective of the control measures.

APPENDIX 7: CASE STUDIES – RISK ASSESSMENT AND CONTROL

A number of examples illustrating the process of risk assessment and control are presented in this section. They do not cover all the possible hazards, risks and control options for the particular situations described. Their purpose is to demonstrate the different ways in which the process can be carried out, and the steps involved in making decisions – particularly about the risk and the controls to be put in place. As these case studies show, the complexity of the process depends on the substance(s) used and the nature of the work.

CASE STUDY 1: SPRAY PAINTING

A spray painting workshop uses a brand name two-pack paint system containing hexamethylene diisocyanate (HDI) for spray painting vehicles. The spraying is carried out in a ventilated (downdraft) spray booth that complies with Australian / New Zealand Standard AS / NZS 4114 Part 1 *Spray painting booths – Design, construction and testing*. The mixing and colour matching are performed in an area that is not mechanically ventilated. The spray painter currently wears a half-face combined particulate / vapour respirator while spraying, but not while mixing and colour matching. The spray equipment is cleaned up by soaking in an open vessel and using rags. The spray painter spends up to 6 hours a day working in this area.

1. Identifying hazardous substances used

The MSDS and label identify the hardener (containing HDI and a solvent) as a hazardous substance. The thinner or solvent used for cleaning up is also a hazardous substance, according to its MSDS.

The employer:

- made sure all employees exposed to the paint and thinners had access to the MSDS;
- checked that all containers of paints and thinners were labelled with the manufacturer's or importer's label;
- made sure the container into which the thinner was decanted (used to soak the spray equipment) was labelled with at least the product name;
- established a hazardous substances register.

2. Assessing the risk to health

A risk assessment of the use of the paints and solvents was undertaken to determine whether they posed a risk to health. This was carried out in consultation with the health and safety representative and involved the following:

Reviewing information about the hazardous substances

Routes of exposure: According to the MSDS, HDI and solvents are hazardous primarily through inhalation of vapour or aerosol and through direct skin contact.

Health effects: Isocyanates (HDI) are skin and eye irritants. Inhalation of the vapour can cause respiratory sensitisation (asthma-like symptoms). Prolonged or repeated contact with the solvents can cause dermatitis, and inhalation may affect the central nervous system. Significant exposure can cause symptoms such as headaches, loss of coordination, and "light headedness" or drowsiness.

No incidents of significant exposure or symptoms that indicated significant exposure were recorded in the workplace accident / incident records book. Discussion with the spray painter revealed that he had occasionally suffered from skin cracking / dermatitis (skin effects) and symptoms of "light headedness" when using the cleaning solvents, but he had not reported these symptoms. Although he had not experienced asthma-like symptoms, the spray painter was aware of a case where this had occurred at another workplace.

Examining the nature of the work

- The employer worked out where exposure to HDI and solvents was likely to be occurring. Each of the tasks (mixing, colour matching, spray painting and cleaning of equipment) was considered separately.
- The spray painter was identified as the employee to be at risk from exposure to the paint and thinners. The employer considered when the painter was exposed, and under what conditions and circumstances, including duration, frequency and level of exposure.
- The existing risk controls (such as personal protective equipment or exhaust ventilation) were identified for each area and task.

Evaluating the risk to health for each task

- *Mixing*

According to the MSDS, most of the isocyanate (HDI) present in the hardener is in a relatively non-volatile pre-reacted form ("pre-polymer"). The concentration of the more volatile free form (non-polymerised) of HDI is less than 0.4%. Given this and the nature of the task, inhalation exposure to HDI vapour or aerosol when handling the hardener during mixing was minimal. However, a risk to health due to skin exposure still existed because suitable gloves were not generally worn.

- *Colour matching:*

Colour matching involves spraying a test panel until the required colour match is achieved. This task was carried out in an area that lacked mechanical ventilation. In this task, there was a significant risk of short-term inhalation exposure to aerosol and vapour, because suitable respiratory protection was not worn. Exposure through skin contact with the two-pack mixture or the aerosol was also likely because suitable gloves were generally not worn.

- *Spray painting:*

Exposure through skin contact and inhalation of aerosol or vapour presented risks to health during spray painting, because significant quantities of aerosol and vapour were generated during this process over a prolonged period of time and personal protective equipment (gloves and supplied air respirator) recommended in the MSDS were not used. The pre-polymer form of HDI did not present a risk when mixing because it is not very volatile. However, during spraying (and colour matching) the pre-polymer form becomes airborne, presenting a risk to health.

- *Clean-up:*

The open container or solvent and the solvent-soaked rags used for the clean-up were placed in an open bin beside the mixing table for disposal. The spray painter probably experienced significant short-term inhalation and skin exposure to the volatile solvent, because he did not usually wear gloves and the general ventilation in the area was likely to be inadequate.

Atmospheric monitoring

The Regulations require atmospheric monitoring to be carried out if an exposure standard exists for a hazardous substance being used at the workplace and there is uncertainty as to the level of exposure or risk through inhalation of the substance, under particular conditions of use. If risk controls are so effective that exposure to the hazardous substance can be prevented, then atmospheric monitoring does not need to be performed.

It was decided that air monitoring could be needed for the colour matching and clean-up operations, as there was some uncertainty as to the actual level of exposure during these tasks.

Air monitoring would not be necessary, if colour matching were performed in the spray booth using a supplied air respirator. However, if these controls proved impracticable, air monitoring would be required to determine if the exposure standards had been exceeded.

Atmospheric monitoring was not required for the spray painting operation because it was obvious that the exposure standard for the HDI would be exceeded.

Health surveillance

Because HDI is an isocyanate listed in Schedule 3 to the National Model Regulations, and there is a reasonable likelihood of adverse health effects occurring when spraying the paint (without a supplied air respirator), health surveillance of the spray painter was needed. The type of health surveillance required was determined by referring to Schedule 3. A registered medical practitioner was consulted to find out how often health surveillance should be performed.

If the spray painter had been wearing a supplied air respirator when spraying in the booth, health surveillance would not be required because the risk was effectively controlled. Nevertheless, it would be prudent to carry out a pre-medical examination on any employee exposed to HDI.

3. Risk control

Once the risk assessment and the necessary air monitoring had been completed, risk controls were considered. Any solution had to eliminate, or if this were not practicable, reduce the risk to health posed by the paints and solvents. Elimination of the two-pack paint was not an option because of the desired finish, turnaround times and cost to the client.

Risk controls for each of the tasks were considered in turn, taking careful account of the way HDI and solvents entered the body.

- *Mixing*

The risk assessment had determined that inhalation exposure to HDI and solvents would be negligible. However there was still the potential for skin exposure. The solution was to investigate whether automation of the mixing operation was practicable (engineering control), and in the interim, make sure that the spray painter wore suitable gloves for the task.

- *Colour matching*

Inhalation and skin exposure were the routes of exposure when colour matching. In this case, the most effective and simplest solution was to perform the task in the spray booth (engineering control) while using a supplied air respirator (PPE). Because skin exposure could still occur, appropriate gloves were to be worn.

- *Spray painting*

The spray painter was at serious risk of overexposure (sensitisation) because of the long duration of this task and the inadequacy of existing controls. There was significant potential for exposure through inhalation and skin absorption, even though the spray booth had downdraft ventilation. As an additional risk control, the spray painter is to use the existing spray booth in conjunction with personal protective equipment, consisting of a full-face supplied air respirator, overalls and gloves, as recommended in the MSDS (see Figure 15).

- *Clean-up*

Air monitoring results indicated that the inhalation exposure to solvents closely approached the short-term exposure limit specified in the MSDS – so it was likely that the limit was exceeded from time to time. Skin exposure was also significant because appropriate gloves were not generally worn.

The most effective way of reducing exposure to solvents through inhalation was to install local exhaust ventilation (engineering control). In the interim, appropriate respiratory protection was to be used and solvent vapours reduced by using lidded containers. The spray painter was required to wear appropriate gloves to prevent or reduce skin exposure.

4. Maintenance of controls

A procedure was set up to ensure that all risk controls were properly used and maintained. This included:

- scheduled testing of the downdraft ventilation system;
- regular replacement of the filters in the spray booth;
- regular inspection of the personal protective equipment for any signs of damage or wear and tear, and regular cleaning of the PPE to ensure that it continues to function as designed (also refer to manufacturers guidelines);
- supervision of the use of PPE and other controls;
- air cleaning filters for supplied air replaced at regular intervals according to manufacturer's instructions; and
- provision of adequate storage facilities for the PPE so that it does not become contaminated or damaged when not in use.

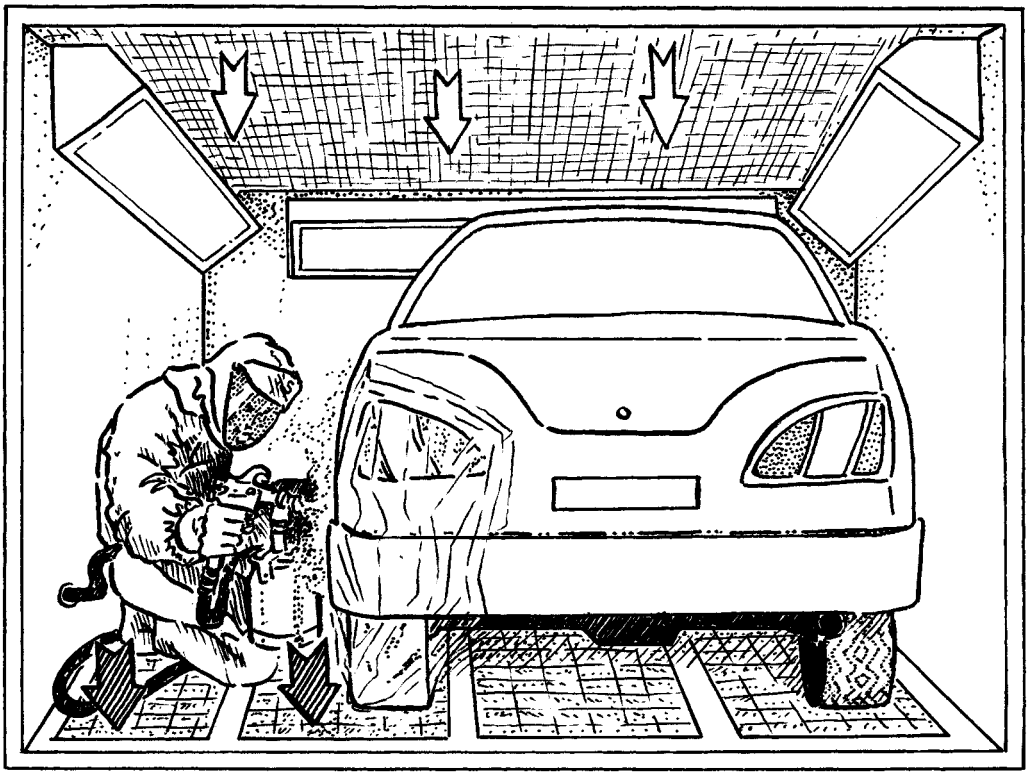


Figure 15: Spray painting booth with downdraft ventilation and use of full-face supplied air respirator, overalls and gloves

CASE STUDY 2: VAPOUR DEGREASING OPERATION

Job description

Small metal components are produced on an automated press that uses oil as a lubricant for the cutting tool. The components are collected in a metal basket and then manually transferred into the solvent vapour-degreasing unit to remove the oil. Trichloroethylene is used as the degreasing solvent. One operator runs the press and the degreasing unit.

Information about the substance

Classification:

Manufacturer's MSDS and label indicate that trichloroethylene (a volatile solvent) is a hazardous substance. The oil is not classified as a hazardous substance.

Health effects for the different routes of exposure:

The MSDS indicates that exposure through inhalation can affect the central nervous system and organs such as the liver, lungs and kidneys. Skin and eye irritation can also occur on contact.

Exposure standard:

The recommended national exposure standard for trichloroethylene is 50 ppm (parts per million) in air averaged over an 8-hour period. Trichloroethylene also has a short-term exposure limit (STEL) of 200 ppm averaged over a 15 minute period.

Controls already in place

Task: normal operation

The degreaser is fitted with a cooling coil to prevent escape of the hot vapour. The baskets are lowered into, and raised out of the degreaser at a pre-set controlled rate (slow speed) using a winch to minimise vapours being dragged out of the unit.

Task: cleaning out the sludge

Before the operator enters the degreaser to clean out the sludge, the solvent is drained out of the unit. A half-face respirator and gloves are worn. This task is carried out approximately three times a year.

Routes of exposure (determined by substance and task)

Considering the nature of the substance and the task during normal operation, the main route of exposure is inhalation. There is very little potential for skin and eye contact during normal operation because of the way the components are handled and the solvent readily evaporates. This would also apply to ingestion.

When cleaning out the sludge at the bottom of the degreaser, there is the potential for significant skin and eye exposure in addition to inhalation.

Evaluation of risk to health

It was determined that there is a risk to health for the following reasons:

- The degreaser is quite old and poorly maintained.
- A very strong solvent odour can be detected in the vicinity of the degreaser, particularly when lifting the basket out. This is because the components trap the condensing solvent vapour. In this case, stacking the components in the basket in a different way would not overcome this problem.
- The operator has reported symptoms of eye irritation and light-headedness.
- The operator may be exposed to a very high level of trichloroethylene vapour whenever the build-up of sludge is cleaned from the bottom of the degreaser. Although this task is only performed occasionally, it requires the operator to get into the degreaser. This task requires the operator to enter the degreaser and as such is a 'confined space entry' which comes under the *Occupational Health and Safety (Confined Spaces) Regulations 1996*. Exposure to the substance in this confined space poses a serious risk to health (possibly death) particularly through inhalation of trichloroethylene vapour. The personal protective equipment used provides inadequate protection.

Controls to be put in place

The sole purpose of the vapour degreasing operation is to remove the fine coating of oil and supply the client with a clean product. Discussion with the client indicated they prefer the components to be coated with oil as it protects against corrosion whilst the components are stored on their premises. Therefore it was decided that the use of trichloroethylene be eliminated.

CASE STUDY 3: CLEANING OFFICES

Risk Assessment Report

Date: 20 June 2000

Assessor(s):

Management and health and safety representative

Job description:

Products used by cleaners of several office blocks include a disinfectant, a toilet cleaner and a glass cleaner. The toilet and glass cleaners are used as supplied. The disinfectant is diluted with two parts of water and sprayed and wiped onto surfaces. Dilution (mixing) of the disinfectant (Zap) takes place in a central storeroom.

Hazardous substance:

The MSDS for Zap indicated that the product is classified as hazardous. Manufacturers of the other products confirmed that their products were not hazardous according to the Regulations.

Product name:	Zap
Form:	Water based concentrate
Active ingredient:	Sodium hypochlorite (15%)
Health effects:	Skin, eye and respiratory irritant; prolonged skin contact may cause dermatitis
Routes of exposure:	Skin, eyes and inhalation (particularly spray mist). Exposure through ingestion is not considered to present a risk to health because of the nature of the tasks and the controls in place (see below).

Who is exposed:

All cleaners are involved in the mixing and application of Zap.

Frequency and duration of exposure:

Mixing (dilution) is done once at the start of each shift. It takes approximately a minute to perform this task. Employees use the working strength solution for 4 hours a day, 5 days a week.

Controls already in place:

- Cleaners are provided with rubber gloves.
- There is good general ventilation in the storeroom.
- Eating, smoking and drinking is prohibited in the storeroom. Signs to this effect are displayed.
- Washing facilities are available in the storeroom and in the areas where Zap is used.

Risk Assessment Worksheet

Task	Routes of exposure	Risk to health? (Yes / No / Not sure)
Mixing	Skin / eyes	YES: • Handling of the concentrate presents the greater risk – particularly to skin and eyes. • Splashes to the skin and face have occurred occasionally when decanting concentrate. • Gloves provided are not always worn. • Goggles or a face shield are not provided.
	Inhalation	NO: • Exposure through inhalation does not present a risk to health due to the short duration of the task. • Adequate general ventilation. • Potential for generating fine spray mist during this task is negligible.
Spray and wipe	Skin	YES: • Gloves provided are not worn very often. • MSDS indicates that prolonged contact even with the diluted substance may cause skin irritation and possibly dermatitis.
	Inhalation	YES: • When working in confined, poorly ventilated areas. • Fine spray mist generated by spray applicator.

Having completed the assessment of risk, the assessors decided to take the following risk control actions:

- Purchase the concentrate in containers fitted with a dispenser (tap) to minimise the potential for spills and splashes during decanting. Hang a small plastic container under the tap dispenser to contain any drips. Alternatively, an automatic dilution and dispensing system may be installed to avoid contact with the concentrate.
- Use a more dilute working strength solution. The directions for use on the label recommend a concentration of 1-2% for this type of application. Cleaners have been using a more hazardous 5% working strength solution. The reason for this is not known.
- Use a coarse spray applicator to reduce the potential for exposure through inhalation.
- Make further enquiries about alternative products by contacting manufacturers. Consider purchasing a ready-to-use (1-2%) solution of the product to eliminate mixing, or consider a different less hazardous product.
- Rubber gloves must still be worn during application of the dilute solution, in order to avoid prolonged contact. Information and training is to be provided on the nature of the hazards, risks and the need to wear the gloves.

CASE STUDY 4: USE OF GLUTARALDEHYDE IN A HOSPITAL

Job description

Biodex (containing 2% glutaraldehyde) is used for the cold sterilisation of endoscopes. The procedure is carried out in a room adjoining a theatre. The sterilisation solutions sit in open containers on the bench top where the actual scrubbing down operations are carried out. The endoscopes are soaked in the solution for a period of time and then rinsed with water. Nurses use the substance intermittently throughout a working day.

Information about the substance

Manufacturer's MSDS and label indicate that Biodex, which contains glutaraldehyde is classified as a hazardous substance. This information (MSDS / label) indicates that glutaraldehyde is a skin, eye and respiratory irritant and that it may cause sensitisation through skin contact. The recommended exposure standard for glutaraldehyde is 0.1 ppm (Peak).

Controls in place

- Baths are labelled with the product name to indicate its contents.
- Nitrile rubber gloves are worn.
- General ventilation only. Local exhaust ventilation is not used.

Routes of exposure (depend on substance and tasks)

The MSDS indicates that exposure can occur through inhalation, skin and eye contact and ingestion. Ingestion is not likely to be a significant route of exposure since gloves are worn and the process involves extensive rinsing with clean water.

A nurse scrubbing down endoscopes may be exposed to glutaraldehyde through inhalation of the vapours, or splashes to the arms, face and eyes.

Evaluation of the risk to health

Based on the information about the substance and the nature of the work, it is concluded that the use of glutaraldehyde presents a risk to health through inhalation and skin and eye contact. Observations and research reveal that:

- Respiratory and skin effects in similar circumstances (ie. hospitals) are well documented. Eye and respiratory irritation and skin effects have been reported at the hospital.
- Atmospheric testing in similar circumstances has indicated that the peak exposure standard is readily exceeded. Consultation with WorkCover and other hospitals, and a review of published studies has confirmed this.
- The MSDS suggests local exhaust ventilation may be required. This is not in place.
- Odour is evident during use.
- Use of the substance is prolonged and repeated.

Controls to be put in place

In determining appropriate risk controls, the routes of exposure identified during the risk assessment process are taken into account. Elimination of the use of a substance to sterilise the endoscopes is not practicable because of the potential for cross infection and the nature of the instruments. The following risk controls were proposed:

Substitution:

Manufacturers of an alternative product to be approached. Discussion with another hospital that is using the product indicates that it may be a suitable alternative.

Engineering controls:

Until the suitability of the alternative product can be determined and a preliminary risk assessment conducted on this product, the available local exhaust ventilation (fume cupboard with a transparent sliding sash) which is located in another room adjoining the theatre is to be used. This will minimise exposure to the glutaraldehyde vapour and guard against splashes to the face and eyes.

Administrative controls:

The containers of Biodex solution are to be kept in the fume cupboard (see above), and fitted with lids to minimise unnecessary evaporation of glutaraldehyde.

Personal protective equipment:

The nature of the work involves some contact with the Biodex solution. Therefore, while Biodex is used, gloves (nitrile) still need to be worn to minimise the potential for skin contact.

CASE STUDY 5: PESTICIDE SPRAYING

Risk Assessment Report **Date: 17 June 2000**

Assessor(s): Manager; health and safety representative; spray operator

Hazardous substance:

Product name: Chlorpyrifos 500 EC

Form: Solvent based concentrate containing 500 grams per litre of Chlorpyrifos

Active ingredient: Chlorpyrifos (an organophosphorus insecticide)

Health effects: Nervous system (cholinesterase inhibition)

Major routes of exposure: Inhalation (spray mist and solvent) and skin absorption (Chlorpyrifos is readily absorbed through intact skin).

Job description:

Chlorpyrifos is an insecticide used on vineyards. Sometimes other liquid organophosphates are also used, following the same mixing and spraying techniques. Therefore this assessment would also cover their use.

500ml of the concentrate is poured (decanted) from a 20 litre drum, into a plastic jug. This is then poured into the spray tank of a tractor-drawn air blast sprayer. The concentrate is diluted down with water to a concentration of 0.25 grams per litre (i.e. 2000 times dilution).

Chlorpyrifos is sprayed two to three times a week on several vineyards from about October to February.

One operator, who has completed the Farm Chemical Users Course (FCUC), does all the mixing, spraying and the cleaning up of the equipment used.

Others who may be exposed to some Chlorpyrifos are those involved in thinning, pruning or repairing spray equipment. They are not considered to be at risk (refer to report).

Task	Routes	Controls already in place	Risk to health? Yes/No/Not sure?		Action
Mixing	Skin	Gauntlet rubber gloves, PVC apron, gumboots and face shield worn. Measuring jug is rinsed immediately after use. Tap available for washing.	Yes	Spills and splashes have occurred. Chlorpyrifos is very toxic. It is handled in concentrated form. The MSDS indicates it is easily absorbed through skin. If protective equipment is not worn or properly maintained there would be a serious risk to health.	Consider ways of eliminating or reducing the use of the pesticide. Consider using a less hazardous pesticide. Investigate the use of suitable dispensers to minimise spills. A dispenser would mean that less personal protective equipment would be required.
	Inhalation	Mixed in well ventilated area.	No	The MSDS indicates that Chlorpyrifos is not very volatile. The solvent is volatile but mixing only takes a few minutes and is done in a well-ventilated area.	
	Ingestion	No eating, drinking or smoking when handling the pesticide. Washing facilities are provided.	No	Procedures followed. Operator has attended training course. Supervision provided.	
Spraying	Skin	No specific controls besides a cotton hat, long sleeve cotton overalls and leather work boots are worn.	Yes	The operator may be exposed to spray drift although the pesticide is not as concentrated as when it is mixed.	Consider the use of a tractor cabin to control the risk. If the use of a tractor cabin is not practicable, consider application techniques that reduce spray drift.
	Inhalation	As above.	Yes	As above.	
	Ingestion	No eating, drinking or smoking when handling the pesticide. Washing facilities provided.	No	Procedures followed.	

Risk Assessment Report Date: 17 June 2000

Task	Routes	Controls already in place	Risk to health? Yes/No/Not sure?		Action
Thinning/ Prunning/ Picking	Inhalation Skin Ingestion	Recommended re-entry periods are observed. People doing these jobs also know when the vineyard was sprayed and the pesticide used. Jobs on the vineyard are coordinated so that people not involved in spraying are kept well away from the areas where Chlorpyrifos 500 EC is sprayed. These people are told when spraying is being done and where.	No	Refer to "CONTROLS ALREADY IN PLACE". Note: where re-entry periods are not given, operators doing these jobs do not enter the orchard for at least 24 hours so that the spray mist has settled.	None. Current controls are adequate. Ensure existing controls are maintained.
Cleaning, Service and Repair of Equipment	Inhalation Skin Ingestion	After spraying, the tank is rinsed and the nozzles flushed. The spray equipment, including the tractor, is also hosed down. This process is repeated for the tank and the nozzles if the equipment is to be repaired or serviced externally.	No	The pesticide is further diluted during cleaning and the task is such that there is no likelihood of skin contact with the diluted pesticide/rinsing water.	None.

Note:

1. You may wish to follow this example and record the risk control actions which you decide need to be taken. However, the Regulations only require you to record risk assessments.

2. Organophosphate pesticides such as Chlopyrifos, are scheduled substances for which health surveillance may be required. In this case, health surveillance is likely to be required for employees spraying and mixing the substance if adequate controls are not used. However if adequate controls are in place and there is no risk to health, health surveillance would not be required.

   Employees not applying the insecticide, such as thinners, pruners and pickers, would not need health surveillance provided recommended re-entry periods are observed and spraying is not carried out near them when they are working.

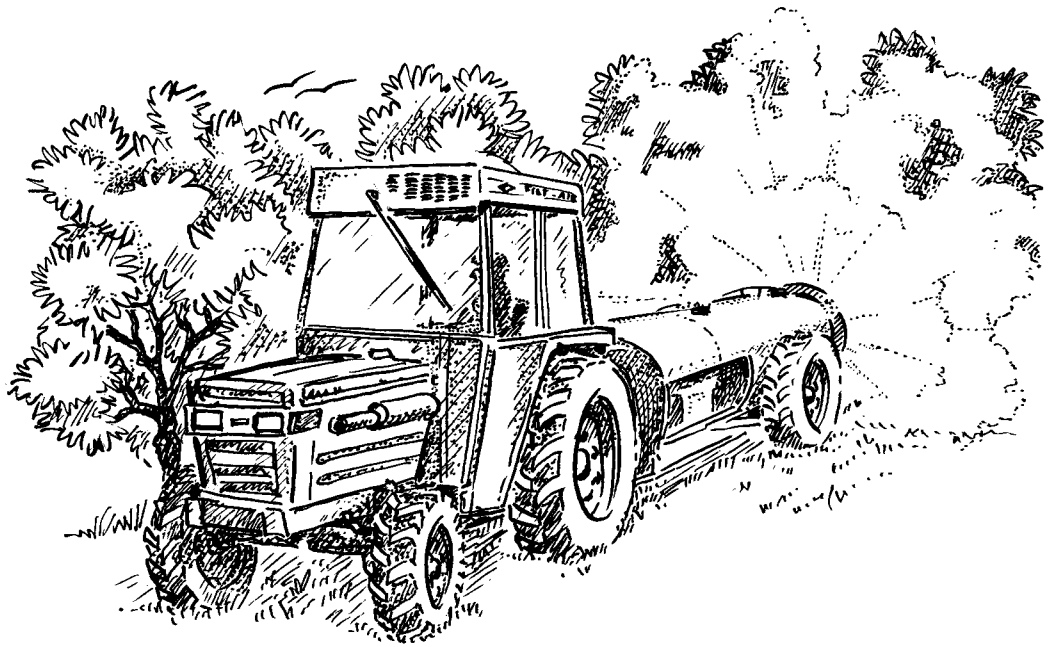


Figure 16: An example of pesticide spraying using a tractor with an enclosed cabin to protect the driver from exposure.