

HAZARDOUS SUBSTANCES

1.0 Material Safety Data Sheet (MSDS)

Many substances may present hazards at work. But if the hazards are known and understood, appropriate precautions can be taken so that they can be used safely. An MSDS (Material Safety Data Sheet) will help a workplace to gather necessary information to safely manage the hazardous substance.

When new substances are to be introduced into the workplace, the employer should make arrangements to get a copy of the MSDS before the substance is brought into the workplace.

In workplaces where a large proportion of the workers are non-English speaking, the MSDS may require translation into the relevant language(s).

1.1 What is an MSDS for?

An MSDS is used for the following:

- Find out how to use and store the chemical safely
- Check that chemicals are being used the right way for the right job
- Decide if improvements should be made to machinery or procedures
- Set up controls in the workplace to limit a worker's exposure (inhalation, skin contact, ingestion) to a chemical or its by-product
- Determine if monitoring needs to be done for airborne contaminants or if workers need to have a health surveillances
- Check that storage and disposal of the chemical and emergency procedures are suitable
- Use in on-the-job training. Training is needed before using hazardous substances.

1.2 Some things to look for in a MSDS

Important things to check for in an MSDS:

- **Check the MSDS is current.** To be a valid sheet it needs to be less than 5 years old from the date of *preparation or issue*. The dates of *printing or faxing* are not the same as the date of *preparation or issue*.
- **Check that the manufacturer's and supplier's details are correct.** This information may be required in an emergency. An Australian 7 digit phone number in this area of the MSDS is an indication that the sheet needs to be updated. Contact your supplier for a revised sheet which will have an area code and an 8 digit phone number.
- **Is it a hazardous substance?** Towards the top of the first page of the MSDS there will be a phrase stating either "Hazardous Substance" or "Non-hazardous Substance". Older type

formats will also possibly say “according to work safe criteria”. If it is a “hazardous substance” then a written risk assessment will need to be done.

- **Is it a dangerous good?** Towards the top of the first page in the newer type of formats for the MSDS there will be a phrase stating either “Dangerous Good” or “Non-dangerous Good”. In older MSDS formats, under the headings of identification, storage and handling or transportation, there will be a listing for UN number (United Nations number) and Class. If these are in the MSDS, then it is a “dangerous good”. For a “dangerous good” a written risk assessment will need to be done. However if the “dangerous good” is stored or handled in a *minor storage location*, a written risk assessment is not necessary but the occupier must be able to demonstrate that safe practices are being used to achieve an acceptable level of risk.

1.3 What Information is in a MSDS?

It contains important information about the chemical and should at least contain:

- The product’s name (trade name) and any other common names for the product
- The chemical name and names of certain ingredients of the product
- Chemical and physical properties of the substance
- Health hazard information
- Precautions for safe use and handling (including spills and disposal of the chemical)
- Directions for use
- First aid directions
- Emergency procedures
- The manufacturer’s contact details.

1.4 Review of MSDS

To keep an MSDS current it should be reviewed whenever there is:

- A change in formulation which:
- Affects the hazardous properties of the substance,
- Alters the form or appearance of the substance, or
- Alters the mode of application of the substance;
- A change to the hazardous substance which alters its health and/or safety hazard or risk;
- New health and/or safety information on the hazardous substance, for example, the exposure standard changes or a substance previously considered not harmful is now established to be carcinogenic.

The amount of information on a label will depend on the size of the container. However, where the container is so small that the label cannot be placed on the actual container, the label can be attached by other means, for example, by a string round the neck of a test tube.

1.5 Providing Access to an MSDS for Workers

Depending on the needs of your workplace, access to an MSDS may be provided in several ways, including:

- Paper copy collections of MSDSs;
- Microfiche copy collections of MSDSs with microfiche readers open to use by all workers;
- Computerised MSDS databases; and
- Internet databases.

Any storage or retrieval equipment used to provide access to an MSDS should be kept in good working order. Where information is displayed on a screen, there should be a means of obtaining a paper copy of that information.

2.0 Labelling

2.1 What information should be on a label of a container?

- The product's name
- Safety phrases
- Risk phrases
- The presence of certain ingredients.

When a chemical has been decanted into a smaller container and the contents are not going to be used on the same day, then that container must be labelled with the product's name, safety phrases and risk phrases. Never decant chemicals into empty food containers.

2.2 Label Formats and Meanings

- Dangerous Goods - diamond shaped symbols, colour coded, with icons and/or words and class numbers on the label
- Hazardous Substances – usually the label has the word “HAZARDOUS” written in red
- Poisons – the words, **DANGEROUS POISON**, **POISON**, **WARNING** or **CAUTION** are printed (in a box) on the container label.

2.3 Risk Phrases

Risk phrases indicate the way in which harm can occur eg “irritating to the skin”. These phrases are to be placed on containers in which a substance has been decanted and not all used on the day of decanting.

2.4 Safety Phrases

Safety phrases provide information on storage and handling eg “keep container dry”. These phrases are to be placed on containers in which a substance has been decanted and not all used on the day of decanting.

2.5 Dangerous Goods Codes

Class	Sub class	P.G.	Type and Examples
1			Explosive eg fireworks; cartridges
2			Gases
	2.1		Flammable – eg acetylene; LPG
	2.2		Non-flammable eg oxygen; nitrogen
	2.3		Poisonous eg ammonia; chlorine; carbon dioxide
3			Flammable Liquids
		I	Highly flammable – BP <35 °C eg diethyl ether; carbon disulphide
		II	Highly flammable – BP >35°C & FP 23°C eg petrol; acetone; ethanol
		III	Flammable FP 23-61°C eg kerosene; mineral turpentine Combustible liquids FP> 61°C eg diesel - not required to be marked
4			Flammable Solids
	4.1		Flammable Solids and Self-reactive Substances eg matches
	4.2		Solids Liable to Spontaneously Combust eg white phosphorus
	4.3		Emit Flammable Gases when in Contact with Water eg calcium carbide
5			Oxidisers
	5.1		Oxidising Agents eg calcium hypochlorite (dry pool chlorine)
	5.2		Organic Peroxides eg methyl ethyl ketone peroxide
6			Poisonous and Infectious Substances
	6.1(a)		Poisonous Substance eg arsenic compounds; cyanides
	6.1(b)		Harmful (Toxic) Substances eg lead acetate
	6.2		Infectious Substances eg vaccines
7			Radioactive Substances eg radioisotopes (used in medicine)
8			Corrosives eg sodium hypochlorite (liquid pool chlorine); car batteries
9			Miscellaneous Dangerous Goods eg polyester beads; lithium batteries

Where: BP is Boiling Point and FP is Flash Point.

2.6 Colour, Size and Style

Labels should be fixed to the container in colours that provide sufficient contrast to the background. Lettering should be of a size and style that is clearly legible and in the English language.

2.7 Revision of Labels

If an MSDS has been amended by the manufacturer, the label should be changed to ensure that it contains the same information as the amended MSDS.

2.8 Decanted Hazardous Substances

When a substance is decanted at work, the requirement for labelling will depend on whether the substance is used immediately or over a longer period of time. Where a hazardous substance is decanted to be used straight away, the container into which the hazardous substance has been decanted does not require labelling only if the container has been cleaned of any residue.

The labels on the decanting containers should be used to provide information for the safe disposal of both the remaining hazardous substance and the container. If the container into which the hazardous substance is decanted is small, it may not provide sufficient room for label information. In this case, the label should be attached to a supporting device or container. For example, in the case of a test tube, the label may be attached to the test tube rack.

Alternatively, a tag with the required label information may also be used. If a container label is damaged or defaced, a replacement copy should be obtained from the supplier. If the label cannot be obtained, the information on the MSDS should be used to produce a label for the container.

2.9 Unlabelled Containers/Unknown Substances

If the container is not labelled and the contents of the container not known, the container should be marked: **“Caution do not use: unknown substance”**

A container of an unknown substance should be stored away from other substances where it cannot be used until its contents can be identified and the container appropriately labelled. If the contents cannot be identified, they should be disposed of following consultation with the relevant local Authority.

3.0 Hazardous Substance Register

The register should be used as an information tool for consultation regarding the management of hazardous substances at the workplace.

3.1 Training

Give a worker who may be exposed to a hazardous substance induction and ongoing training about the substance having regard to the level of risk identified in the risk assessment and the workers who may be exposed to the substance. Keep a record of the induction and training for 5 years stating the date of the session, the topics dealt with, the name of the person who conducted the session, and the names of the workers who attended.

4.0 Risk Management

Managing hazardous substances in the workplace. The following issues should be considered when hazardous substances are used in the workplace:

- How hazardous substances should be used;
- How persons are exposed to hazardous substances;
- Whether the risk from the hazardous substance is significant; and
- How exposure to hazardous substances in the workplace should be controlled.

4.1 The Risk Management Process

- Identify hazardous substances used in the workplace;
- Assess the risk from their use;
- Determine and implement appropriate control measures so that they can be handled and used safely; and
- Review and monitor the effectiveness of control measures used.

Management of risks from hazardous substances should be applied wherever the work is being carried out, for example the different locations where cleaners are carrying out cleaning work while using hazardous substances.

4.2 Assessing Risk

An assessment is the examination of ways in which a hazardous substance is used at work and the health risks involved. The purpose of the assessment is to enable decisions to be made about appropriate control measures, training, monitoring and health surveillance. These decisions will depend on the risk that arises from the use of a hazardous substance under particular working conditions.

- Types of Assessments
- The way in which an assessment is conducted depends on the circumstances of the workplace. Two possible methods are workplace specific assessments and generic assessments.

4.2.1 Workplace Specific Assessment

An example could be a walk-through survey of the workplace using a checklist. The checklist should be based on information on labels and MSDS's, for example, risk phrases on labels could be used to get an idea of how a person using a substance may be exposed.

In some cases, considerably more detail will be required, particularly where:

- A significant risk to health is suspected; or
- There is uncertainty about the degree of risk; or

- There are complex chemical processes and/or exposures involved.

In these cases, additional detail on all facets of the assessment may be required. This could include the use of outside professional assistance.

4.2.2 Generic Assessments

An example of a generic assessment may be in the use of hazardous substances at service stations. In this case, the nature of the hazard and the degree of risk at one service station may be comparable to the degree of risk at others.

Therefore, a single assessment of the activity can be applied to other workplaces where the use for the hazardous substance is the same. When a generic assessment is undertaken it should be checked for validity at each individual workplace.

4.3 Assessing Risk - Identify who should be Trained

People who should be trained include:

- Workers who may be exposed to a hazardous substance at work;
- Supervisors of workers at risk from exposure to a hazardous substance;
- workplace health and safety committee members and workplace health and safety representative(s);
- Workers responsible for the purchasing of hazardous substances, control equipment, personal protective equipment and for the designing, scheduling, organisation and layout of work; and
- Those who have direct involvement in fire or other emergency action.

4.4 Hazardous Substances Risk Assessment

Only required for chemicals that are listed as Hazardous Substances

The chemical's label and Material Safety Data Sheet (MSDS) will be needed to complete the risk assessment.

References: [Workplace Health and Safety Regulation Part 13; the Hazardous Substances Code of Practice 2003](#)

1. Name of Substance: _____
(or name of the substances if using a mixture)

2. How is the substance used? - i.e. describe the process? <i>(If the chemical is used for a number of different processes a risk assessment may be needed for each task. Also consider decanting, storage & disposal)</i>		
3. How are people exposed to the substance? <i>(Tick or mark applicable routes or entry)</i>	Skin (splashed onto or absorbed through):	
	Eyes (splashed onto or absorbed through):	
	Inhalation (breathed in):	
	Ingestion (swallowed):	
4. How much of the substance are workers exposed to during the task? <i>(eg: in litres / millilitres)</i>		
5. For how long are workers exposed to the substance? <i>(How often is the chemical used. eg: in hours per day and days per week)</i>		
6. Briefly, what are the health effects of exposure to this substance? <i>(Refer to the MSDS)</i>	Skin:	
	Eyes:	
	Inhalation:	
	Ingestion:	
7. What engineering control measures (eg: extraction ventilation; dilution ventilation) are recommended by the MSDS and/or label?		
8. Currently, what engineering controls are used to control exposure to the substance?		
9. If engineering controls are used, are they maintained and checked for effectiveness? <i>(Give Details)</i>		

10. What Personal Protective Equipment (PPE) is recommended by the MSDS and/or label?	Skin:
	Eyes:
	Inhalation:
11. Currently, what PPE is used? (Give Details)	Skin:
	Eyes:
	Inhalation:
12. Are <u>any</u> other control measures (eg: procedures, rotation of people, using substance after hours to minimise how many people are exposed...) recommended by the MSDS and/or label?	
13. Are any other control measures <u>currently</u> used at the workplace?	
14. <u>What is</u> the level of risk from use of this hazardous substance (<u>select one</u>)? 1. <u>Risks not significant and not likely to increase in the future</u> 2. <u>Risks are significant but effectively controlled (but could increase in the future)</u> 3. <u>Risks are significant and not effectively controlled</u> 4. <u>Uncertain about the risks (Conduct air monitoring and/or health surveillance [see below] or obtain further information and advice)</u>	Level of risk: Explanation of why this risk level is chosen:
15. Does air monitoring need to be done? You can have air monitoring done to: <ul style="list-style-type: none"> find out how much your employees are being exposed to find out if the controls being used are adequate to ensure employee's health and safety is protected 	
16. What control measures will be implemented? (The best type of control is by elimination; however other types of controls can be used). Hierarchy of Control Measures <ul style="list-style-type: none"> <input type="checkbox"/> <u>Elimination</u> (MOST EFFECTIVE) <input type="checkbox"/> <u>Substitution (with a less hazardous substance)</u> <input type="checkbox"/> <u>Engineer out the hazard by isolation</u> <input type="checkbox"/> <u>Engineer out the hazard by ventilation</u> <input type="checkbox"/> <u>Administrative controls (rotation, procedures etc)</u> <input type="checkbox"/> <u>PPE (especially respiratory protection)</u> (LEAST EFFECTIVE) 	Give details (<u>if any</u>):
17. Is health surveillance required? Health surveillance is required if:	

<ul style="list-style-type: none"> • Someone has an adverse effect from a hazardous substance at work and there is a way to detect signs of the health effect; or: • The level of risk (from question 14) is significant <u>and</u> the substance contains (or is) one or more of the following: <ul style="list-style-type: none"> • 4,4' Methylenebis (2-chloroaniline) (MOCA) • Acrylonitrile • Asbestos • Benzene • Cadmium • Creosote • Crystalline silica • Inorganic arsenic • Inorganic chromium • Isocyanates • Organophosphate pesticides • Pentachlorophenol (PCP) • Polycyclic aromatic hydrocarbons (PAH) • Thallium • Vinyl chloride <p><small>(Refer to section 109 of the Queensland Workplace Health and Safety Regulation 1997)</small></p>	
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18. Date: _____ **19. Review Date:** _____

20. Person/s conducting risk assessment:

<p>What Personal Protective Equipment (PPE) is recommended by the MSDS? (Refer to MSDS)</p>	<p>Approved respirators, goggles, face shield, elbow length PVC gloves, safety footwear, PVC apron.</p>
<p>Currently, what PPE is used? (Give Details)</p>	<p>None</p>
<p>Are <u>any</u> other control measures (procedures) recommended by the MSDS?</p>	<p>Do not wear contact lenses, have eye wash unit available.</p>
<p>Are any other control measures (procedures) <u>currently</u> used at the workplace?</p>	<p>No</p>
<p><u>What is</u> the risk of exposure to this hazardous substance (<u>select one</u>)?</p> <ol style="list-style-type: none"> 5. <u>Risks not significant now and not likely to increase in the future</u> 6. <u>Risks are significant but effectively controlled (but could increase in the future)</u> 7. <u>Risks are significant and not effectively controlled</u> 8. <u>Uncertain about the risks</u> (Conduct air monitoring <u>and/or</u> health surveillance <u>[see below]</u> or obtain further information and advice) 	<p>Risk level ...3..... Why did you select this risk level? Significant because there are no controls to prevent or minimise injury.</p>
<p><u>What control measures will be implemented?</u> (The best type of control is by elimination; however other types of controls can be used). <u>Hierarchy of Control Measures</u></p> <ul style="list-style-type: none"> • <u>Elimination</u> (MOST EFFECTIVE) • <u>Substitution</u> (with a less hazardous substance) • <u>Engineer out the hazard by isolation</u> • <u>Engineer out the hazard by ventilation</u> • <u>Administrative controls</u> • <u>PPE</u> (especially respiratory protection) (LEAST EFFECTIVE) 	<p>Give details (if any): In addition to goggles and suitable gloves, an appropriate respirator will be given to each worker who cleans the oven. Training in the use of respirators and the chemical will be given. Each worker will only be rostered to clean the oven twice a month. Will provide a fan & open windows while doing job.</p>
<p>If uncertain, is air monitoring required? Why?</p> <ul style="list-style-type: none"> • Are workers likely to be exposed to the substance in the air? • Is there an Exposure Standard for the substance in the MSDS? <p>(Refer to section 108 of the Queensland Workplace Health and Safety Regulation 1997)</p>	<p>Not Applicable</p>
<p>Is health surveillance required?</p>	<p>Not Applicable</p>

<ul style="list-style-type: none"> • Health surveillance is required if there continues to be a significant risk <u>and</u> the substance contains (or is) one or more of the following: <table border="0" style="width: 100%; margin-left: 20px;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • 4,4' Methylenebis (2-chloroaniline) (MOCA) • Acrylonitrile • Asbestos • Benzene • Cadmium </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • Creosote • Crystalline silica • Inorganic arsenic • Inorganic chromium • Isocyanates • Organophosphate pesticides </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • Pentachlorophenol (PCP) • Polycyclic aromatic hydrocarbons (PAH) • Thallium • Vinyl chloride </td> </tr> </table> <p>(Refer to section 109 of the Queensland Workplace Health and Safety Regulation 1997)</p> 	<ul style="list-style-type: none"> • 4,4' Methylenebis (2-chloroaniline) (MOCA) • Acrylonitrile • Asbestos • Benzene • Cadmium 	<ul style="list-style-type: none"> • Creosote • Crystalline silica • Inorganic arsenic • Inorganic chromium • Isocyanates • Organophosphate pesticides 	<ul style="list-style-type: none"> • Pentachlorophenol (PCP) • Polycyclic aromatic hydrocarbons (PAH) • Thallium • Vinyl chloride 	
<ul style="list-style-type: none"> • 4,4' Methylenebis (2-chloroaniline) (MOCA) • Acrylonitrile • Asbestos • Benzene • Cadmium 	<ul style="list-style-type: none"> • Creosote • Crystalline silica • Inorganic arsenic • Inorganic chromium • Isocyanates • Organophosphate pesticides 	<ul style="list-style-type: none"> • Pentachlorophenol (PCP) • Polycyclic aromatic hydrocarbons (PAH) • Thallium • Vinyl chloride 		

Date: 25/07/05

Person/s conducting risk assessment: Business owner

Review dates: 25/08/05; 25/11/05; 25/07/06

4.4.2 Example Hazardous Substances Risk Assessment

Only required for chemical that are listed as Hazardous Substances

The Material Safety Data Sheet (MSDS) will be needed to complete the risk assessment.

References: [Workplace Health and Safety Regulation Part 13: the Hazardous Substances Code of Practice 2003](#)

Name of Substance: Mineral Turpentine (Turps)

(or name of the substances if using a mixture)

<p>Briefly, what are the health effects of exposure to this substance? <i>(Refer to the MSDS)</i></p>	<p>On the skin - discomfort, drying, scaling skin, can lead to dermatitis. Inhaled (breathed in) - lung irritation, coughing, nausea, headaches, fatigue</p>
<p>How is the substance used? - i.e. describe the process? <i>(If the chemical is used for a number of different processes a risk assessment may be needed for each task. Also consider decanting, storage & disposal)</i></p>	<p>Only small amounts used to clean off paints and for cleaning metal frames. Poured onto a rag (using bare hands). Rag left on benches until the end of the day clean-up then placed in rag drum with lid.</p>
<p>How are people exposed to the substance? <i>(Please circle/highlight all routes of entry)</i></p>	<p><u>Skin</u> <u>Eyes</u> <u>Inhalation</u> <u>Ingestion</u> (Swallowed) (Breathed in)</p>
<p>How much of the substance are the workers exposed to during the task?</p>	<p><u>(eg: in litres / millilitres)</u> 50ml</p>
<p>For how long are the workers exposed to the substance? <i>(How often is the chemical used)</i></p>	<p><u>(eg: in hours per day & days per week)</u> <u>20 minutes per day</u></p>
<p>What engineering control measures (eg ventilation) are recommended by the MSDS? <i>(Refer to the MSDS)</i></p>	<p>Use in a well ventilated area.</p>
<p>Currently, what engineering controls are used to control exposure to the substance?</p>	<p>In summer there is flow through breeze in the shed. In winter or when raining the roller doors are closed.</p>

<p>If engineering controls are used, are they maintained and checked for effectiveness? (Give Details)</p>	<p>Not applicable.</p>
<p>What Personal Protective Equipment (PPE) is recommended by the MSDS? (Refer to MSDS)</p>	<p>PVC gloves. Safety glasses/goggles.</p>
<p>Currently, what PPE is used? (Give Details)</p>	<p>None.</p>
<p>Are <u>any</u> other control measures (procedures) recommended by the MSDS?</p>	<p>Do not wear contact lenses when using turps. Have an eye wash unit available.</p>
<p>Are any other control measures (procedures) <u>currently</u> used at the workplace?</p>	<p>Only that Barrier cream is available if the workers want to use it.</p>
<p><u>What is</u> the risk of exposure to this hazardous substance (select one)? 9. <u>Risks not significant now and not likely to increase in the future</u> 10. <u>Risks are significant but effectively controlled (but could increase in the future)</u> 11. <u>Risks are significant and not effectively controlled</u> 12. <u>Uncertain about the risks</u> (Conduct air monitoring <u>and/or</u> health surveillance [see below] or obtain further information and advice)</p>	<p>Risk level1..... Why did you select this risk level? Due to the quantity used there are no great risks, however there needs to be some thought about ventilation/extraction of vapours in the winter time.</p>
<p><u>What control measures will be implemented?</u> (The best type of control is by elimination; however other types of controls can be used). Hierarchy of Control Measures</p> <ul style="list-style-type: none"> • <u>Elimination</u> (MOST EFFECTIVE) • <u>Substitution (with a less hazardous substance)</u> • <u>Engineer out the hazard by isolation</u> • <u>Engineer out the hazard by ventilation</u> • <u>Administrative controls</u> • <u>PPE (especially respiratory protection)</u> (LEAST EFFECTIVE) 	<p>Give details (if any): Install an extraction unit for the area where the turps is used. To be in place by May 2006. Provide gloves (PVC) for the workers. Used rags to be placed in drum immediately after use. Training for workers about the hazardous substance. Document training.</p>
<p>If uncertain, is air monitoring required? Why?</p> <ul style="list-style-type: none"> • Are workers likely to be exposed to the substance in the air? • Is there an Exposure Standard for the substance in the MSDS? <p>(Refer to section 108 of the Queensland Workplace Health and Safety Regulation 1997)</p>	<p>Not applicable.</p>

<p>Is health surveillance required?</p> <ul style="list-style-type: none"> Health surveillance is required if there continues to be a significant risk <u>and</u> the substance contains (or is) one or more of the following: <ul style="list-style-type: none"> 4,4' Methylenebis (2-chloroaniline) (MOCA) Acrylonitrile Asbestos Benzene Cadmium Creosote Crystalline silica Inorganic arsenic Inorganic chromium Isocyanates Organophosphate pesticides Pentachlorophenol (PCP) Polycyclic aromatic hydrocarbons (PAH) Thallium Vinyl chloride <p>(Refer to section 109 of the Queensland Workplace Health and Safety Regulation 1997)</p>	<p>Not applicable.</p>
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Date: 22/08/05 _____

Person/s conducting risk assessment: I.B. Strong _____

Review dates: Training by 22/09/05.

4.5 Controlling the Risks

Implement control measures to address actions required from risk management. Control or prevention of exposure is undertaken by implementing appropriate control measures. When considering methods to control exposure, all the possible routes of entry to the body should be taken into account. Control measures are not mutually exclusive and in some circumstances two or more control measures may be required to reduce exposure to as low a level as is practicable. Control measures for a hazardous substance should be considered in the planning of any new workplace or modifications to an existing workplace. The costs of the control should be considered in the same way and at the same time as all other plant and process costs.

4.6 Control Measures

4.6.1 Hierarchy of Control Measures

The hierarchy of control measures is a list of control measures, in priority order, that can be used to eliminate or minimise exposure to a hazardous substance. The order in which control measures should be implemented is:

- Elimination
- Substitution
- Isolation
- Engineering Controls
- Administrative Controls
- Personal Protective Equipment (PPE).

Application of the hierarchy of control measures involves firstly assessing whether a hazardous substance can be eliminated. Where this is not practicable, substitution should be considered. If this is not practicable, consideration should be given to each of the other control measures (isolation, engineering controls, safe work practices and use of personal protection equipment) in turn, with the objective of identifying a control measure or combination of control measures that will eliminate or minimise exposure.

Elimination

Where a work activity involves the use of a hazardous substance that is not essential to the work activity the hazardous substance should be eliminated, wherever practicable. Examples of elimination include:

- Using a physical process rather than a chemical process to clean an object, for example, use of ultra-sound;
- Using clips, clamps or bolts instead of adhesive; and
- Purchasing supplies of a material in a ready-cut and sized form rather than carrying out a dust producing

- Cutting process on site.

Substitution

Which includes substituting a less hazardous substance, the same substance in a less hazardous form or the same substance in a less hazardous process? Examples of substitution include:

- Replacing a chlorinated degreasing solvent with a detergent;
- Using a water-based paint in place of an organic solvent-based paint;
- Using a hazardous substance in paste or pellet form rather than a dusty powder; and
- Brush application of paint rather than aerosol application.

Isolation

Which involves separation of the process from people by distance or the use of barriers to prevent exposure? For example, a booth in an underground carpark is supplied with fresh air to minimise carbon monoxide exposure for a parking attendant.

Engineering Controls

Which by the use of plant or processes which minimise the generation of a hazardous substance, suppress or contain a hazardous substance or which limit the area of contamination in the event of spills or leaks. Types of engineering controls include enclosure or partial enclosure, local exhaust ventilation and automation of processes. Some examples of engineering controls are:

- Ventilated booths for spraying paint or fibre glassing;
- Robot welding;
- Local extraction systems attached to grinding machines;
- Automation of the removal of objects from degreasing baths; and
- Closed reaction vessels.

Administrative Controls

Which are work practices which require people to work in safer ways and are intended to limit the extent of exposure to a hazardous substance. Examples of safe work practices include:

- Excluding non essential persons from a work area;
- Shift or work rotation to reduce the period of exposure for workers;
- Regular cleaning of contamination from walls and surfaces;
- Providing means for safe storage and disposal of a hazardous substance;
- Prohibiting eating, drinking and smoking in contaminated areas;
- Prohibiting the use of compressed air for personal cleaning purposes;

- Vacuuming dust from areas where cutting processes take place;
- Keeping lids on containers when not in use;
- Providing and using facilities for effective decontamination; and
- Providing first aid, safety showers and eye wash facilities, evacuation procedures and emergency procedures.

Personal Protective Equipment (PPE)

The basic personal protective equipment available to guard against risks from hazardous substances includes respirators, goggles, face shields, gloves, footwear, and aprons. Self contained breathing apparatus or hazardous chemical suits may be required if the risk of exposure is significant because a hazardous substance is present in an uncontrolled environment.

Situations where the use of suitable personal protective equipment may be necessary include:

- Where it is not technically feasible to achieve adequate control by other means. In these cases, exposure should be reduced as far as practicable by other measures and then, in addition, suitable personal protective equipment should be used to secure adequate control;
- Where personal protective equipment is necessary to safeguard health until such time as adequate control is achieved by other means, for example, where urgent action is required because of plant failure;
- During routine maintenance operations where the infrequency and small number of people involved may make other control measures not practicable; or
- Where MSDS and labels indicate.

The ongoing costs (eg training and maintenance and/or replacement) and operator considerations¹⁰ (eg correct fit and medical factors) associated with PPE should be given significant consideration before determining it as the preferred control option.

To ensure PPE is effective as a control it should be:

- Selected for the contaminant, task and the operator in accordance with appropriate standards;
- Readily available;
- Clean and functional;
- Checked before use;
- Correctly used when required; and
- Appropriately maintained.

Following the selection of appropriate PPE as a control measure, training should be provided to ensure it is properly used in accordance with the appropriate standards for the equipment.

4.6 Review Of Control Measures

All measures for the control of exposure should be thoroughly examined and tested at regular intervals to ensure effective performance. Controls should be reviewed if work related ill health is reported.

Routine maintenance including preventive service procedures should be established, specifying:

- Which control measures require servicing;
- The servicing needed;
- The frequency of servicing;
- Who is responsible for servicing;
- How any defects will be corrected;
- Performance testing and evaluation; and
- Record of servicing.

4.7 Record the Assessment

Assessment reports should reflect the detail of the assessment, and provide sufficient information to show how the decisions about risk and controls were made.

The risk assessment record should include:

- The name of the assessor or assessment team;
- Personnel involved;
- Description of the hazard and routes of entry to the body;
- Description of normal operations in the work area;
- Procedures used to assess exposure;
- Procedures used to assess the degree of exposure;
- Procedures used to assess existing control measures;
- Conclusion from the assessment whether the risk was not significant or significant;
- Action to be taken;
- Induction, training, emergency procedures and health surveillance action to be taken;
- The circumstances when reassessment will be required;
- Signature, date and position of the assessor/assessment team; and
- Signature, date and position of the employer accepting the assessment.

4.8 Monitoring

4.8.1 What is Monitoring?

This monitoring refers almost exclusively to monitoring of the air which a worker breathes, as the majority of occupational exposures to hazardous substances occur through inhalation. Knowing the extent of exposure to a hazardous substance is fundamental to providing adequate control against breathing a contaminated atmosphere. In rare cases, monitoring may also relate to exposure occurring via the unprotected skin or even to the skin when personal protective equipment is worn.

The risk assessment process for hazardous substances in the Workplace Health and Safety Regulation 1997 section 105 calls upon using information about exposure to assist in making that risk assessment. In most of the simpler cases, the extent of exposure can be gauged from observation and relevant detail from the label and MSDS. In some instances exposure can be tolerated without protection provided it is maintained within accepted limits.

There are some instances, however, where the procedure of observing a process aided by an MSDS and a label will not provide reliable estimates of exposure. Examples include:

- A respirable dust which workers are exposed to often cannot be seen;
- A visible dust concentration cannot be judged by eye;
- Some airborne contaminants have no odour so their presence is undetected and hence underestimated;
- An exposure standard may be exceeded before an odour is detected;
- A strong odour at low concentration levels may lead to gross overestimation of exposure and exacerbate the perception of risk; and
- There is significant process or environmental variability which makes an unmeasured estimate of exposure unreliable.

4.8.2 The Role of Monitoring in Risk Assessment

Air monitoring provides a reliable estimate of exposure and is the primary means of making a comparison with exposure standards possible. Air monitoring is also used to help in correct selection of controls, including personal protective equipment. In some circumstances, monitoring can also be used to review the effectiveness of any newly introduced engineering or process controls.

4.8.3 What Monitoring Should Cover

Monitoring takes into consideration:

- Individual worker behaviour by measuring concentration of contaminants in the worker's breathing zone;
- All environmental and process variables;

- Collection of sufficient data needed to estimate any Time Weighted Average (TWA), Short Term Exposure Limit (STEL),
- Peak Limitation, or adjusted exposure standard that is appropriate for that hazardous substance in that work situation;
- Correct selection of workers from groups doing the same or different tasks where it is not feasible to sample all workers;
- Adequate statistical evaluation of measurements, including the number of measurements, to establish some confidence limits in the estimate of exposure; and
- Whether monitoring is for simple legislative (pass/fail) compliance or more exacting health surveillance purposes.

5.0 Health Surveillance

5.1 What is Health Surveillance?

Health surveillance involves the medical monitoring of a person who may be exposed to a hazardous substance. This may be through the testing of body fluids such as blood and urine, or through testing of body function, for example, lung function tests for workers who work with respiratory sensitisers, or an examination of the skin.

5.2 Requirement for Health Surveillance

Workers should be made aware that health surveillance is sometimes necessary to ensure their ongoing health. Health surveillance is often used in addition to workplace monitoring.

5.3 Selection of the Designated Doctor

The Division of Workplace Health and Safety maintains a register of designated doctors for hazardous substances. Advice should be sought from industry associations, neighbouring businesses and others with similar concerns before selecting a designated doctor.

Choose a doctor who:

- Is willing to visit the workplace so as to understand the hazards and work processes;
- Demonstrates good interpersonal skills with workers; and
- Is sensitive to other considerations intrinsic to the workplace.

5.4 Access of Information by a Doctor

When the risk assessment requires health surveillance to be undertaken the doctor should be:

- Provided with access to a list of the hazardous substances for which the workers are required to have health surveillance and a copy of the MSDS and exposure standards for those substances;

- Provided with a list of the names of workers requiring health surveillance;
- Permitted to have access to any relevant assessment reports; and
- Provided with any air monitoring results.

6.0 Dictionary

Biological monitoring means testing for the presence of a hazardous substance, its metabolites or a biochemical change in a person's body tissue, exhaled air or fluid.

Control measures means the ways of preventing or minimising a person's exposure to a substance.

A **Hazard** is the potential for a substance to adversely affect the health and safety of people in the workplace.

Health surveillance means the monitoring (including biological monitoring and medical assessment) of a person to identify changes in the person's health because of exposure to a hazardous substance.

Medical record of a person means personal medical results or clinical findings obtained from health surveillance of the person.

Monitoring means regularly checking, other than by biological monitoring –

- (a) The person's risk from, or level of exposure to, a hazardous substance; and
- (b) The effectiveness of hazardous substance control measures at a person's workplace.

A **Risk** is the likelihood that a substance will cause illness or injury in the conditions of its use. The risk to health and safety usually increases with the severity of the hazard, the amount of hazardous substance used, and the duration and frequency of exposure. For example, the solvent Xylene has been identified through tests on animals and humans as being a hazard to humans. The risk to a worker using Xylene will depend on the way it is used. If it is used in an enclosed system the risk will be low. However, if it is used in a degreasing bath without ventilation, the risk to health from inhaling the vapour is likely to be high.

Representative of a worker includes a co-worker elected by workers at the worker's workplace to represent the worker on workplace health and safety issues.

Substance does not include a thing (other than a fluid or particle) -

- (a) Formed during production to a predetermined design or shape or to have a predetermined surface; and
- (b) Used for a purpose depending completely or partly on its design, shape or surface; and
- (c) Keeping its chemical composition and physical state during use.

Use includes handling, production, storage, movement and disposal of the substance, but does not include the carriage of a substance covered by the ADG Code or the International Maritime Dangerous Goods Code.