LEARNER STUDY GUIDE

Controlling Workplace Hazards and Risks

NAME OF LEARNER:	

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We hope that this makes you as excited as it does us and it is a real privilege for us to be able to facilitate and assess you on the outcomes of the unit standard that we are about to start.
Please feel free to communicate any questions to your facilitator or to your assessor.
Remember; look out for the following icons in your Study Guide:

LEARNING PROGRAMME SCHEDULE

Learning Programme Name: **CONTROLLING WORKPLACE HAZARDS AND RISK**

Unit Standard	Unit ID	US NQF Level	US Credits
Control workplace hazards and risks	259624	NQF Level 2	4 Credits

Details of the Learning Programme Schedule:

- ✪ This learning programme will be trained over a period of 1 DAY
- ✪ The learner has 8 HOURS (1 DAY) in which to complete the FORMATIVE and SUMMATIVE Assessments
- ✪ The learner has to spend a minimum of 28 HOURS (4 DAYS) in the work environment in the form of practical work

Good Luck and enjoy your learning experience!

UNIT STANDARD

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

REGISTERED UNIT STANDARD:

Control workplace hazards and risks

SAQA US ID	UNIT STANDARD TITLE			
259624	Control workplace hazards and risks			
ORIGINATOR		**ORIGINATING PROVIDER**		
SGB Occupational Health and Safety				
QUALITY ASSURING BODY				
-				
FIELD			**SUBFIELD**	
Field 09 - Health Sciences and Social Services			Preventive Health	
ABET BAND	**UNIT STANDARD TYPE**	**PRE-2009 NQF LEVEL**	**NQF LEVEL**	**CREDITS**
Undefined	Regular	Level 2	NQF Level 02	4
REGISTRATION STATUS		**REGISTRATION START DATE**	**REGISTRATION END DATE**	**SAQA DECISION NUMBER**
Reregistered		2012-07-01	2015-06-30	SAQA 0695/12
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**		
2016-06-30		2019-06-30		

In all of the tables in this document, both the pre-2009 NQF Level and the NQF Level is shown. In the text (purpose statements, qualification rules, etc.), any references to NQF Levels are to the pre-2009 levels unless specifically stated otherwise.

This unit standard does not replace any other unit standard and is not replaced by any other unit standard.

PURPOSE OF THE UNIT STANDARD

The person credited with this unit standard is able to describe the information, training and duties of persons exposed to hazardous substances and risks, as well as understanding the responsibilities of both employer and employee in such situations. Learners will be able to identify hazardous substances by product and company, the procedures required to handle them, the risks and dangers associated with hazardous substances and the methods of dealing with exposure to them. They will also be able to explain the production, processing, use, storage, handing or transporting of hazardous substances, as well as dealing with compliance and non-compliance issues.

The qualifying learner is capable of:

- Explaining the governance of workplace hazardous substances.
- Explaining material safety data sheets (MSDS) for hazardous substances in the workplace.
- Explaining risks associated with workplace hazardous substances.
- Controlling workplace hazardous substances.

LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING

- Communication at NQF Level 1 or equivalent.
- Mathematical Literacy at NQF Level 1 or equivalent.

Specific Outcomes and Assessment Criteria:

SPECIFIC OUTCOME 1

Explain the governance of workplace hazardous substances.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1

The actions required by persons who may be exposed to hazardous substances are explained in terms of the impact of exposure on those persons.

ASSESSMENT CRITERION 2

Hazardous substances directly related to the specific workplace are defined and identified with examples.

ASSESSMENT CRITERION 3

The responsibilities of both employer and employee are explained in terms of the prevention of exposure to hazardous substances.

ASSESSMENT CRITERION 4

Non-compliance with the governance of workplace hazardous substances is explained in terms of the impact on the organisation and the immediate environment.

SPECIFIC OUTCOME 2

Explain material safety data sheets (MSDS) for hazardous substances in the workplace.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1

Hazardous substances are identified by product and company.

ASSESSMENT CRITERION 2

Hazards associated with a specific substance are described in terms of the MSDS.

ASSESSMENT CRITERION RANGE

Hazards may include but are not limited to, flammability, chemical hazard, biological hazard, reproductive hazard, eye effects and heath effects (skin, ingestion, inhalation).

ASSESSMENT CRITERION 3

Emergency procedures to deal with hazardous substances are explained in terms of the MSDS.

ASSESSMENT CRITERION RANGE

Emergency procedures may include first aid measures, fire fighting and accidental release.

ASSESSMENT CRITERION 4

Handling and storage procedures of hazardous substances are explained in terms of the MSDS.

ASSESSMENT CRITERION 5

Exposure controls/personal protection measures are explained in terms of the MSDS.

ASSESSMENT CRITERION 6

Disposal methods for the hazardous substance and container are explained according to governance requirements.

ASSESSMENT CRITERION 7

Transportation of the hazardous substance is explained in terms of governance requirements.

SPECIFIC OUTCOME 3

Explain risks associated with workplace hazardous substances.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1

The risks associated with workplace hazardous substances are identified in terms of the impact on people and the immediate environment.

ASSESSMENT CRITERION 2

A risk assessment is conducted for different hazardous substances in the work environment.

ASSESSMENT CRITERION 3

The dangers associated with working with hazardous substances are explained in terms of health and safety of people, assets and the environment.

ASSESSMENT CRITERION 4

Methods of dealing with the possible exposure of persons to hazards associated with hazardous substances are explained with examples.

SPECIFIC OUTCOME 4

Control workplace hazardous substances.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1

The production, processing, use, storage, handing and transporting of hazardous substances are explained with examples in terms of safety to people, objects and the environment.

ASSESSMENT CRITERION 2

Disposal practices for hazardous substances are explained in terms of governance requirements.

ASSESSMENT CRITERION 3

Control measures to prevent exposure in the workplace are implemented according to governance requirements.

ASSESSMENT CRITERION 4

Workplace emergency preparedness plans are evaluated against governance requirements.

ASSESSMENT CRITERION 5

Communication with all stakeholders is carried out in accordance with governance requirements.

ASSESSMENT CRITERION 6

Control of hazardous substances is reported on in order to address non-compliance.

ASSESSMENT CRITERION 7

The importance of complying with measures to control hazardous substances is explained in terms of the consequences for health, safety, environment and production.

UNIT STANDARD ACCREDITATION AND MODERATION OPTIONS

- An individual wishing to be assessed (including through RPL) against this unit standard may apply to an assessment agency, assessor or provider institution accredited by the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.
- Anyone assessing a learner against this unit standard must be registered as an assessor with the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.
- Any institution offering learning that will enable achievement of this unit standard or assessing this unit standard must be accredited as a provider with the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.
- Moderation of assessment will be conducted by the relevant ETQA at its discretion.

UNIT STANDARD ESSENTIAL EMBEDDED KNOWLEDGE

Effects of hazardous substances on persons, equipment and environment.

Critical Cross-field Outcomes (CCFO):

UNIT STANDARD CCFO IDENTIFYING

Identify and solve problems pertaining to the control of workplace hazardous substances.

LESSON 1

Workplace Hazardous Substances

This Learning Unit is aligned to US 259624 Specific Outcome 1:

Explain the governance of workplace hazardous substances

This Learning Unit comprises the theoretical component of your learning and includes activities that are class-based and of a formative nature.

Hazardous substances are used in many workplaces and take many different forms – solids, liquids, gases, mists and fumes, which can all be present in the workplace. Exposure to these hazardous substances can affect the body in many different ways – skin contact, inhalation, ingestion can all cause damage to our bodies.

In legislation, Hazardous Substances are defined in a number of ways – for example, they are those substances classified as toxic, very toxic, corrosive, harmful or irritant. Biological agents and dusts in substantial concentrations are also classified as hazardous substances.

Hazardous Substances can cause short and long term health problems. They can cause serious ill health including cancers, dermatitis and asthma. A cleaner splashing bleach on their skin could cause a burn or inflammation, which will have little long-term effect in most cases. However, a splash of the bleach in the eye could cause permanent damage to their sight. A joiner suffering years of exposure to wood dust could have long term health problems – the dust could affect his lungs and cause health problems for the rest of his life. There are legal obligations on employers to control exposure to hazardous substances to preserve the health of their employees.

TASK 1 – This task needs to be completed and placed in your Portfolio of Evidence.

What exposure do you have to hazardous substances in your own workplace? If these are not present or applicable to your workplace, find a local organisation or factors that does have this type of exposure and answer the question.

This Task is aligned to **Specific Outcome 1, Assessment Criterion 2**

Who is at risk of exposure?

Anyone who works with or is exposed to hazardous substances is at risk. Those exposed to more hazardous substances for long periods of time are more at risk than those exposed for short periods or to less hazardous substances.

The aim should be to prevent exposure to hazardous substances. Where exposure cannot be avoided, then adequate controls should be put in place.

Examples of those who could be exposed to hazardous substances include:

- ⇨ Cleaners – common cleaning materials can cause localised burns and skin complaints
- ⇨ Hairdressers – a number of hairdressing products can damage their skin
- ⇨ Welders – dangerous fumes from welding can damage their lungs
- ⇨ Bakery workers – flour and bakery dust can cause irritation of eyes and nose, skin problems and asthma
- ⇨ Garage workers – paints, solvents, oils and grease and exposure to exhaust fumes can all damage their health
- ⇨ Healthcare staff – exposure to biological agents can cause infection

In reality, the list is endless and most workers will be exposed to hazardous substances at some time or other.

TASK 2 – This task needs to be completed and placed in your Portfolio of Evidence.

What should the responsibilities of the employer and employee be when there is potential for exposure to hazardous substances and why?

This Task is aligned to **Specific Outcome 1, Assessment Criterion 1 and 3**

Legal duties and responsibilities

As well as a common law duty of care on employers to protect employees and members of the public, health and safety legislation covers all employers and workplaces.

In addition, there are specific regulations relating to hazardous substances: these are defined as *very toxic, toxic, corrosive, harmful* or *irritant*.

They include all substances allocated a Workplace Exposure Limit (WEL). There are eight principles that apply, regardless of whether a substance has a WEL or not. These are as follows:

Workplace exposure limits

Adequate control of exposure requires employers to:

- ⇨ Apply the eight principles of good practice for the control of substances hazardous to health
- ⇨ Ensure that Workplace Exposure Limits (WEL) is not exceeded
- ⇨ Ensure that exposure to substances that can cause occupational asthma, cancer or damage to genes that can be passed from one generation to another, is reduced as low as is reasonably practicable

Assessing risks from hazardous substances in your workplace

The risks associated with the hazardous substances in your workplace must be assessed. The employer has the responsibility for the risk assessment.

The person conducting the assessment must have a knowledge and understanding of the process and the requirements of the OHS regulations. Always make use of the existing knowledge within the workplace before deciding whether outside assistance is needed.

Most simple assessments can be carried out internally:

- ⇨ Make a list of all the substances and products in the workplace
- ⇨ Gather as much information as you can on each substance and the risks associated with them
- ⇨ Look at information on labels, in supplier's catalogues and material safety data sheets (discussed in more detail in Lesson 2)

You then need to assess how these risks relate to the specific circumstances of your workplace. Consider the following:

- ⇨ How much of each substance is used and how often? Larger quantities or substances that are used often will increase the risk of exposure.
- ⇨ How is each substance used? Are the substances mixed, poured, sprayed, piped, heated, cooled, etc.? The way they are used will determine how you will control exposures.
- ⇨ How could people be exposed and what effect could it have on their health? Is the substance a solid, liquid, gas, mist or fume? Will the substance damage their skin, lungs, eyes, through skin contact, absorption, ingestion, inhalation or injection?

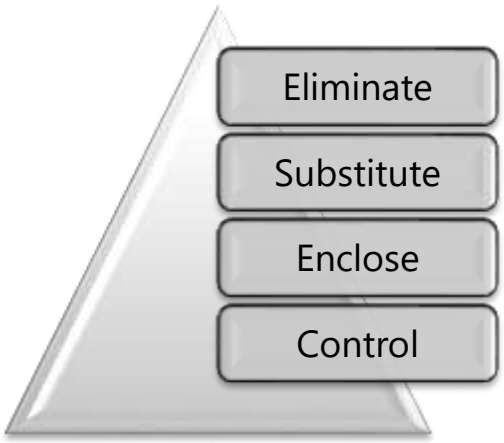
Answering these questions will help you carry out the risk assessment and determine the measures you need to take to protect the health of those people who could be exposed.

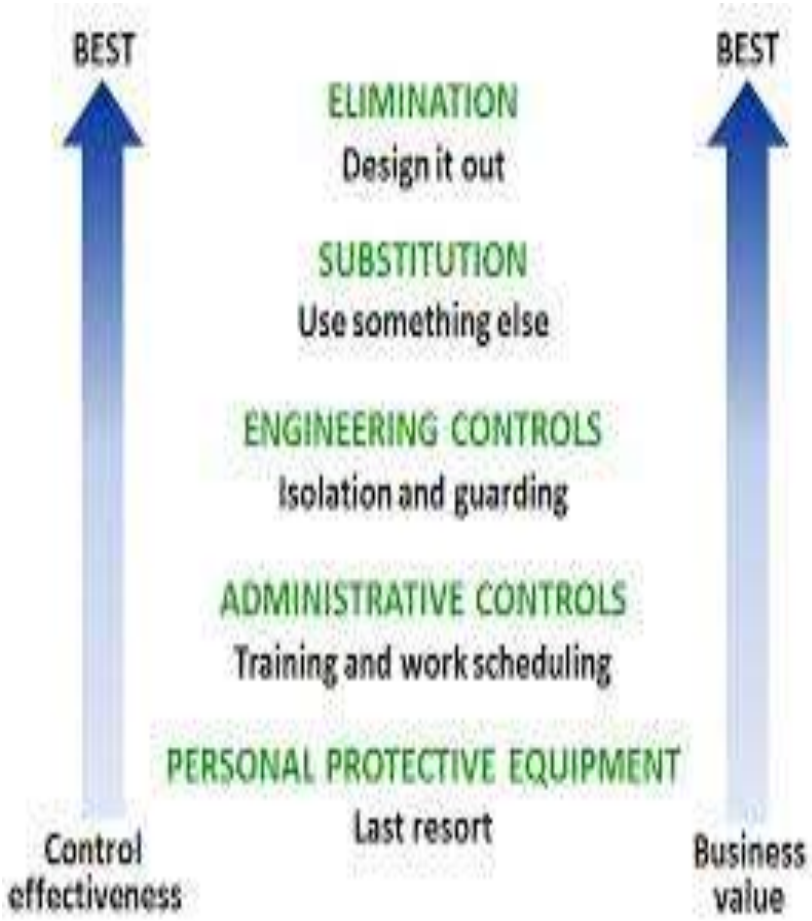
Good practice around hazardous substances

Exposure can be prevented by:

- ⇨ Altering work methods so that the task that causes exposure is no longer carried out
- ⇨ Modifying the process to remove hazardous substances including by-products or waste
- ⇨ Substituting the hazardous substance with a less hazardous type or form of the substance, e.g. using granules instead of powder to reduce dust levels or a less volatile solvent in a process

If exposure cannot be prevented, it must be adequately controlled. The hierarchy of control measures can be summarised below:





Eliminate – don't use the hazardous substance or avoid the procedure which causes exposure

Substitute – change the material or working practice to one less hazardous

Enclose – enclose the hazardous substance or process in a closed system

Control – control exposure to the hazardous substance by using one of the following methods:

- ⇨ *Engineering Controls* – control the exposure at source with local exhaust ventilation or increased dilution ventilation to lower concentrations in the atmosphere
- ⇨ *Procedural Controls* – reduce the numbers exposed or the time spent on the procedure, carry it out in specified areas and carry out routine monitoring and health and medical surveillance – if required
- ⇨ *Personal Protective Equipment* – provide gloves, impervious aprons or overalls and/or respiratory protection to minimise the effects of exposure to hazardous substances

Respiratory protective equipment

This is considered to be the last resort. PPE must only be considered when exposure cannot be adequately reduced by other means (as listed above). It is vital that the respiratory protective equipment (RPE) selected is adequate for the purpose. It must reduce exposure as low as reasonably practicable, and in any case, to below any applicable workplace exposure limit or other control limit.

RPE must fit the face of the wearer properly to be effective. Face-fit testing helps ensure that inadequately fitting face-pieces are not selected.

Information, instruction and training

Everyone in the workplace who is involved with or could be affected by the use of hazardous substances must be provided with the degree of training, instruction and information required to ensure their safety. It is also important to put in place procedures to cope with accidents and emergencies. The controls you have in place may be adequate for normal activities but what would you do if there were an emergency like a major spillage or release of a substance? It is vital that all employees are training to deal with these circumstances, should they occur.

Compliance

By law, employers are responsible for controlling all risks to health and safety in their workplace. Where solutions are not obvious, employers should use a process to help them determine the most effective measures. The workplace should have policies and procedures relating the management of hazardous substances in the workplace. All employees should receive adequate training and information on this aspect of their work. They should also be informed of the action the workplace will take if they do not comply with certain standard operating procedures in their own work areas (if these are related to hazardous substances).

In some workplace, employees are required to sign Health and Safety Agreements wherein all standard operating procedures are listed, and compliance measures are indicated. This document will also indicate any action the workplace may take if an incident or accident occurs and it is found that the employee was at fault for not following standard procedures.

LESSON 2
Material Safety Data Sheets (MSDS)

This Learning Unit is aligned to US 259624 Specific Outcome 2:

Explain material safety data sheets (MSDS) for hazardous substances in the workplace

This Learning Unit comprises the theoretical component of your learning and includes activities that are class-based and of a formative nature.

Material Safety Data Sheets (MSDS)

A Material Safety Data Sheet (MSDS) is a form containing data regarding the properties of a particular substance. An important component of workplace safety, it is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data – *melting point, boiling point, flash point, etc. – toxicity, health effects, first aid, reactivity*, storage, disposal, protective equipment and spill handling procedures. MSDS formats can vary from source to source within a country depending on national requirements.

MSDS are a widely used system for cataloguing information on chemicals, chemical compounds and chemical mixtures. MSDS information may include instructions for the safe use and potential hazards associated with a particular material or product. These data sheets can be found anywhere where chemicals are being used.

The hazard warning can be any type of message, picture, or symbol that provides information on the hazards of the chemical(s) and the targeted organs affected, if applicable
Labels must be legible, in English (plus other languages), and prominently displayed

TASK 3 – This task needs to be completed and placed in your Portfolio of Evidence.

How do you think a MSDS can assist in harmful or emergency situations related to hazardous substances? This Task is aligned to **Specific Outcome 2, Assessment Criterion 2 and 3**

There is also a duty to properly label substances on the basis of physic-chemical, health and environmental risk.

Hazards

Flammability

This is defined as how easily something will burn or ignite, causing fire or combustion. The degree of difficulty required to cause the combustion of a substance is quantified through fire testing.
Internationally, a variety of test protocols exist to quantify flammability. The ratings achieved are used in building codes, insurance requirements, fire codes and other regulations governing the use of building materials as well as the storage and handling of highly flammable substances inside and outside of structures and in surface and air transportation. For instance, changing an occupancy by altering the flammability of the contents requires the owner of a building to apply for a building permit to make sure that the overall fire protection design basis of the facility can take the change into account.

Chemical hazards

Anyone working with chemicals of any sort must ensure before the work commences that they understand the hazards associated with the chemicals, and know what precautions should be taken.
The main hazards of chemicals are:

- ⇨ The toxic effects of chemicals if they enter the body
- ⇨ The corrosive effects of some chemicals if they come into contact with human tissue
- ⇨ The flammable nature of some chemicals

⇨ The reactive nature of some chemicals – often when incompatible chemicals come together

These hazards need to be considered during:
Storage of chemicals
⇨ Use of chemicals
⇨ Disposal of chemical waste

Consider also what will be done if there is a spillage or other uncontrolled release of a chemical.

MSDS
Unless the chemical is one whose properties are well known to the user, it is essential to consult the MSDS. Employees should continuously consult the MSDS as part of the process of carrying out risk assessments.

Risk assessments must always take into account of the risks created by any chemicals which are used. They must always address:
⇨ Storage of chemicals
⇨ Use of chemicals
⇨ Disposal of waste
⇨ Action to be taken in event of a spillage

Biological hazards
These are also known as biohazards and refer to biological substances that pose a threat to the health of living organisms, primarily that of humans. This can include medical waste or samples of micro-organisms, virus or toxins that can affect human health. It can also include substances harmful to animals. The term and its associated symbol is generally used as a warning, so that those potentially exposed to the substances will know to take precautions.

TASK 4 – This task needs to be completed and placed in your Portfolio of Evidence.

What types of hazards exist in your own workplace in relation to hazardous substances? What are their effects on human health?
This Task is aligned to **Specific Outcome 2, Assessment Criterion 2**

Reproductive hazards
Thousands of hazardous chemicals are produced and used in a wide variety of workplaces, all over the world. Some of these substances can have negative effects on the reproductive health of both male and female workers who are exposed to them. There are also a variety of physical and biological agents, such as radiation and bacteria, used in many workplaces that expose workers to additional reproductive hazards. Additionally, there are many work situations – such as work which is highly stressful or shift work – that may cause negative effects on the reproductive systems of male and female workers.

To date, most chemical substances and work situations have not been studied for their potential to have damaging effects on the human reproductive system. Despite the lack of information about possible reproductive health effects, many substances are still used in a variety of workplaces. Many workers are exposed to such hazards every day at work. Working with particular substances or under certain work situations may cause some workers to experience abnormalities in their sexual or reproductive health. Many workers may not know that such problems can be related to occupational exposures. While the information is minimal, much of what is known about the effects of workplace substances on male and female reproductive systems has been learned, in fact, by studying exposed workers, their spouses and children.

It is important that workers and trade union learn as much as possible about the substances used in their workplaces, when information does exist, particularly through the MSDS. Protective measures should be implemented to ensure that pregnant workers and workers – male and female – who may be planning to have a child are not exposed to known or suspected reproductive health hazards.

Eye effects

Although eye splashes or eye contamination by workplace chemicals is fairly common, large quantities of chemicals probably do not enter the body this way. Small amounts of chemicals may enter by dissolving in the liquid surrounding the eyes, and larger, but probably not significant amounts, may enter the eyes if they are splashed with chemicals.

The eyes are richly supplied with blood vessels and many chemicals can penetrate the outer tissues and pass into the veins. The eye may or may not be damaged during this process, depending on the corrosive nature of the chemical and its ability to penetrate the outer tissues.

Any chemical, whether in the form of a liquid, dust, vapour, gas, aerosol or mist, can contact and enter the eye. For example, the organic solvent toluene can pass through the outer layers of the eye and probably enter the blood stream. During this process it can cause keratitis, an inflammation of the outer layer of the eye.

Chemicals that can be inhaled

Gases and vapours

Workplace chemicals can enter the air in a number of different ways. Simple evaporation is probably the most common way. Organic solvents, such as toluene, MEK or alcohols, generally evaporate more rapidly than water, acids or caustics, though this is not always the case. Evaporation produces vapours. Vapours are formed from substances that exist as solids or liquids under normal temperature and pressure conditions. Substances that do not exist as solids or liquids at normal temperatures and pressures are called gases. Gases as well as vapours can contaminate the workplace air.

Mists

In some instances, an industrial process might produce tiny liquid droplets that are able to float in the air. These droplets are called mists. Mists are formed by gases that condense into smaller liquid droplets in the air. Alternatively, mists may form breaking up, splashing or an atomising liquid. Examples include

acid mists from electroplating, oil mists from cutting and grinding, or paint spray mists from painting operations.

Dusts, fumes and smoke
Other workplace processes can generate tiny solid particles which are light enough to float in the air, and these are referred to as dusts, fumes and smoke. Dusts are solid particles often generated by some mechanical or abrasive activity. They are usually heavy enough to settle slowly to the ground. Fumes are very tiny solid particles which can remain airborne that are formed when a heated metal has evaporated in the air and then condensed back to a solid form. This occurs in welding operations. Smoke is carbon or soot from burning. Smoke particles can settle or remain airborne depending on their size.

Chemicals that can enter the body through the skin
Chemicals which pass through the skin are nearly always in liquid form. Solid chemicals and gases or vapours do not generally pass through the skin unless they are first dissolved in moisture on the skin's surface.

The skin is the second most common route by which occupational chemicals enter the body. It consists essentially of two layers, a thin, outermost layer called the epidermis and a much thicker under-layer called the dermis. The epidermis consists of several layers of flat, rather tightly-packed cells which form a barrier against infections, water, and some chemicals. This barrier is the external part of the epidermis. It is called the keratin layer, and is largely responsible for resisting water entry into the body. It can also resist weak acids but is much less effective against organic and some inorganic chemicals. The keratin layer contains fat and fat- like substances which readily absorb chemicals which are solvents for fat, oil, and grease.

Organic and caustic (alkaline) chemicals can soften the keratin cells in the skin and pass through this layer to the dermis, where they are able to enter the veins and hence the blood stream. Areas of the body such as the forearms, which may be particularly hairy, are most easily penetrated by chemicals since they can enter down the small duct containing the hair shaft. Chemicals can also enter through cuts, punctures or scrapes of the skin since these are breaks in the protective layer. Contact with some chemicals such as detergents or organic solvents can cause skin dryness and cracking. There can also be hives, ulcerations or skin flaking. All these conditions weaken the protective layer of the skin and may allow chemicals to enter the body.

Chemicals can vary enormously in the degree to which they penetrate the skin. Some solvents such as trichloroethylene, naphtha and toluene may soften the keratin layer but are not believed to penetrate much further unless there is prolonged skin contact. On the other hand, chemicals such as benzene, carbon tetrachloride, carbon disulfide and methyl alcohol can readily pass through the epidermis and subsequently enter the blood stream. Some chemicals are so corrosive they burn holes in the skin, allowing entry for infection or other chemicals.

In some instances, chemicals may enter by accidental injection through the skin. This may occur in hospital settings or in industrial hole-punching or injection processes. Once in the blood stream, the chemicals can be transported to any site or organ of the body where they may exert their effects.

Chemicals that enter my digestive system
Chemicals can enter the stomach either by swallowing contaminated mucus which has been expelled from the lungs, or by eating and drinking contaminated food. Food and drink are most frequently

contaminated by contact with unwashed hands, gloves or clothing, or by being left exposed in the workplace. Nail-biting and smoking also contribute.

Once inside the mouth, workplace chemicals pass down the esophagus and then into the stomach. Food in the stomach is digested with a strong acid produced by the stomach. A few chemicals, such as alcohol, may pass across the stomach wall and enter the veins and the blood stream here, but most chemicals move from the stomach into a long, twisting tube known as the small intestine. The inside of the small intestine has many hundreds of tiny finger-like projections called villi. The villi have very thin walls and are filled with tiny blood vessels. This allows the digested food to pass from the small intestine across the walls of the villi and enter the veins. The food is then carried around in the blood stream to the parts of the body that need it.

Some workplace chemicals which contaminate food or drink can also pass across the thin walls of the villi and into the blood stream in this manner. Other workplace chemicals, which are not soluble or whose basic units (molecules) are too big to pass across the villi walls, will stay in the gut and pass out through the feces without being absorbed into the blood stream to any extent. Some acids, caustics and organics may cause severe "burn" damage to the digestive system if ingested in high concentrations.

In workplaces, dusts, smoke or fumes can enter the digestive system by accidental ingestion (e.g., swallowing contaminated mucus which has been expelled from the lungs) or by eating something with contaminated hands (e.g., lead paint on unwashed hands).

Information on the MSDS

The MSDS is an essential starting point for the development of a complete health and safety programme. MSDS are not complete sources of information on their own. Most MSDS are prepared by the manufacturer or supplier of the product / material. Therefore, they tend to be general in nature, since they provide summarised information which tries to address all reasonably anticipated uses of the material. As well, there are local laws which must be followed. These laws are not generally described on the MSDS.

When you read an MSDS, you should keep in mind that there are three types of hazards which can be related to the use of a chemical product:

- ⇨ Health hazards – e.g. skin contact with strong acids will cause burns
- ⇨ Fire hazards – e.g. propane burns very easily and may explore
- ⇨ Reactivity hazards – e.g. mixing ammonia and household bleach will result in the release of a harmful gas.

You should make certain that the MSDS describes the preventive and emergency-response measures for all of the potential hazards of the material. A good quality MSDS will provide information that is specific and practical (easy to apply).

Boss Lubricants: Material Safety Data Sheet

Date: March 1, 2009

Product Information

Product Trade Name:	Boss Industrial Hydraulic Oils- HVI
Transportation:	Emergency Phone Number (CHEMTREC): (800) 424-9300
Chemical Name:	Petroleum Oil Blend
NFPA Code:	Health: 0 Fire: 1 Reactivity: 0
HMIS System:	Health: 0 Flamability: 1 Reactivity: 0

1. HAZARDOUS INGREDIENTS

This material is not known to contain any chemical listed as a carcinogen or suspected carcinogen by OSHA, IARC or the National Toxiology Program (NIP) at a concentration greater than 0.1%.

Contains refined petroleum oil and selected additives.
This material is non-carcinogenic as defined by OSHA, IARC, or NIP

2. FIRE AND EXPLOSION HAZARDS

Flash point, C:	216- 246
Upper Flammable Limit:	Not determined
Lower Flammable Limit:	Not determined
Extinguishing Media:	CO2 dry chemical: foam: water spray: water fog
Special Firefighting Procedures:	Cool containers with H2O and remove from fire exposure
Unusual fire & Explosion Hazards:	Empty containers could contain flammable vapours

3. HEALTH HAZARD DATA

Oral Toxicity:	Minimal hazard. Oral toxicity greater than 5,000 mg/kg
Eye Irritation:	May be an eye irritant
Skin Irritation:	Possible redness may result from prolonged exposure.
Other:	Unknown
TLV:	5 mg/m3 as oil mist

Emergency First Aid Procedures:

Skin:	Wash with soap
Eye:	Flush with large amounts of water. If irritation persists, get medical attention
Inhalation:	Remove to fresh air. See physician if irritation persists
Oral:	Call physician. Do not induce vomiting
Additional:	None

4. SPECIAL PROTECTION INFORMATION

Ventilation Procedure:	Normal shop ventilation adequate
Glove protection:	Oil impervious gloves recommended
Eye protection:	Not usually required, but goggles recommended
Other Protection:	None required

5. PHYSICAL DATA

Vapour Pressure: >1mm Hg
Specific Gravity: <1.00 @ 15.5 C
Water Solubility: Slight
Percent Volatile: Not determined
Vapour Density: Not determined
Evaporation Rate: Not determined
Odor: Mild hydrocarbon odor
Appearance: Amber liquid.

6. STABILITY

Stability:	Stable
Incompatibility:	Oxidizing agents
Polymerization:	Will not occur
Thermal Decomposition:	Oxides of carbon, nitrogen, phosphorus, and hydrogen sulfide.

7. SPILL OR LEAK PROCEDURES

Spill Procedures: Wear chemical splash goggles
Wear rubber boots
Prevent entry into sewers and waterways. Pickup free liquid for recycle/disposal
Absorb small amounts of inert material for disposal

Waste Disposal: Disposal should be in compliance with federal, provincial and local laws

8. SPECIAL PRECAUTIONS

Special Precautions: Launder contaminated clothing before reuse.
Wash skin thoroughly after handling. Avoid prolonged contact

9. TRANSPORTATION AND LABELING

DOT Proper Shipping Name: Not applicable
DOT Hazard Class: Not applicable

BOSS INDUSTRIAL HYDRAULIC OILS - HVI

Emergency procedures

First aid measures

The First Aid Measures section describes actions to be taken immediately in case you are exposed to the material. The purpose of first aid is to minimize injury and future disability. In serious cases, first aid may be necessary to keep the victim alive.

- ⇨ Inhalation
- ⇨ Skin
- ⇨ Eyes
- ⇨ Ingestion

You need to know first aid information before you start working with the material. There is no time to find and read the MSDS during an emergency. First aid procedures should be periodically reviewed by everyone working in areas where the material is handled. Everyone should know the location of the facilities and equipment for providing first aid; for example, the eyewash fountains, safety showers and first aid kits.

Knowing the first aid procedures for materials used in a work area is also necessary so that people will have the appropriate first aid skills. In most cases, only basic first aid training is needed. Sometimes, you may need advanced training; for example, for the administration of cardiopulmonary resuscitation (CPR) or oxygen.

Often, the first aid procedures on an MSDS are for a "worst case" exposure.

The first-aider should evaluate how severe the exposure is before using the full first aid procedure. Formal first aid training will help you make this decision. If you are not sure, follow the instructions given on the MSDS.

When medical treatment is necessary, send the MSDS, if it is readily available, to the emergency facility with the victim. If the MSDS is not available, you should send the material's label or a labelled container of the material, if it is small enough. The medical personnel need to know what the material is and what first aid measures have been recommended and used. Occasionally, the MSDS has additional instructions which may be useful to the emergency doctor; for example, it may say, "Monitor kidney function for 24 hours."

Preventative measures

Preventative measures as listed on the MSDS will include the following:

- ⇨ Engineering controls
- ⇨ Personal protective equipment
- ⇨ Gloves – type of material
- ⇨ Eye protection
- ⇨ Respiratory protection
- ⇨ Clothing
- ⇨ Storage requirements
- ⇨ Handling procedures and equipment
- ⇨ Leak / spill clean-up
- ⇨ Waste disposal
- ⇨ Special shipping information

The section on Preventive Measures provides information which is used to develop procedures and practices for working safely with the material. It should be noted that most Material Safety Data Sheets are written to address all reasonably anticipated uses of the material. Because they must address such a wide range of usage situations, the information is not always as specific to your particular situation as it could be. The services of a health and safety professional may be valuable when you are trying to interpret the information and assess its relevance to your particular situation. You may also be able to get more specific information by contacting the manufacturer using the phone numbers given either in the Preparation Information section or in the Product Information section.

All of the possible hazards (fire, reactivity and health) need to be considered when developing safe handling procedures. The Preventive Measures section of the MSDS usually provides information on personal protective equipment, engineering controls, leak/spill procedures, waste disposal, general handling procedures/equipment and storage requirements.

Engineering Controls

Engineering control systems reduce potential hazards either by isolating the person from the hazard or by removing the hazard from the work environment. They include mechanical ventilation and process enclosure. Engineering control systems are important because they are built into the work process to reduce the hazards.

Substitution of a less hazardous material or industrial process is the best way to reduce a hazard, but engineering control systems are the next best option. Engineering controls are preferred to other control measures such as the use of personal protective equipment. This is because engineering controls either control the potential hazard at its source, or put up a permanent barrier between the worker and the potential hazard.

The MSDS does not usually provide the specific details of the engineering controls (for example, ventilation rates, fan size and so on). This is because the controls must be designed to suit the individual work site.

You need to make sure that engineering control systems recommended for your job are properly maintained and are operating when you are working with the material. If there are changes in the process or materials, the controls may have to be changed as well.

Personal Protective Equipment

General guidance on the need for and selection of personal protective equipment such as protective clothing, eye protection and respiratory protection is provided under this heading.

(i) Protective Clothing

Protective clothing includes items such as gloves, aprons, full body suits, and boots. The MSDS should tell you the types of rubbers or other materials that provide the best protection against the chemicals you are using. No one material acts as a barrier to all chemicals. For example, polyvinyl alcohol (PVA) provides excellent protection against toluene diisocyanate but offers poor resistance to trichloroethylene. Sometimes, the MSDS may only say to use impervious (resistant) materials. In this case, you have to get information about the exact material of which the clothing should be made. You may be able to obtain this information from the product supplier or manufacturer or from a protective clothing supplier or manufacturer.

Whenever possible, you should wear protective clothing which is resistant to all the potentially hazardous chemicals to which you may be exposed while performing a particular task. Also, it is

important to maintain your protective equipment properly (for example, protective gloves may need to be rinsed or washed between uses).

(ii) Eye Protection
Under this heading, the MSDS describes the type of eye protection you may need when handling the material. The most common types of eye protection recommended are safety glasses, chemical safety goggles and face shields.

(iii) Respiratory Protection
There are many different types of respirators. The correct type of respiratory protection can change as the amount of the material in the air changes. Also, one type of respirator may be effective against some kinds of chemicals but may provide little or no protection against others.

Complete respiratory protection guidelines usually cannot be given on the MSDS because there is not enough room or because of the lack of specific information about the job. The selection of the best respirator for you can be quite complicated and usually requires a work site assessment. This assessment should be done by someone who knows your operations and who knows how to evaluate potentially hazardous conditions.

If respirators are required at your work site, a complete respiratory protection program including respirator selection, fit testing, training and maintenance is necessary. The relevant standard "Selection, Use and Care of Respirators" should be followed.

Depending on the job, you may have to use personal protective equipment all the time, part of the time, or only in an emergency. You should know which protective equipment is necessary for your work. You also need to know where, when and how to use and maintain your protective equipment and how to recognize problems with it.

Sometimes, there may be no information about personal protective equipment on the MSDS. If a potentially hazardous exposure is possible in your job, you should check the routes of entry in the Toxicological Properties section. If a certain type of exposure is possible and the route of entry is indicated, you should get advice about the need for you to wear protective equipment. For example, if you have hand contact with a material which can damage or be absorbed through the skin, you may need to wear protective gloves.

Storage Requirements
Information provided under this heading gives advice about the conditions necessary to store the material safely. For example, "store in a cool, dry, well-ventilated area away from heat and ignition sources" is commonly used to describe storage conditions for materials which can burn. The MSDS may also give information about the types of chemicals which should NOT be stored with the material.
The storage recommendations are a good starting point for deciding where and how materials should be stored. Refer also to the Fire/Explosion and Reactivity sections of the MSDS. In order to design safe storage areas for chemicals, the applicable fire codes, building codes and industry standards also need to be consulted.

Handling Procedures and Equipment
You will usually find general precautions necessary for the safe use of the material under this heading. For example, the MSDS may suggest electrical grounding and bonding of containers for dispensing a flammable liquid. These instructions may or may not apply to your work, depending on how the material is used and the hazard control measures already in place. An assessment of your work will determine

the best handling precautions for your particular case. You need to know the specific handling procedures for your job.

Leak/Spill Clean-up
General instructions for cleaning up a spill are provided in this section. More specific information, such as recommended sorbent materials for spill clean-up, may be included. The information is used by the people who are responsible for planning emergency response procedures for a spill. Usually, special training is required to clean up a spill or leak safely. You should know your own work site emergency response plan.

Waste Disposal
The waste disposal information is used by people who are responsible for developing waste disposal procedures. The MSDS does not usually contain all the steps and precautions necessary for hazardous waste disposal. As well, the MSDS often does not give the federal, provincial, or local regulations which must be followed. The appropriate authorities for your area should be contacted for this information.

Special Shipping Information
If there are special precautions necessary during shipment of the material, they will be provided in this section. For example, some products may be sensitive to shock or sensitive to high temperatures. The supplier may also include the TDG (Transportation of Dangerous Goods) classification in this section.

LESSON 3

Risks Associated with Hazardous Substances

This Learning Unit is aligned to US 259624 Specific Outcome 3:

Explain risks associated with workplace hazardous substances

This Learning Unit comprises the theoretical component of your learning and includes activities that are class-based and of a formative nature.

TASK 6 – This task needs to be completed and placed in your Portfolio of Evidence.

Identify a workplace who deals with a hazardous substance. Find out what the risks associated with this substance are in relation to human health.

This Task is aligned to **Specific Outcome 3, Assessment Criterion 1**

The risks when working with hazardous substances

The health effects information contained in the MSDS should be considered general since a particular material will not affect everyone the same way. In addition, the way in which a material is used in a particular workplace will influence the degree of the health hazard.

Some MSDSs provide "worst case" toxicity information, describing any known health effect which may possibly occur at any dose, by any route of exposure. Other MSDSs provide information on health effects which would reasonably be anticipated under conditions of normal use, spills or emergencies. This latter information is usually more useful to the user of the product. Because of these differences of approach, one must be cautious in assuming that a product is or is not a health hazard on the basis of information given in this section.

Sometimes, the MSDS will describe effects of the material on animals. This information is usually included when there is a lack of information about the effects of the material on people. When reading about the effects of the material on animals, it is important to remember that the effects are not necessarily the same for people. With careful interpretation, animal data can add to our understanding of how the material can affect people.

Sometimes medical terms are used to describe the possible health effects. If there are words you don't understand, ask for assistance from someone familiar with the use of medical terms to find out what they mean; for example, a nurse or a doctor. Even a medical dictionary will not always provide a complete or understandable definition. You need to understand the potential health effects of the material because they underline the importance of following safe work practices and wearing appropriate protective equipment.
You also should give the health effects information to your family doctor. This will help your doctor follow your work history and to monitor your health and relate any symptoms you have to a possible workplace exposure.

Routes of Entry/Exposure

The information under the Routes of Entry heading describes how you can be exposed to the material. In designing ways to reduce exposure, each Route of Entry needs to be considered. Chemicals can cause harm either at the point of contact, by absorption into the body, or both. Chemicals absorbed into the body can affect body systems and organs far away from the point of entry. For example, phenol absorbed through the skin can cause kidney failure.

The possible routes of entry are the skin, the eyes, the respiratory system (through inhalation), and the digestive (gastrointestinal) system (through swallowing). How important each route of entry is for a particular material depends on many factors, such as the physical properties of the material and how it is used.

Effects of Acute Exposure to Product

An acute exposure or short-term exposure is one that takes place over a short period of time (minutes, hours or days).

The health effects caused by an acute exposure are usually seen at the time of exposure. Sometimes, they may not appear for several hours or even days after an exposure.

You need information on the typical effects of a short-term exposure because symptoms can alert you that you are being accidentally exposed. For example, workplace control measures may have failed. Any symptoms you experience which may be associated with use of a material should be reported so that your workplace can be investigated to find out the cause. Possible reasons for the symptoms can vary widely. For example, perhaps the material has passed through your gloves, or the ventilation system is not working effectively. Sometimes the symptoms may not be related to an exposure at work - they may be caused by a cold, for example.

Usually, the effects of exposure to a low concentration of the material are described first. The MSDS may then go on to tell you the possible effects of a moderate or severe exposure. You need to know the nature of these symptoms so that you can recognize the potential seriousness of an exposure.

Effects of Chronic Exposure to Product

A chronic exposure is a long-term exposure. Long-term means over months or years. This type of exposure may also be described as prolonged, meaning very long, or repeated, meaning many exposures.

Any illness related to a chronic exposure may develop very slowly or may not appear until many years after the exposure has stopped. You should be aware that at the time of the exposure you may experience no warning symptoms but an illness possibly related to the exposure may appear months or years later. For example, if you are exposed to asbestos you may not experience any respiratory symptoms at the time but may develop lung cancer many years later. Therefore, it is important that you follow all safe handling procedures established for your job.

Exposure Limits
MSDSs usually give common occupational exposure limits. Some manufacturers provide their own recommended exposure limits for their products. Exposure limits are typically used by health and safety professionals if air sampling needs to be conducted. The airborne concentrations measured in the workplace are compared with the exposure limits as part of a health hazard assessment. Legally, your company must comply with the applicable regulated limits, which are not necessarily those listed on the MSDS.

Irritancy of Product
Some products can cause irritation if they come into direct contact with the skin, eyes or respiratory tract (nose, breathing airways and lungs). If there is information available about irritancy of the product, it will be indicated in this section.

Sensitization to Product
Sensitization is the development, over time, of an allergic reaction to a chemical. The chemical may cause a mild response on the first few exposures but, as the allergy develops, the response becomes worse with subsequent exposures. Eventually, even short exposures to low concentrations can cause a very severe reaction.

There are two different types of occupational sensitization: skin and respiratory. Typical symptoms of skin sensitivity are swelling, redness, itching, pain, and blistering. Sensitization of the respiratory system may result in symptoms similar to a severe asthmatic attack. These symptoms include wheezing, difficulty in breathing, chest tightness, coughing and shortness of breath. It is very important that you reduce your exposure to sensitizing materials as much as possible by following safe handling procedures.

Carcinogenicity
A carcinogen is a substance which can cause cancer. Carcinogenic means able to cause cancer. Carcinogenicity is the ability of a substance to cause cancer. Certain chemicals may be listed as suspect or possible carcinogens if the evidence is limited or so variable that a definite conclusion cannot be made.
If the product you are using contains materials that are identified as known carcinogens, probable carcinogens, suspected carcinogens, or possible carcinogens, you should be particularly careful that you follow safe handling procedures and reduce your exposure to the product as much as possible.

Reproductive Toxicity
Reproductive toxicity is defined as effects on the reproductive process in adult males and/or females, which may be caused by a substance. Possible reproductive effects include reduced fertility in the male or female, menstrual changes, or effects on gonadal function, mating behaviour or conception.

If you are working with a chemical that is identified as having the potential to cause reproductive effects, you should be careful to reduce your exposure as much as possible by following safe handling procedures.

Teratogenicity
A teratogen is a substance which can cause birth defects. An embryotoxin is a substance which can cause toxic effect on the developing embryo. Teratogenic means able to cause birth defects. Embryo toxic means able to cause toxic effects on the developing embryo. Both teratogenicity and embryo toxicity result from a harmful effect on the embryo or the foetus during pregnancy. Most chemicals can cause teratogenicity effects if there is an extremely high exposure. In these cases, the exposed person would experience other noticeable signs and symptoms caused by the exposure. On the other hand, chemicals which cause reproductive effects in the absence of other significant harmful effects are regarded as true reproductive hazards. Very few workplace chemicals are known to be in this category. Pregnant women need to be particularly careful to reduce their exposure to these types of materials as much as possible.

Mutagenicity
A mutagen is a substance which can cause changes in the DNA of cells (mutations). Mutagenic means able to cause mutations. Mutagenicity is the ability of a substance to cause mutations. DNA determines the characteristics that children inherit from their parents. DNA also determines how cells in the body divide or reproduce.

A number of laboratory tests are used to screen chemicals for possible mutagenic effects. Also, there is some evidence that mutations may increase the risk of cancer and reproductive problems such as infertility or birth defects. However, mutagenicity test results are not very reliable predictors of these effects. One reason for this is that the human body can repair mutations while the bacteria used for many of the mutagenicity tests cannot.

Mutagenicity is included on the MSDS because it is an early indicator of potential hazard and often there is very little other evidence available on possible genetic, carcinogenic or reproductive effects.

Conducting risk assessments

Health and safety requires employees to undertake suitable and sufficient risk assessments; part of a risk assessor's duties will include assessing the risks imposed by hazardous substances use or stored on site.

Hazardous substances used in the workplace will and often have caused harm to the health of employees and others not directly associated with the activities, where exposure has not been properly controlled.

Exposure may cause short or long term health problems. It can be many years before symptoms become apparent, and even more difficult to relate them back to an individuals' historical work activities.

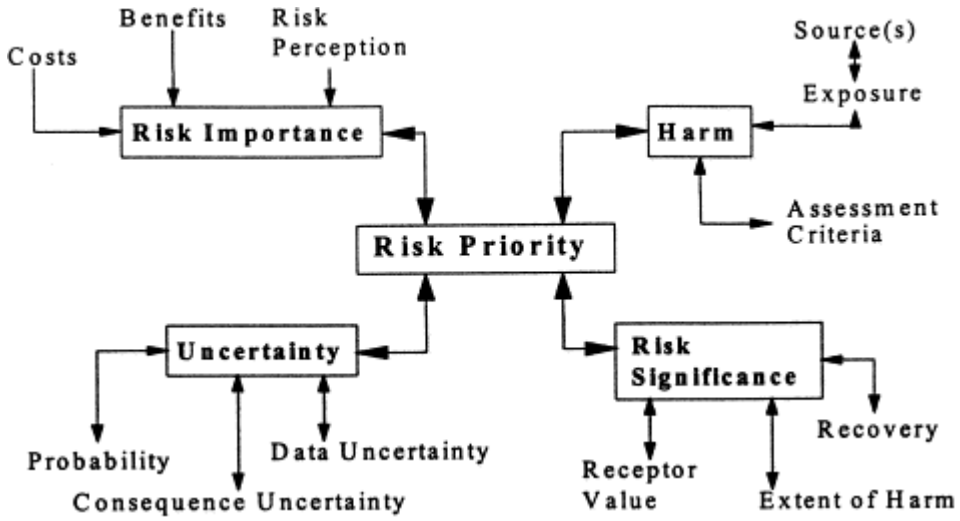
Hazardous substances themselves cover a surprisingly large spectrum of materials and not all are man-made and many are the result of processes applied to inert materials, i.e. drilling operations. A few common examples are listed below:

- ⇨ Oils and greases
- ⇨ Glues and adhesives
- ⇨ Paints and varnishes
- ⇨ Petrol and diesel

- ⇨ Cleaning materials
- ⇨ Sand and cement
- ⇨ Substances generated during work activities, e.g. fumes from soldering and welding or dust from grinding
- ⇨ Naturally occurring substances, e.g. grain dust
- ⇨ Sewage and effluent

Examples of the effects of hazardous substances include:

- ⇨ Skin irritation or dermatitis as a result of skin contact
- ⇨ Asthma as a result of developing allergy to substances used at work
- ⇨ Losing consciousness as a result of being overcome by toxic fumes
- ⇨ Cancer, which may appear long after the exposure to the chemical that caused it, and
- ⇨ Infection from bacteria and other micro-organisms (biological agents)



A risk assessment is not mandatory for hazardous chemicals under OHS Regulations, though it is required for specific situations, for example when working with asbestos. However, in many circumstances it will be the best way to determine the measures that should be implemented to control risks. It will help to:

- ⇨ Identify which workers are at risk of exposure
- ⇨ Determine what sources and processes are causing that risk
- ⇨ Identify if and what kind of control measures should be implemented
- ⇨ Check the effectiveness of existing control measures

Where the hazards and associated risks are well-known and have well established and accepted control measures, it may not be necessary to undertake a risk assessment, for example, where there are a small number of chemicals in a workplace and the hazards and risks are well understood.

Your risk assessment should also consider foreseeable failures of plant and equipment, as well as any control measures, for example:

- ⇨ A power failure may impact on the operation of a mechanical ventilation system at the workplace
- ⇨ Accidental spills have the potential to corrode or impact on nearby plant or equipment

Documenting risk assessments is not mandatory, but may help when reviewing where improvements can be made and risks controlled more effectively.

Decide who should do the assessment

Assessments are based on a thorough understanding of what happens, or might happen, in the workplace and should be carried out by a person or persons who have:

- ⇨ A practical understanding of regulations, codes of practice and relevant guidance materials
- ⇨ An understanding of the work processes involved at the workplace
- ⇨ Enough resources to gather information, consult the appropriate people, review existing records and examine the workplace

The person or persons should also have abilities to:

- ⇨ Interpret the information on the label and MSDS of the hazardous chemical
- ⇨ Observe the conditions of work and to foresee potential problems
- ⇨ Communicate effectively and consult with workers, contract workers, managers and technical specialists
- ⇨ Draw all the information together in a systematic way to form valid conclusions about exposures and risks
- ⇨ Accurately report the findings to all parties concerned

A single person such as a supervisor may be suitably competent to perform simple assessments. In more complex cases, several persons representing a variety of skills may need to be involved in collecting and assessing the information. This may also include workers and their health and safety representatives.

Decide what sort of risk assessment is appropriate

The type of risk assessment that should be conducted will depend on the nature of the work being performed.

a) **A basic assessment** consists of:

- ⇨ Reviewing the MSDS of hazardous chemical and assessing the risks involved in their use
- ⇨ Deciding whether the hazardous chemicals in the workplace are already controlled with existing control measures, as recommended in the MSDS or other reliable sources, or whether further control measures are needed

For example, the MSDS and label report that a cleaning agent may have potential skin irritation effects and may liberate a toxic gas when in contact with certain other chemicals, while in itself it is non-volatile. The assessment indicates that workers who handle this chemical will require control measures, including the use of protective clothing and gloves and that the chemical must be kept away from incompatible materials. Without such an assessment, skin irritation or intoxication by toxic gas when handling the cleaning agent could have occurred.

b) **In a generic assessment**, an assessment is made of a particular workplace, area, job or task and the assessment is then applied to similar work activities that involve the use of the chemical being assessed.

For example, a business or industry association might do a generic assessment for a number of workplaces that use, handle, generate or store identical chemicals (such as service stations or dry cleaners). When conducting a generic assessment, it is important that the workplace, tasks and hazardous chemicals being assessed are identical in characteristics, properties, potential hazards and risks. Generic assessments are not appropriate for very high risk chemicals such as carcinogens.

c) **A detailed assessment** may be needed when there is a significant risk to health and for very high risk chemicals such as carcinogens, mutagens, reproductive toxicants or sensitisation agents in the case of health hazards. Information on the label and SDS will allow you to determine whether the

chemical has these hazards. Schedule 10 of the WHS Regulations provides further information on the hazardous chemicals that are restricted or prohibited for use (see Appendix C of this Code). A more detailed assessment may also be required when there is uncertainty as to the risk of exposure or health.

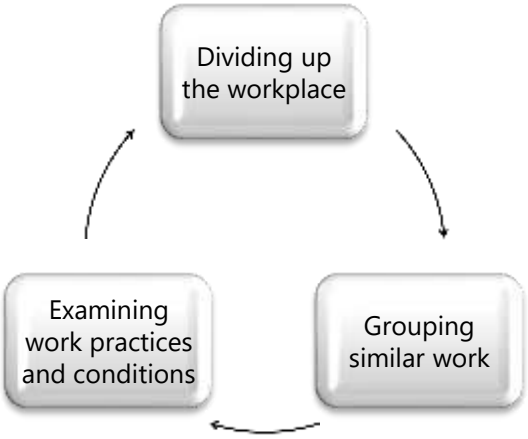
In order to complete a detailed assessment, further information may be sought and decisions taken to:

- ⇨ Eliminate the uncertainty of any risks
- ⇨ Select appropriate control measures
- ⇨ Ensure that control measures are properly used and maintained; and
- ⇨ Determine if air monitoring or health monitoring is required

It may be necessary to engage external professional assistance to undertake a more detailed assessment.

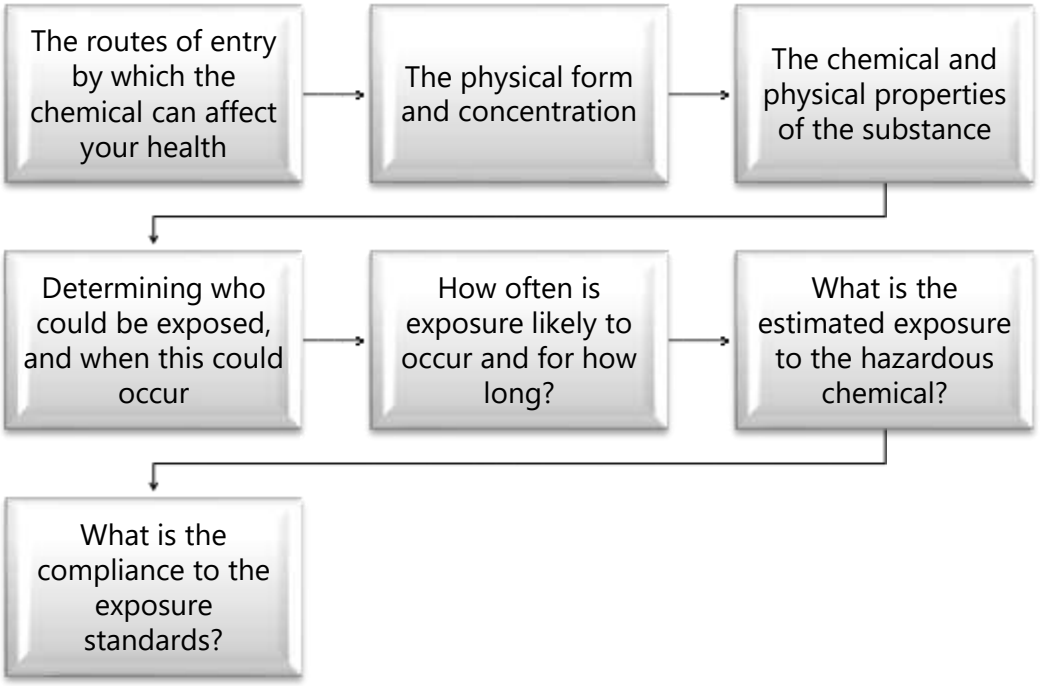
Structuring risk assessments

Risk assessments can be simplified by evaluating the nature of the work in smaller, more manageable parts. You do not need to do a risk assessment covering each work activity in the whole workplace. Instead, evaluate the nature of the work by:



Considerations in assessing health risks

The assessment of health risks from hazardous chemicals involves gaining an understanding of the situations where people can be exposed to, or come into contact with the chemicals, including the extent of exposure and how often this can occur. Health risk depends on hazard severity and level of exposure, and thus depends on both the type of chemical and also the nature of the work itself. As with all risk assessments, the assessment involving chemical hazards needs to consider all workers potentially at risk, including those not directly involved in a work activity, as well as other people such as visitors to the workplace.



– RISK ASSESSMENT CHECKLIST

Questions	Yes	No
1. Does a risk assessment need to be carried out?	☐	☐
2. Has it been decided who should carry out the risk assessment?	☐	☐
3. Have all the hazardous chemicals in the work place been identified? Has a hazardous chemical register been produced?	☐ ☐	☐ ☐
4. Has information about the hazardous chemicals been gathered? *(refer to labels, SDS, placards and relevant Australian Standards for the type of hazardous chemical)*	☐	☐
Q. 5 – 9 should be answered for each hazardous chemical or each process where hazardous chemicals are used in the workplace		
5. Have you checked other records associated with the hazardous chemical? *(Consider previous assessments, monitoring records, injury or incident records, induction training, task-specific training etc)* If 'Yes', are there any hazardous chemical previously assessed as 'high' or as 'significant risk'? Specify the risk(s):	☐ ☐	☐ ☐
6. Does the chemical have health hazards? *(consider potential acute / chronic health effects and likely route of entry)*	☐	☐
7. Does the hazardous chemical have physicochemical hazards?	☐	☐
8. Does the hazardous chemical have an exposure standard? (refer to the *Workplace Exposure Standards for Airborne Contaminants*)	☐	☐

Questions	Yes	No
9. Do workers using the hazardous chemical require health monitoring? (refer to *Part 7.1, Division 6 and Schedule 14 of the WHS Regulations*) If 'Yes', air monitoring may be required.	☐	☐
10. Are workers, or can workers be potentially, exposed to hazardous chemicals at the workplace, including by-products and waste? For each hazardous chemical or group of hazardous chemicals in the work unit, find out: • Is the substance released or emitted into the work area? • Are persons exposed to the chemical? • How much are the persons exposed to and for how long? *Air monitoring may be required to determine exposure* • Are there any risks associated with the storage and transport of the chemical? Have all hazardous chemicals in the workplace been identified? If not, repeat Q.2 for the next hazardous substance.	☐	☐
11. Are control measures currently in the workplace well maintained and effective in controlling the hazards? If 'No', take appropriate action	☐	☐
12. What are the conclusions about risk? Only answer 'Yes' to one conclusion. • Conclusion 1: Risks are not significant • Conclusion 2: Risks are significant but effectively controlled If you answer Yes to conclusion 1 or 2, go to Q.14. • Conclusion 3: Risks are significant and not adequately controlled • Conclusion 4: Uncertain about risks If you answer 'Yes' to conclusion 3 or 4, go to Q.13.		
13. Have actions resulting from conclusion about risks been identified? • Seek expert advice • Requires appropriate control measure • Requires induction training • Requires on-going monitoring • Requires health monitoring • Requires emergency procedures and first aid		
14. Has the assessment been recorded? ☐ ☐ only a notation in the register.)	☐	☐

TASK 7 – This task needs to be completed and placed in your Portfolio of Evidence.

What are the dangers associated with working with hazardous substances in terms of the safety of people, assets and the environment?

This Task is aligned to **Specific Outcome 3, Assessment Criterion 3**

LESSON 4

Controlling Workplace Hazardous Substances

This Learning Unit is aligned to US 259624 Specific Outcome 3:

Explain risks associated with workplace hazardous substances

And: Specific Outcome 4:

Control workplace hazardous substances

This Learning Unit comprises the theoretical component of your learning and includes activities that are class-based and of a formative nature.

TASK 8 – This task needs to be completed and placed in your Portfolio of Evidence.

What methods does your own workplace apply or implement for dealing with the exposure to workers that are working with hazardous substances?

This Task is aligned to **Specific Outcome 3, Assessment Criterion 4**

Handling and managing hazardous substances

Mitigating the risks associated with hazardous materials may require the application of safety precautions during their transport, use, storage and disposal. Most countries regulate hazardous materials by law, and they are subject to several international treaties as well. Even so, different countries may use different class diamonds for the same product.

People who handle dangerous goods will often wear protective equipment, and metropolitan fire departments often have a response team specifically trained to deal with accidents and spills. Persons who may come into contact with dangerous goods as part of their work are also often subject to monitoring or health surveillance to ensure that their exposure does not exceed occupational exposure limits.

Laws and regulations on the use and handling of hazardous materials may differ depending on the activity and status of the material. For example, one set of requirements may apply to their use in the workplace while a different set of requirements may apply to spill response, sale for consumer use, or transportation. Most countries regulate some aspect of hazardous materials.

Transporting hazardous substances

Hazardous materials in transportation must be placarded and have specified packaging and labeling. Some materials must always be placarded; others may only require placarding in certain circumstances. Trailers of goods in transport are usually marked with a specific number. This number can be referenced by first responders (firefighters, police officers, and ambulance personnel)

Controlling risks

There are a number of ways to control the risks associated with hazardous chemicals. Some control measures are more effective than others. Control measures can be ranked from the highest level of protection and reliability to the lowest. This ranking is known as the *hierarchy of control*.

You must always aim to eliminate a hazard and associated risk first. If this is not reasonably practicable, the risk must be minimised by using one or more of the following approaches:

- ⇨ Substitution
- ⇨ Isolation
- ⇨ Implementing engineering controls.

If a risk then remains, it must be minimised by implementing administrative controls, so far as is reasonably practicable. Any remaining risk must be minimised with suitable personal protective equipment (PPE).

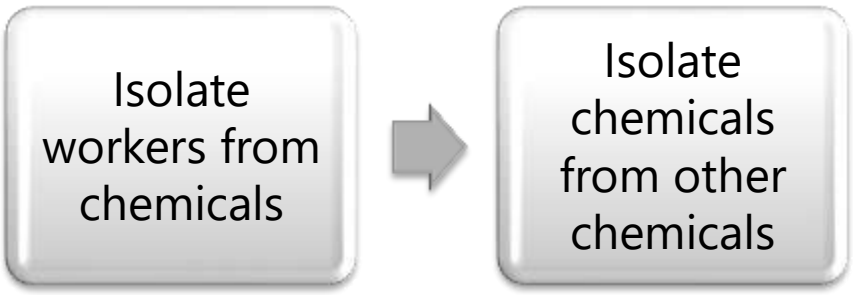
Administrative control measures and PPE rely on human behaviour and supervision and when used on their own, tend to be the least effective ways of minimising risks.

Eliminating the hazard
This means removing the hazard or hazardous work practice from the workplace. This is the most effective control measure and must always be considered before other control measures.

For example, not using a hazardous chemical or eliminating exposure by:
- ⇨ Using nails instead of using chemical based adhesives
- ⇨ Eliminating a handling activity and potential worker exposure by purchasing pre-mixed or diluted chemicals instead of manually mixing or diluting chemicals at the workplace.

Substitution
Substitution is the replacement of a hazardous chemical with a chemical that is less hazardous and presents lower risks, for example:
- ⇨ Substituting a less volatile material to control a vapour hazard may cost less than the installation and maintenance of a mechanical ventilation system
- ⇨ Substituting a highly flammable liquid with one that is less flammable or combustible
- ⇨ Using hazardous chemicals with a single hazard class rather than those with multiple hazards
- ⇨ Substituting high hazard chemicals like carcinogens, mutagen, reproductive toxicants and sensitizers, with less hazardous chemicals
- ⇨ Using diluted acids and alkalis rather than concentrates
- ⇨ Using a product in either paste or pellet form rather than as dust or powder.

Isolation
Isolation involves separating people from the chemicals or hazards by distance or barriers to prevent or minimise exposure. Examples of isolation include:



Engineering controls
Engineering controls are physical in nature, including mechanical devices or processes that eliminate or minimise the generation of chemicals, suppress or contain chemicals, or limit the area of contamination in the event of spills and leaks. They often involve partial enclosure, use of exhaust ventilation or automation of processes.

Administrative controls
Administrative controls should only be considered when other higher order control measures are not practicable, or to supplement other control measures. For carcinogens, administrative controls should only be used to provide additional protection.

Administrative controls are also relevant for emergencies when other control measures fail, such as for managing spills and leaks and are particularly important for those workers who are required to clean up spills, or who carry out regular cleaning and maintenance work.

Examples of administrative controls include:

- ⇨ Written policies and work procedures (for example safe work method statements)
- ⇨ Reducing the number of workers exposed to the chemical (for example by performing the task out of normal work hours or by restricting worker access to certain areas)
- ⇨ Reducing the duration and/or frequency of workers' exposure through specific work procedures (for example, job rotation)
- ⇨ Reducing quantities of hazardous chemicals through inventory reduction – this may include just in time ordering rather than storing large quantities of hazardous chemicals and prompt disposal of hazardous chemicals that are no longer required
- ⇨ Implementing procedures where only staff who are involved in the use, handling, storage or generation of hazardous chemicals are allowed access to high risk areas where there may be a greater risk of exposure
- ⇨ Implementing procedures to prevent introduction of ignition sources into hazardous areas
- ⇨ Reducing the period of time in which a chemical 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)
- ⇨ Safe work practices, including good housekeeping, including regular cleaning of work areas
- ⇨ Changing packaging material to minimise exposure during handling (for example purchasing liquids in ready to use packages instead of decanting from large containers)
- ⇨ Using vacuuming or wet methods to suppress dust that may be generated during dry sweeping
- ⇨ Keeping containers of hazardous chemicals tightly closed when not in use
- ⇨ Cleaning up spills immediately
- ⇨ Prompt cleaning of residues from empty containers that have held hazardous chemicals
- ⇨ Prohibiting eating, drinking and smoking in potentially contaminated areas
- ⇨ Providing washing facilities for rinsing off chemicals (e.g. hand washing, safety showers, laundering of clothes).

Training and supervision should always be provided to ensure administrative controls are effectively implemented.

TASK 9 – This task needs to be completed and placed in your Portfolio of Evidence.

Explain how your workplace emergency preparedness plans are evaluated against legislation?
This Task is aligned to **Specific Outcome 4, Assessment Criterion 3**

Personal protective equipment (PPE)

In most circumstances, PPE should not be relied on to control risk. It should be used only as a last resort when all other reasonably practicable control measures have been used and the risk has not been eliminated, or as interim protection until higher level controls are implemented. There may also be situations when the use of other controls is not practicable.

PPE includes overalls, aprons, footwear, gloves, chemical resistant glasses, face shields and respirators.

For some high risk activities, such as spray painting, abrasive blasting and some emergency response actions, PPE should always be used to supplement higher level control measures.

The effectiveness of PPE relies heavily on workers 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 workers have not been adequately trained on how to fit and use PPE properly, workers might avoid using it.

The best way to determine this is to observe workers performing the task. If they discard the PPE or do not use it, this may indicate that it does not fit, is uncomfortable or is a hindrance in the work. You should also observe workers after the task is complete to ensure that the PPE they have used is stored and maintained correctly.

PPE must be suitable for the task being performed. Examples include:

- ⇨ Choosing appropriate chemical-resistant gloves offering the best resistance to the chemical being used. Some gloves may be resistant to some solvents but not others.
- ⇨ Using full-face, air-fed respirator rather than a half-face respirator during spray-painting operations to reduce exposure to hazardous chemicals like isocyanides, which can cause skin and respiratory allergic reactions.
- ⇨

TASK 10 – This task needs to be completed and placed in your Portfolio of Evidence.

How are control measures communicated and trained in your own workplace? What recommendations for improvement do you have for this current process? And why?

This Task is aligned to **Specific Outcome 4, Assessment Criterion 5**

Disposing of hazardous substances

Many businesses generate wastes that are considered hazardous or harmful to human health or the environment because they are flammable, corrosive, reactive, or toxic. Due to the harmful potential of hazardous materials, workers must remain aware of the safety hazards and proper handling and disposal procedures in order to protect the environment, themselves, and comply with state and federal regulations.

Workers that generate or handle hazardous waste require training on the hazards and safe, proper handling of these materials. Training should cover the procedures for collection, labelling, and storage of the hazardous waste before it is transported for final disposal or treatment. In addition, workers should be trained on emergency procedures and accidental spill response for the materials that they work with.

Hazardous materials should never be disposed of down the drain or in regular trash receptacles. They should be put into proper and compatible containers that can be securely sealed. Compatible container materials ensure that wastes will not react with or corrode them. The containers should not be completely full; a "head space" allows for waste expansion. The sealed containers should be labelled with the name and hazard class of the waste along with the words 'Hazardous Waste' and the date it was generated.

Waste containers should be stored in a secure manner and protected from extreme environments. They should be segregated and stored in compatible hazard classes (flammable, corrosive, oxidizers, etc.) to prevent hazardous reactions if the wastes combine. The containers should remain closed during storage, except when adding or removing waste.

Proper handling and storage of waste containers can prevent ruptures, overturns, or other failures. They should not be stacked or handled in a manner that could cause them to fail. Some flammable material containers may require grounding and containers should be seismically secured, if possible, to prevent spills in an earthquake. Waste storage time limits vary depending on the facility or material; workers should be familiar with the requirements for their worksite and wastes.

Storage areas for hazardous wastes should be inspected at least weekly. Secondary containment can prevent spills, but if a leak or spill occurs, workers should follow facility spill and emergency response procedures. Spill kits should be available for such emergencies; all clean-up materials should be handled as hazardous waste.

Proper waste documentation is important to track and maintain accountability for hazardous waste prior to shipment. Workers should be familiar with the documents required for their facility and waste types including EPA Identification numbers issued by the Environmental Protection Agency and Uniform Hazardous Waste Manifests. Workers must receive training before they can sign waste manifest documentation. Transportation of hazardous wastes should be done according to regulation requirements and by dedicated hazardous waste haulers. Proper training and knowledge can help workers ensure that hazardous wastes are safely and properly handled from "cradle to grave."

TASK 11 – This task needs to be completed and placed in your Portfolio of Evidence.

What is the importance of complying with the control measures within the workplace?
This Task is aligned to **Specific Outcome 4, Assessment Criterion 7**

SUMMARY OF DIFFERENT HAZARDS THAT ARE IDENTIFIED AND CATEGORISED ACCORDING TO SPECIFIC AREA, JOB CATEGORY, WORK PROCEDURE, MACHINERY OR SUBSTANCES USED.

A perfectly safe and healthy workplace would have no hazards. There would be nothing that could harm you. Unfortunately, many workplace hazards are so familiar that we ignore them and put ourselves, and sometimes others, at risk.

Mechanical hazards

- Impact force
- Collisions
- Falls from height
- Struck by objects
- Confined space
- Slips and trips
- Falling on a pointed object
- Compressed air/high pressure fluids (such as cutting fluid)
- Entanglement
- Equipment-related injury

Physical hazards

- Noise
- Vibration

- Lighting
- Barotraumas (hypobaric/hyperbaric pressure)
- Ionizing radiation
- Electricity
- Asphyxiation
- Cold stress (hypothermia)
- Heat stress (hyperthermia)
- Dehydration (due to sweating)
- Using the same tool all day long
- Being crushed by equipment
- Tripping or falling

Chemical hazards

- Acids
- Bases
- Heavy metals
- Lead
- Solvents
- Petroleum
- Particulates
- Asbestos and other fine dust/fibrous materials
- Silica
- Fumes (noxious gases/vapours)
- Highly-reactive chemicals

Psychosocial issues

- Work-related stress, whose causal factors include excessive working time and overwork
- Violence from outside the organisation
- Bullying, which may include emotional and verbal abuse
- Sexual harassment
- Mobbing
- Burnout
- Exposure to unhealthy elements during meetings with business associates, e.g. tobacco, uncontrolled alcohol
- Musculoskeletal disorders, avoided by the employment of good ergonomic design

Biological hazards

- Bee stings
- Allergic reaction to plants, insects or mould
- Being in contact with materials where viruses or bacteria are present

Occupational Diseases

The following occupational diseases must be reported

1. Aniline poisoning
2. Anthrax
3. Arsenical poisoning
4. Asbestosis
5. Barotrauma
6. Beryllium poisoning
7. Byssinosis
8. Cadmium poisoning
9. Carbarmate poisoning
10. Compressed air illness ot its sequelae, including dysbaric osteonecrosis
11. Cyanide poisoning
12. Diseases caused by excessive heat
13. Diseases caused by ioniziong radiation
14. Hydrogen sulphide poisoning
15. Lead poisoning
16. Leptospirosis
17. Liver angiosarcoma
18. Managanese poisoning
19. Mercurial poisoning
20. Mesothelioma
21. Musculoskeletal disorders of the upper limb
22. Noise-induced deafness
23. Occupational asthma
24. Occupational skin cancers
25. Occupational skin diseases
26. Organophosphate poisoning
27. Phosphorous poisoning
28. Poisoning by benzene or a homologue of benzene
29. Poisoning by carbon disulphide
30. Poisoning by carbon monoxide gas
31. Poisoning by oxides of nitrogen
32. Poisoning from halogen derivatives of hydrocarbon compounds
33. Silicosis
34. Toxic anaemia
35. Toxic hepatitis

Information for Customers Collecting Gas Cylinders (Flammable, Inert and Oxidising Gases)

Check the cylinder label and confirm that it is the gas you require. If you are unfamiliar with the hazards and properties of the gas please ask for the safety data sheet.

Ensure that you read the safety data sheet. Take time to understand the properties and hazards associated with the gas before transporting or using it. If in doubt ask the supplier for advice. Know what to do in an emergency: evacuate the vehicle/room/workspace and contact your gas supplier for further advice.

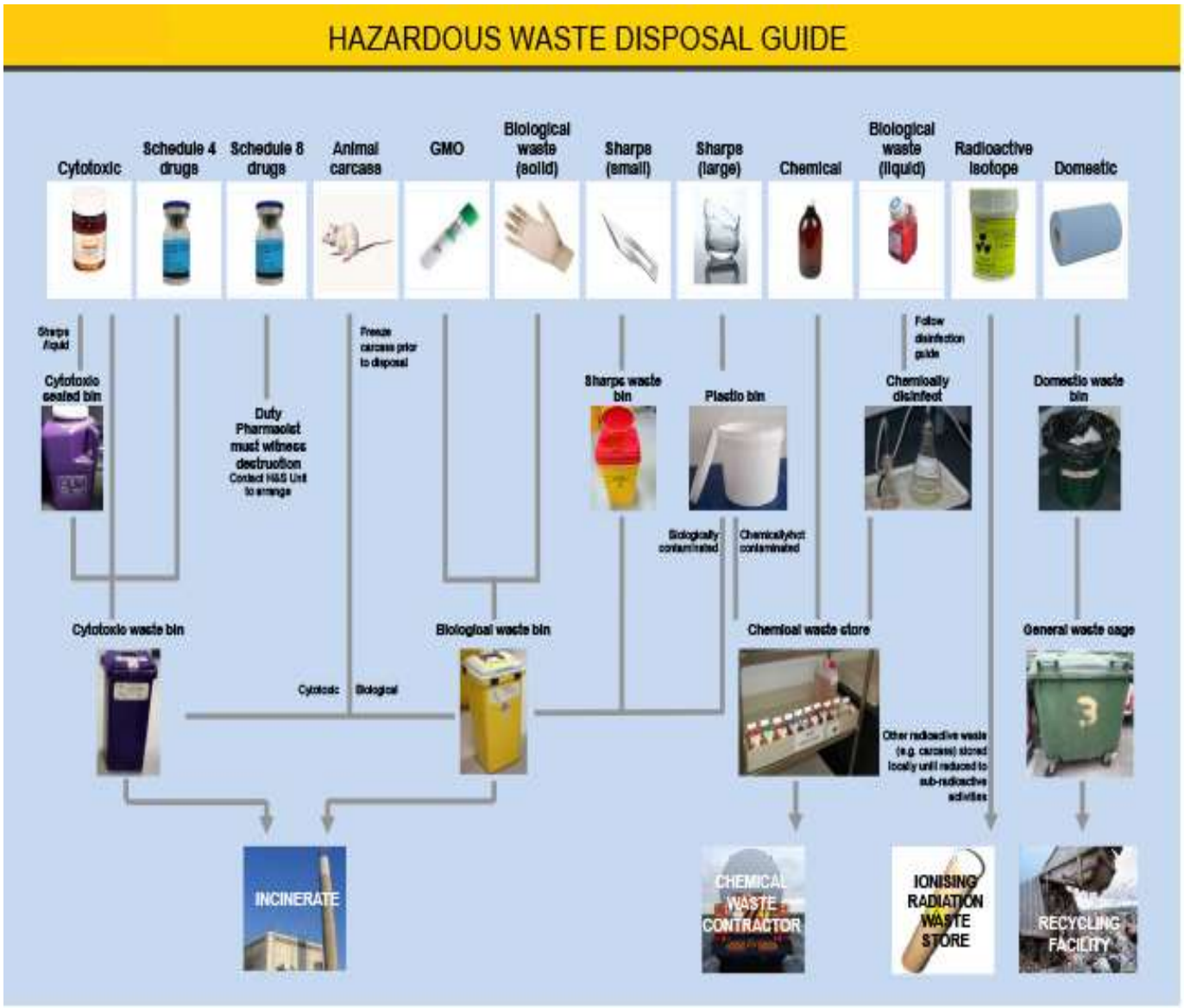
Cylinders are heavy, handle with care. If you are moving large cylinders, use a trolley, or seek help. Take care when handling. Close the valve before moving the cylinder. Do not drop cylinders. Never try to catch a falling cylinder.

Use appropriate protective equipment, see the safety datasheet. It is recommended that eyes, hands and feet are protected when handling or using cylinders.

An open vehicle is recommended for the carriage of all cylinders. This is particularly important for acetylene and LPG cylinders which should be transported and stored upright.
If a closed vehicle is used ensure there is adequate ventilation. It is recommended to drive with a window open.

Secure the cylinder in the boot/load area and remove the cylinder from the vehicle as soon as the journey is completed.

When you get to your destination store in a secure and well-ventilated location, where it cannot be damaged or tampered with. It will assist the Emergency Services if storage areas are labeled, particularly if acetylene cylinders are being stored.


HAZARDOUS WASTE DISPOSAL GUIDE
Cytotoxic
Schedule 4 drugs
Schedule 8 drugs
Animal carcass
GMO
Biological waste (solid)
Sharps (small)
Sharps (large)
Chemical
Biological waste (liquid)
Radioactive isotope
Domestic
Sharps /liquid
Cytotoxic sealed bin
Duty Pharmacist must witness destruction
Contact H&S Unit to arrange
Freeze carcass prior to disposal
Sharps waste bin
Plastic bin
Follow disinfection guide
Chemically disinfect
Domestic waste bin
Biologically contaminated
Chemically/not contaminated
Cytotoxic waste bin
Biological waste bin
Chemical waste store
General waste cage
Cytotoxic
Biological
Other radioactive waste (e.g. carcass) stored locally until reduced to sub-radioactive activities
INCINERATE
CHEMICAL WASTE CONTRACTOR
IONISING RADIATION WASTE STORE
RECYCLING FACILITY