



Module Resource Manual

NBB02

Occupational Health and Safety

Student Workbook

Second Edition

Manufacturing and
Engineering
Educational Services

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1997

NBB018 OCCUPATIONAL HEALTH AND SAFETY

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INTRODUCTION

About this module

This module is about establishing and maintaining safe workplaces and safe work practices, so that people can work with little risk to their health or safety. Some of the principles are established by law. Others vary from occupation to occupation. Students need to learn the principles, and to know both their rights and their responsibilities in the matter of health and safety at work.

What students will need for this module

Butrej, P. and Douglas, G., *Hazards at work : A Guide to Health and Safety in Australian Workplaces* (Second Edition.). OTEN (NSW TAFE), 1995.

A first aid manual such as the St John Ambulance Association *First Aid Manual*

An important note to the student

It is essential to have access to the textbook Hazards at Work as this workbook refers to the textbook as part of the learning process. This student workbook will give references to required reading from the textbook. In addition, some material has been included to supplement the material in the textbook. All the reference material designated as *essential reading* should be read. Doing so will enable you to develop an understanding of the topic material and help you to complete the review questions provided in this workbook

The textbook will also be a suitable reference text for further studies in occupational health and safety.

Module organiser

This module organiser shows the recommended time that a student would spend on each section of the module.

Section	Activity	Suggested time (hours)
1	Legislative requirements of OH&S	1
2,3	Factors and conditions threatening health and safety	4.5
4	Identifying workplace hazards	1
5	Use of electricity in the workplace	1
6	Rescue from a live electrical situation	1
7	Coping with injury in the workplace	8

Information for the student

In the "National Guidelines for Integrating Occupational Health and Safety Competencies into National Industry Competency Standards" (National Occupational Health and Safety Commission, 1994) *three generic competencies* were identified.

Basically these generic competencies relate to the level of responsibility for the enactment, supervision or management of OH&S in the workplace.

- Generic Competency A is relevant for employees without managerial or supervisory responsibilities who nevertheless have to follow defined occupational health and safety policies and procedures related to the work being undertaken to ensure their own safety and that of others in the workplace.
- Generic Competency B is relevant for employees with supervisory responsibility who are charged with implementing and monitoring the organisation's occupational health and safety policies, procedures and programs in the relevant work area to achieve and maintain occupational health and safety standards.
- Generic Competency C is relevant for those with managerial responsibilities, either as an employee or as an owner of a business, who are charged with establishing, maintaining and evaluating the organisation's occupational health and safety system in order to ensure that the workplace is, so far as practicable, safe and without risks to the health of employees.

This module provides some of the important knowledge and skills which support Generic Competency A, namely for employees without supervisory responsibilities who must apply relevant occupational health and safety legislation and codes of practice including duties and responsibilities of all parties under the general duty of care.

An important purpose of this module is to generate in the learner an outlook in which safety is always paramount. To this end the depth of treatment should be general enough to cover the breadth of occupational health and safety issues in the workplace but not to the depth that would be addressed at the next generic competency level or by specialists in a particular occupational field.

For example objectives exist in Section 2 relating to fires and fire extinguishers. One cannot be expected to gain all the knowledge relating to fire fighting or the advantages or disadvantage of each type of extinguisher. However the student should be expected to observe the location of extinguishers in a work environment, the types of fires each can extinguish with safety and to know the procedures for evacuating a building.

Also consider the responsibilities related to the identification of workplace hazards. An in-depth treatment of this would be required by Generic Competency B addressed by the national module Occupational Health and Safety for Supervisors. However some treatment of this topic has been included in this module at an awareness level. It is intended to encourage a safe outlook in the learner. A small assessment task has been included that reflects this approach.

The application of this module covers a wide range of work functions and occupations in addition to meeting the requirements of the nationally recognised module descriptor titled Occupational Health and Safety - NBB018.

The inclusion of the material on the use of electricity in the workplace and rescue from a live electrical situation reflects the importance of the knowledge required in this area for all workers, not only electrical workers. For example it is essential that all workers be trained to deal with basic electrical safety including the use of danger tags and other safety aiding devices.

NBB018 was developed as part of a national review of aspects of engineering curriculum and is a replacement for the descriptors NBB002 and NEC02.

National module descriptor

This resource package is based on the revised National Module Descriptor NBB02 dated September 1995. This resource package has been designed to be used with the Subject/Module Syllabus available from the NSW TAFE Course Information System (CIS) which incorporates the Module Descriptor.

Other Resources

State & Territory Legislation (Acts with any amendments)

Australian Capital Territory	Occupational Health & Safety Act, 1989
New South Wales	Occupational Health & Safety Act, 1983
Northern Territory	Work Health Act, 1986
Queensland	Workplace Health & Safety Act, 1989
South Australia	Occupational Health, Safety and Welfare Act, 1986
Tasmania	Industrial Safety, Health & Welfare Act, 1977
Victoria	Occupational Health & Safety Act, 1985
Western Australia	Occupational Health, Safety and Welfare Act, 1984

Commonwealth Legislation

Occupational Health and Safety (Commonwealth Employment Act), 1991

Other publications

Many other publications relevant to OH&S are available from the relevant state or territory *Worksafe* organisation students could avail themselves of the publications list for this body. Information includes fact sheets, codes of practice, national standards, best practice publications, reports and information kits and the like.

Another important reference for students is the publication:

National Guidelines For Integrating Occupational Health and Safety Competencies Into National Industry Competency Standards [NOHSC:7025(1994)], published by the National Health and Safety Commission. (Australian Government Publishing Service)

Relevant Australian Standards should also be referred to, as appropriate, such as:

- AS1270 - 1988 Hearing Protection Devices
- AS1318 - 1985 Use of colour for marking physical hazards and the identification of certain equipment in industry
- AS1319 - 1988 Rules for design and use of safety signs for the occupational environment
- AS1336 - 1982 Code of practice for industrial eye protection
- AS1345 - 1982 Identification of the contents of piping, conduits and ducts, 1982
- AS1470 - 1986 Code of general principles for safe working in industry, 1986
- AS1558 - 1978 Protective clothing for welders
- AS1716 - 1984 Respiratory protective devices
- AS1837 - 1976 Code of Practice for application of ergonomics in factory and office work
- AS2161 - 1978 Industrial safety gloves and mittens
- AS2210 - 1980 Safety footwear
- AS2745 - 1984 Electrical welding safety

Many more will be found in the reference list of *Standards Australia*.

Material Safety Data Sheets (MSDS)

Further information can be obtained from the following bodies throughout Australia:

<p>WorkCover authority of New South Wales Locked Bag 10, Clarence Street SYDNEY NSW 2000 Telephone: (02) 9370 5301 (008) 451 462 (toll free)</p> <p>Victorian Occupational Health and Safety Authority PO Box 414 World Trade Centre MELBOURNE VIC 3005 Telephone: (03) 9628 8889</p> <p>Division of Workplace Health and Safety Department of Employment, Vocational Education, Training and Industrial Relations 30 Makerston Street BRISBANE QLD 4000 Telephone: (07) 227 4876</p> <p>Occupational Health and Safety Division South Australia WorkCover Corporation Henry Waymouth Building 100 Waymouth Street ADELAIDE SA 5000 Telephone: (08) 226 3120</p> <p>Department of Occupational Health, Safety and Welfare of Western Australia West Centre 1260 Hay Street WEST PERTH WA 6005 Telephone: (09) 327 8777</p> <p>National Occupational Health and Safety Unit Australian Council of Trade Unions ACTU House 393-397 Swanston Street MELBOURNE VIC 3000 Telephone: (03) 9663 5266</p>	<p>Occupational Health and Safety Branch Department of State Development and Resources 30 Gordon Hill Road ROSNY PARK TAS 7018 Telephone: (02) 338 333</p> <p>Work Health Authority Minerals House 66 The Esplanade DARWIN NT 0801 Telephone: (089) 89 5010</p> <p>ACT WorkCover Level 1, North Building London Circuit CIVIC ACT 2601 Telephone: (06) 276 0333</p> <p>Comcare Australia GPO Box 9905 CANBERRA ACT 2601 Telephone: (06) 276 0333</p> <p>Worksafe Australia GPO Box 58 SYDNEY NSW 2001 Telephone: (02) 9565 9555</p> <p>Occupational Health and Safety Unit Australian Chamber of Commerce and Industry PO Box 18008 Collins Street EAST MELBOURNE VIC 3000 Telephone: (03) 9289 5289</p>
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MODULE SECTIONS

Section 1: Legislative requirements of occupational health and safety

PURPOSE
This section addresses the legislative requirements of a state or territory relating to occupational health and safety in the workplace and the responsibilities of both employer and employee.
This section relates to parts of learning outcome 1 of the National Descriptor

Objectives

At the end of this section you should be able to:

- ☐ state the underlying principles of OH&S
- ☐ outline the features of the OH&S legislation of one state or territory
- ☐ state the two main sources of standards and codes of practice relating to OH&S
- ☐ describe the responsibilities of *employers* with respect to OH&S
- ☐ describe the responsibilities of *manufacturers and suppliers* with respect to OH&S
- ☐ describe the rights and responsibilities of *employees* with respect to OH&S
- ☐ state the functions of the safety committee and its representatives
- ☐ list common issues that would come under the OH&S committee
- ☐ describe the grievance procedures with respect to OH&S issues.

Essential reading

Textbook: Hazards at Work, pages 1-24

Review questions

This section will help you revise what you have learnt in Section 1.

1. State the primary aim of the O.H. & S. Act.

2. Who does the O.H & S. Act cover?

3. What is the minimum number of employees in any workplace in which the OH&S Act requires a OH&S committee to be set up?

4. If a OH&S committee exists does it have the responsibility of ensuring the health and safety of employees?

5. Who has the responsibility of ensuring the health and safety of employees?

6. What is an OH&S Committee?

Review questions

7. What can OH&S Committees do?

8. What can committee members do?

9. In one State alone there are over 50 deaths, 35,000 injuries and 5,000 illnesses costing billions of dollars annually. How do these costs affect the:
 - a) Employee _____
 - b) Employer _____
 - c) Community _____
10. Can employees be dismissed for making a safety complaint?

11. What are the responsibilities of employees with respect to OH&S in the workplace?

Review questions

12. State the responsibility of employers with regard to persons **not** employed by their organisation., e.g. members of the public visiting the site.

13. What are the responsibilities of employers with respect to OH&S in the workplace?

Section 2: Factors and conditions threatening health and safety (1)

PURPOSE

This section addresses the situations, factors and events that militate against personal health and safety.

This section relates to parts of learning outcome 2 of the National Descriptor

Objectives

At the end of this section the student should be able to:

- ☐ define *housekeeping* and describe potential hazards in relation to improper housekeeping
- ☐ list various *emergencies* that pose threats to health and safety
- ☐ describe steps to be taken in the event of a workplace fire
- ☐ explain the need for different types of fire extinguisher
- ☐ state the hazards associated with working with confined spaces and control measures for various circumstances
- ☐ state the hazards associated with work on scaffolds and the safety measures to be used
- ☐ describe the procedures for the storage and use of ladders
- ☐ describe procedures to protect against manual handling injuries
- ☐ list substances that come under the area of chemical hazards
- ☐ state the requirements for labelling dangerous substances
- ☐ describe the purpose of, and interpret, a material safety data sheet (MSDS).

Essential reading

Textbook: Hazards at Work

Topic	pages
housekeeping	225-226
emergencies	47-48
personal protective equipment	36-38
confined spaces	325-329
fires and extinguishers	55-61
ladders	226-229
manual handling	199-205
chemical hazards	231-240
material safety data sheets	244-254

Also browse the statistics on pages 74-84 with particular reference to the manufacturing and construction classifications. Read also the short section *Hazards for Young Workers*, page 84.

Review questions

This section will help you revise what you have learnt in Section 2.

1. What is *housekeeping*? List some hazards that can occur as a result of poor housekeeping.

2. List some emergencies that pose a threat to health and safety.

3. It is essential that the employer provides personal protective equipment for the employee, for example respiratory protection. List **five** other types of protective gear that is required by the worker.
 - ---
 - ---
 - ---
 - ---
 - ---

Review questions

4. What sort of extinguisher should be used on an oil based fire?

5. What sort of extinguisher should **not** be used on an oil based fire?

6. Describe the major steps to be taken in the case of a workplace fire

7. Before attempting a job requiring *manual lifting* there are a number of safety factors to consider. List **five** factors that would be considered essential.
 - ---
 - ---
 - ---
 - ---
 - ---
8. A ladder rests against a wall at a height of 4m. How far from the wall should the base of the ladder be?

Review questions

9. List **three** ways in which industrial chemicals can enter the body.

- _____
- _____
- _____

10. What is a MSDS and what is it for?

11. What information should a label on a dangerous substance contain?

12. Referring to the MSDS on *mercury* contained in this workbook as an appendix, describe the symptoms that can occur through occupational exposure.

Section 3: Factors and conditions threatening health and safety (part 2)

PURPOSE

The topic addresses the situations, factors, conditions and events that militate against personal health and safety.

This section relates to parts of learning outcome 2 of the National Descriptor

Objectives

At the end of this section you should be able to:

- ☐ describe the short and long term effects of exposure to noise
- ☐ describe the techniques employed to limit noise and to avoid damage to hearing
- ☐ describe the effects of vibration on the human body
- ☐ list the risk factors and protective work practices relating to vibration
- ☐ state the effects of thermal stress, both heat and cold
- ☐ describe the protective work practices relating to thermal stress
- ☐ list factors that cause psychological stress in the workplace
- ☐ list physical and psychological symptoms of an employee suffering stress
- ☐ describe methods used to contribute to personal stress management
- ☐ state the detrimental effects and dangers of drug and alcohol use in the workplace
- ☐ explain the term *occupational overuse syndrome*, state examples of how it occurs and describe means to overcome it.

Essential reading

Textbook: Hazards at Work

Topic	pages
temperature extremes	146-161
vibration	107-117
noise	89-106
psychological stress	285-301
drugs and alcohol	312-323
occupational overuse syndrome	212-222

Review questions

This section will help you revise what you have learnt in Section 3.

1. What is meant by heat stress?

2. What are the effects of excess heat on the human body?

3. What are the "prevention and control" measure for excess cold?

4. List effects of vibration exposure on the worker.

Review questions

5. Excessive vibration can be controlled and prevented. List **five** ways in which this can be achieved.

- _____
- _____
- _____
- _____
- _____

6. What is noise?

7. What are the long term effects of exposure to noise?

8. List general methods of noise reduction.

9. What are the psychological symptoms of stress?

10. What are some of the physiological symptoms of stress?

Review questions

11. What are some of the effects of alcohol consumption on the human body?

12. What is the O.O.S. and what are some of its symptoms?

Section 4: Identifying workplace hazards

PURPOSE

This topic develops the ability to be able to conduct a safety check and report on it within a workplace situation.

This section relates to learning outcome 3 of the National Descriptor

Objectives

At the end of this section you should be able to:

- ☐ identify potential workplace hazards
- ☐ describe suitable preventative measures for the removal of workplace hazards
- ☐ design a simple safety checklist for a workplace situation
- ☐ conduct and report on a simple safety check within a workshop situation.

Essential reading

Many sections in the textbook relate to this topic but in particular read the section on *housekeeping* on pages 225-226 of *Hazards at Work*. That, together with the supplementary material below, will help you with your assessable student project.

Supplementary material

The following is general information that relates to engineering workshops including workshops on TAFE premises. The principles also apply to most workplaces including building sites.

Safety First. This is a term in common use to describe an attitude of mind which should control all personal actions, conscious and subconscious. The objective is to prevent an accident to oneself or to others in the workplace.

Some people readily acquire safety habits some do not. Accidents often occur when the employee is unfamiliar with the workplace surroundings or with operating procedures. It is absolutely necessary to familiarise oneself with the local safety regulations and to seek advice when unsure about safety procedures. The onus is on the employee to exercise care.

If an individual is the basic cause of accidents, the attitude of that person towards work and fellow employees must be examined. Some aspects of human behaviour, can cause serious accidents. These include

- recklessness (foolhardiness),
- absence of consideration (selfishness),
- indifference,
- laziness,
- nervousness and excitability (panic),
- wilful intent to damage or injure,
- temper,
- deliberate failure to understand instructions,
- ignorance of safe practice
- impatience

An adequately lighted, orderly workshop is safe for employees provided these conditions are maintained. Poorly lit or untidy workshops and building sites lend themselves to accidents.

Physical and mental alertness will prevent accidents. Fatigue, the outcome of insufficient sleep or overwork, will produce an accident-prone condition. A knowledge of first-aid and resuscitation and the location of the first aid equipment and its application is essential.

Clothing. A correct size boiler suit with sleeves buttoned at the wrists and a pair of safety boots are considered safe attire for workshop practice. For long hair a suitable head covering is essential.

Accidents have been caused by unsafe workshop attire, for example, bulky knitted sweaters, shorts and thongs. An arm or perhaps the whole body could be dragged

towards a machine because a woollen garment catches on a moving part of a machine. The unprotected skull, legs, feet or toes could be crushed by a falling object. A safety helmet should be worn for overhead protection when on site work. Safety boots should be worn where required.

It is not advisable to wear a wrist watch or a finger ring as there is the possibility that either may be hooked by a moving part of a machine, or entangled with metal shavings. Rings are also excellent conductors of electricity and can become very hot with inadvertent contact even with low voltages.

The eyes. Eyesight should be tested regularly. If fatigue readily accompanies reading, they may require attention; eyestrain could cause an accident. Serious damage to the eyes may be caused if the eyes are exposed to an electric flash; prompt medical attention will alleviate the intense pain which could develop within a few hours.

The eyes must be protected if there is danger from flying particles, flashing from electric-arc welding operations, splashing from molten substances, or splashing from chemicals. Protection implies the wearing of goggles, safety glasses, eye-shields or face-shields. Correct treatment must be obtained if, under any circumstances, there is an eye injury.

In the workshop. Walk in the designated traffic lanes and concentrate on direction.

Do not skylark. Do not distract others, for example if an operator's attention is distracted from the work, he/she may be injured.

Never participate in practical jokes. The anticipated amusement may result in a serious injury or a fatal accident.

Do not tread on round metal bars or loosely stacked material. There is always the danger resulting from movement of the material.

Do not stand or walk under overhead loads which are either travelling or suspended. Lifting tackle, although inspected and tested periodically, may fail at the most unexpected moment.

Do not approach scaffolding on which people are working. There is always the danger of a tool or object falling from the hands of a person or being knocked off the scaffolding.

Slippery surfaces develop quickly, especially if there is oil or water on the floor. Tread carefully if the floor is slippery.

Handrails are secured to stairways and platforms for the purpose of maintaining a person's balance and should be used.

Machine operation. All dangerous parts of machinery including belts, pulleys, shafting, chains, sprockets and gears should be securely guarded. Guards and safety devices must be in position before switching a machine 'on'.

The electric control gear of a machine, should be periodically inspected and tested by an authorised person; particularly the earthing connections.

It is essential that machine operators familiarise themselves with the controls of their machines. The position of the emergency stop button must be known.

Machine operators should not wear gloves because a glove caught in a machine could also involve a finger. Metal shavings should not be handled with bare hands and fingers must not come in contact with moving cutters, gears, chains or belts.

A rigid encircling guard should be fitted to an abrasive wheel with only sufficient opening to undertake the task. A reinforced safety glass shield should be attached.

An abrasive wheel must be maintained in true condition and the tool rest positioned close to the wheel to prevent small tools and thin material being drawn-in.

Do not stand in front of an abrasive wheel when it is accelerating from standstill to rated speed as a flaw in the wheel could cause it to disintegrate.

Do not use cotton waste or loose material to grasp work while grinding.

Do not off-hand grind soft materials or exert pressure against the side of an abrasive wheel. Excessive pressure against the face surface of a wheel will cause overheating and possible breakage.

When using an angle grinder ensure that the correct abrasive wheel is installed for the application (e.g. steel or masonry) and check the soundness of the wheel before use.

Hand tools. Accidents are caused by incorrect use of tools and negligence in the care of tools. Most of these accidents can be avoided by complying with recognised safety rules. Use Hand tools only for their intended purpose.

Handles. Do not use tools with split, damaged or loose handles. They are a source of danger. The exposed tang of a file may cause injury to the hand or wrist.

Screwdrivers. Never hold a screwdriver in one hand and the material in the other hand. A slip of the screwdriver may cause injury to the hand. Hold the article securely on the bench or place it in the vice. Do not use a screwdriver as a chisel.

Mushroom heads. Do not use a tool with a mushroom head. Chisels, drifts and punches should have all burrs removed by grinding before being used. A ragged edge may cause injury if the tool slips in the hand, or a flying metal chip may injure a fellow employee.

Spanners. Do not use a spanner that is a loose fit. It may slip and may cause a painful injury.

Pliers. Do not assume insulated pliers are sufficient protection to enable work to be done on live equipment. It is advisable to isolate the equipment from the supply.

Knives. When using a knife to cut cable insulation or any other material, always cut away from you.

Vices. Ensure that the job is secure in the vice. Overhanging material should be supported firmly.

Oiling or Minor Adjustments. Switch off the machine if it is necessary to oil or undertake minor adjustment to a part of a machine.

Lifting Heavy Masses. Stand close to the object to be lifted with the feet in a non-slip position. Bend the knees with the heels close together, that is, the body is in a crouched position. Commence the lift by straightening the legs; the leg muscles should provide the force for lifting, not the back.

Do not overestimate personal strength. If the object will not move without jerking, obtain assistance.

Hand Trucks. Do not overload to the situation where vision is obscured. The load must be correctly balanced, and if necessary securely fastened.

Cotton Waste. Always examine cotton waste before using it to wipe electrical equipment or the hands. It may contain metal shavings which could cause damage or injury.

Workshop Equipment. This equipment should be carefully examined before use. Do not assume that the previous operator left it in reliable condition.

Electrical Equipment. Do not attempt to examine or adjust electrical equipment. This servicing should be done by an authorised person. Report any electrical faults immediately.

Fire Extinguishers. It is essential to know the locations of fire extinguishers and the types of fires they are capable of extinguishing.

Section 5: Use of electricity in the workplace

PURPOSE
This topic addresses the danger associated with the use of electricity in the workplace.
This section relates to learning outcome 3 of the National Descriptor

Objectives

At the end of this section you should be able to:

- ☐ state the effects that electric shock can cause to the human body
- ☐ describe common causes of electrical accidents
- ☐ describe precautions that can minimise the chance of electric shock
- ☐ explain the need for the use of extra low voltage in certain situations
- ☐ explain the protection offered by a residual current device (RDC or safety switch)
- ☐ describe the appropriate technique for isolating the electrical supply to a machine or piece of equipment and the proper use of locks and/or danger tags to ensure safety.

Essential reading

Textbook: Hazards at Work

Topic	Pages
electric shock, electrical accidents	163-171; 175-177
protective devices (RCDs)	177-178
isolation, locks and tags	172-175

Supplementary information

The following cases occurred in one year in one particular Australian state. It can be seen that electricity respects no age group, gender or occupation.

Case No. 1

Gender: Female Age: 33 years Occupation: Housewife

The deceased suffered a fatal electric shock from the frame of a freezer made live by a neutral / earth transposition in the plug of a refrigerator and an open circuit earth connection in the plug of an extension lead used to supply both appliances via a double adaptor

Case No. 2

Gender: Male Age: 18 years Occupation: Apprentice Welder

The deceased suffered a fatal electric shock from the frame of equipment fitted with a three pin plug which had been mistakenly plugged into an old pattern metal clad polyphase outlet with the earth pin entering an active socket. Vision was apparently obstructed by a pillar.

Case No. 3

Gender: Male Age: 24 years Occupation: Plumber

The deceased suffered by a fatal electric shock whilst manoeuvring a length of copper pipe under a house. The pipe was in contact with an old earth wire attached to an un-earthed length of conduit which had been bent, crushed and broken thus damaging the installation of the live conductor in the conduit.

Case No. 4

Gender: Male Age: 35 years Occupation: Electrical Contractor

The deceased suffered a fatal electric shock whilst standing in a ladder working through a suspended ceiling. He apparently contacted a live conductor when stripping a cable to make connections. He was aware that the cable was alive.

Case No. 5

Gender: Male Age: 36 years Occupation: Mechanical Fitter

The deceased was apparently attempting mechanical repairs to a washing machine. Without disconnecting the machine from the supply at the plug socket, he had removed access covers and suffered a fatal electric shock when he contacted live internal parts.

Case No. 6

Gender: Male Age: 30 years Occupation: Labourer

The deceased was helping to guide a temporary building being lifted by a crane. He suffered a fatal electric shock when the crane fouled 11kV overhead conductors with ground clearance of 10.4m.

Case No. 7

Gender: Male Age: 20 years Occupation: Farmer

The deceased was engaged in welding a steel framework on wet ground at a dairy. He apparently suffered a fatal electric shock from the welding machine secondary voltage when moving the return clamp and the electrode contacted the work whilst he was leaning against it.

Case No. 8

Gender: Male Age: 17 years Occupation: Apprentice Fitter

The deceased while barefooted was using an electric drill fitted with a sanding disc to work on a car. He suffered a fatal electric shock when he contacted a piece of bare wire, previously used to hold the chuck key to the drill flexible cord, which had entered a gap between the plug and the socket of a cord extension set and contacted the active pin.

Case No. 9

Gender: Male Age: 10 years Occupation: Child

The deceased suffered a fatal electric shock when he contacted a pipe enclosing sheathed cables above a creek. The pipe had been made live by damage to the cables caused by movement of the pipe as the creek bank eroded.

Case No. 10

Gender: Male Age: 55 years Occupation: Line Worker

The deceased was involved in replacing a pole using high voltage live line methods. While climbing the pole he received a shock and fell from the ladder. Apparently one conductor of the 11kV line was in contact with the crossarm brace and his arm bridged between the crane rope and wooden pole.

Case No. 11

Gender: Male Age: 41 years Occupation: Farmer

The deceased farmer was found slumped over the chassis of a tip truck. Apparently a farm-hand had elevated the tray of the vehicle on which a wheat bin was standing and contact was made with an 11 kV line with ground clearance at 5.25m. The farm hand had left the vicinity to seek help to fight the fire started by the tyres and was unable to warn the farmer of the danger.

Case No. 12

Gender: Male Age: 80 years Occupation: Retired

The deceased was using secateurs to cut tree roots away under his house. A hand lamp was being used for illumination and the deceased suffered a fatal electric shock when he attempted to cut the flexible cord to the hand lamp by mistake.

Case No. 13

Gender: Male Age: 29 years Occupation: Clerk

The deceased was found beneath a sink in the vicinity of a dishwasher which was plugged into an incorrectly wired plug socket. The active conductor had been connected to the earth terminal of the plug socket.

Case No. 14

Gender: Male Age: 24 years Occupation: Unlicensed Electrician

The deceased was working in a factory substation and suffered a fatal electric shock when he touched an arc arrestor tube in the centre pole 11kV switch/fuse unit. This pole had failed to open correctly when the switch tripped.

Case No. 15

Gender: Male Age: 56 years Occupation: Truck Driver

The deceased, while barefoot and operating the hydraulic controls of a tip trailer, suffered a fatal electric shock when the raised tray contacted a 22kV overhead line with ground clearance of 7.6m.

Case No. 16

Gender: Male Age: 31 years Occupation: Labourer

The deceased was extending the roof of his house. He was lying bare chested on the existing metal roof and suffered a fatal electric shock when a sheet of new iron he was manoeuvring cut through a cable protruding from the soffit. An outdoor light socket had been removed and left hanging by the cable.

Case No. 17

Gender: Female Age: 10 months Occupation: Infant

The deceased and her sister were in the bath when apparently the baby pulled a hair drier which had been left plugged into an energised socket and resting on the window sill, into the bath. The baby suffered a fatal shock and the older sister suffered burns.

Case No. 18

Gender: Male Age: 33 years Occupation: Licensed Electrician

The deceased was working from the bucket of a front - end loader, fitting spacers to private overhead lines on a farm. He suffered a fatal electric shock when he apparently contacted a live conductor on a line which he had inadvertently failed to isolate.

Case No. 19

Gender: Male Age: 3 years Occupation: Child

The deceased suffered a fatal electric shock when he touched the frame of a caravan made live as a result of an insulation failure in a defrost heater on a refrigerator and a broken earthing conductor in the cord extension socket connecting power to the caravan.

Case No. 20

Gender: Male Age: 37 years Occupation: Truck Driver

The deceased was assisting to guide a load being lifted from a container by a crane. He suffered a fatal electric shock when the crane fouled an 11kV overhead line with ground clearance of 8.75m.

Normal Protective Measures Against Electrical Shock

Electrical installations and appliances contain basic safeguards to minimise the likelihood of their causing dangers of fire and shock. In fact, these are brought out in a number of legal requirements governing quality of materials, methods of installation, safety levels of appliances and the like.

Apart from obvious safeguards, such as the guarding of live parts, the basic normal safety provision is that all wiring must be protected by a fuse or circuit breaker, designed to operate and disconnect the supply when the current is flowing in the circuit exceeds a predetermined value. In addition, the exposed metal of the installation or appliance, which is insulated from the live conductors, is connected to "earth" by means of an earthing conductor. Thus, if the insulation fails or the live conductor in some other way comes into contact with the exposed metal, a heavy current will flow through the circuit to earth, operating the fuse or circuit breaker and cutting off supply to the faulty equipment. Thus, in normal circumstances, it should be possible for the exposed metal of the installation or the metal "frame" of an appliance to become and remain alive.

However, these normal conditions are not always maintained and most electrical accidents occur in abnormal circumstances. Examples of these are:-

- Deterioration or failure in the earthing conductor or earthing system, resulting in loss of protection at a time when the insulation in an appliance fails. This generally results in the energising of the metal frame of the appliance and / or portion of the earthing system.
- Contact with live parts of an appliance or accessory, either because of some breakage or defect in the equipment or by a deliberate act which circumvents the normal safeguards.
- The use of an incorrectly connected flexible cord which negates the normal safeguards and which may even energise the frame of the appliance.

When a person touches live metal, be it a live frame of an appliance, whilst at the same time he/she is in contact with earth, a shock current of any value up to about 250mA may flow through that person. Such currents may have fatal results but would be too small to be detected by or to operate the normal circuit protection which, of course, must be designed to accommodate the full load currents of the equipment in use - generally several amperes.

Special Protective Measures

Apart from the normal "earthing system" outlined above, certain special protective measures, designed to supplement or improve the normal measures have been devised. These include:-

Double Insulation - in which the insulation (generally of an appliance) is so arranged and reinforced that the chance of a breakdown, such as could cause any accessible metal parts to become alive, is virtually negligible; thus eliminating the need to earth the appliance. "All-insulated" appliances, i.e. those in which all accessible parts are made of or covered with durable insulating material, fall into the same category. Double insulation is commonly applied to small portable appliances but, because of practical problems, is seldom applied to large or fixed appliances.

Extra Low Voltage - The use of voltage below 32V a.c., direct contact with which is unlikely to create any danger. For practical and economic reasons, the use of extra-low voltage is generally limited to comparatively small appliances such as hand lamps. (Note: Handlamps should not be connected to 240 volts.)

Isolating Transformers - These reduce the risk of electric shock by providing an "earth free" circuit. However, to be effective, each appliance must be supplied from a separate isolating transformer and thus this system becomes uneconomical if many appliances are involved.

Earth Monitoring Devices - These devices are designed to continuously test or "monitor" the continuity of the earthing conductor or system and to cut off the supply of electricity to an appliance if its earthing system becomes faulty. Many of the incorrect connections of flexible cords would also be detected by the device which, in such cases, would prevent the energising of the appliance. The monitoring of the earthing conductor is achieved by passing a current round an earth loop comprising the normal earthing conductor and a second or "auxiliary" earthing conductor. If this current is interrupted, by failure of any portion of the earth loop or any other cause, a relay will operate and disconnect the appliance from the supply. The extent of the earthing conductor which is monitored in this manner will depend upon the point at which the loop is completed by the connection of the auxiliary earth to the normal earthing conductor.

The device calls for the use of a four-core flexible cord and a four-pin plug and socket to convey the normal and auxiliary earthing conductors to a portable appliance. Special units can be obtained to enable more than one plug socket and its connections to be monitored by one device.

Safety Switches - (Current Operated 'Core Balance' Earth Leakage Devices) - These devices, as discussed in more detail below, are designed to disconnect supply before any electric shock or leakage current to earth can have serious consequences. These are discussed in more detail below.

In considering safety measures for any given situation, the various alternatives available should be considered and any recommendation should be based on the measure considered most appropriate in all the circumstances.

Current Operated (Core Balance) Earth Leakage Devices

These devices are designed to detect very small *leakage* currents (as low as 5 mA) and to operate a circuit breaker to isolate supply within times of the order of 30 to 100 milliseconds. From the classification of electrical fatalities it is clear that the use of the core balance devices as supplementary protection provides increased protection from the serious effects of electric shocks.

The operation of the core balance earth leakage protection system is based on the use of a current transformer through which the active and neutral currents flow. If there is no leakage from the protected circuits, these currents will, at all times, summate to zero and will produce no effect on the secondary or "sensing" winding of the current transformer.

If there is a leakage to earth from the circuit, this leakage will not return through the current transformer and there will be an imbalance in the active and neutral currents that will produce a current in the sensing winding of the current transformer. This current is used to trip a circuit breaker. The earth leakage current may be normal leakage through or across insulation or it may be shock current passing through a body to earth.

A number of core balance relays are available on the Australian market. These have various load current capacities and are rated for leakage tripping currents up to 30 mA usually with tripping times of 30 milliseconds or less.

It is important to realise that core balance relays do not necessarily prevent a person receiving a shock, the magnitude of the current being determined by the voltage and the resistance of the body and earth circuit. However, by virtue of the operating speed, the circuit should be disconnected before the shock has serious consequences.

Shock Accidents Between Live Conductors

The core balance relay depends for its operation on the flow of earth leakage current which does not pass in both directions through the current transformer. As far as the sensing circuit is concerned, shock current from active to neutral or phase to phase is no different to load current and thus no protection is given against this form of shock. However, fatal accidents of this type are rare. Furthermore, in such cases an active to neutral contact will often result in active to earth current apart from the primary shock path.

Portable Core Balance Units

Although the above notes relate primarily to the use of core balance relays as fixed installations, special mention should be made of portable units which are available. These units incorporate a relay with a number of plug socket outlets and are particularly useful for workshops, building sites or for "on stage" sound equipment. When using portable units it is important to realise that if by chance an incorrectly connected flexible cord is used to supply the device it may result in the frames of appliances becoming energised without protection. Consequently portable devices *should never be supplied on the input side through extension cords*. The unit should be plugged directly to the installation outlet and extension cords if required may then be used on the outlet side of the portable protection device. *Testing instructions attached to portable units should be followed strictly.*

Review questions

This section will help you revise what you have learnt in Section 5.

1. List effects that electricity can have on the human body.

2. List **three** major hazards connected with electricity.

- ---
- ---
- ---

3. What care should be taken when using electric tools?

4. Electrical and electronic equipment can sometimes be fitted with "safety interlock" switches to doors and covers. State the reasons for this safety feature.

5. What is the special safety feature of Residual Current Devices (RCDs), sometimes referred to as a safety switch?

6. Can RCDs give the consumer complete electrical protection? Give reasons for your answer.

Review questions

7. If electrical equipment is "locked off" who should retain the keys until all the maintenance work is finished?
- _____
- _____
8. When should a worker place a "danger tag" on electrical equipment?
- _____
- _____
9. Double insulated portable tools provide additional safety protection from electric shock. All such tools are marked DOUBLE INSULATED DO NOT EARTH. Why should double insulated equipment never be earthed?
- _____
- _____

Section 6: Rescue from a live electrical situation

PURPOSE

This topic describes the process of removing a victim from a live electrical situation so that the rescuer is not subjected to danger.

This section relates to learning outcome 5 of the National Descriptor

Objectives

At the end of this section the student should be able to:

- ☐ isolate a supply if this can be done quickly and safely
- ☐ select suitable non-conducting materials to remove a victim from a live situation
- ☐ use a correct technique to rescue the victim
- ☐ select a suitable position in the rescue process so as to avoid electric shock or injury to the rescuer.

Essential reading

Hazards at Work, pages 182-183

Review questions

This section will help you revise what you have learnt in Section 6.

- 1. Describe the procedures you would use to remove a victim from what is believed to be a live electrical situation.

Handwriting lines for question 1.

Review questions

- 2. What procedures for rescue should occur if the voltage is known to be 1000 volts or above?

Handwriting lines for question 2.

Section 7: Coping with injury in the workplace**PURPOSE**

This topic addresses the provision of basic first aid practices in the workplace.

This section relates to learning outcome 6 of the National Descriptor

Objective:

At the end of this section you should be able to:

- ☐ outline the basic concept underlying the practice of first aid
- ☐ describe and demonstrate the priorities of management in first aid care when dealing with life threatening conditions including CPR
- ☐ describe the dangers associated with, and provide first aid management for the treatment of bleeding
- ☐ describe the dangers associated with, and provide first aid management for fractures, sprains, strains and dislocations
- ☐ describe first aid management of burns and the associated danger for the casualty and the first aider.

Essential reading

Hazards at Work, pages 49-55

Review questions

This section will help you revise what you have learnt in Section 7.

1. When an accident occurs and a person is injured, it is most important to ensure that: *(tick the correct box)*
 - ☐ no further injury occurs to the victim
 - ☐ the ambulance is called
 - ☐ no injury occurs to rescuers
 - ☐ no damage occurs to property.
2. The ABC of first aid represents: *(tick the correct box)*
 - ☐ airway, breathing, conscious
 - ☐ airway, breathing, conscious
 - ☐ airway, breathing, circulation
 - ☐ airway, bleeding, circulation.
3. The best place to feel for a victim's pulse is in the carotid artery which is located on the: *(tick the correct box)*
 - ☐ side of the Adam's apple
 - ☐ rear of the left ear
 - ☐ inside of the thigh
 - ☐ chest above the sternum.
4. The occupational health and safety (first aid) regulation states the requirements for the provision of first aid in the workplace, including: *(tick the correct box)*
 - ☐ a first-aid facility
 - ☐ first-aid equipment and personnel
 - ☐ a register of injuries and treatment
 - ☐ all of the above.

Review questions

5. DRABC is an abbreviation of the priorities for a first-aid action plan. Complete the words below.
 - D _____
 - R _____
 - A _____
 - B _____
 - C _____
6. If you are alone and you have to give first aid, what should you do about telephoning for help? *(tick the correct box)*
 - ☐ stabilise the victim and then phone
 - ☐ quickly telephone and then give emergency care
 - ☐ concentrate on emergency care and not take time to phone
 - ☐ perform the ABCs of emergency care for one minute and then phone.
7. You would assume that a victim is in cardiac arrest if: *(tick the correct box)*
 - ☐ there is no pulse
 - ☐ there are no signs of breathing
 - ☐ the pupils of the eyes are dilated
 - ☐ all of the above signs are present.

ANSWERS TO REVIEW QUESTIONS

Section 1

1. To prevent injury, disability and long term health problems associated with persons in the workplace.
2. The provisions of the Act cover every place of work, self employed people, employers and employees.
3. The Act states that where the majority of workers request it, occupational health and safety committees must be established in workplaces employing 20 or more people. Committees must have representatives of employees (elected by employees) and representatives of employers (appointed by management). The number of employers' representatives must not exceed the number of employees' representatives.
4. No. The employer has this responsibility.
5. The employer
6. Forum where health and safety problems can be identified and resolved and where procedures can be developed to implement and monitor OH&S issues.
7. Committees can:
 - review measures taken to make the workplace healthy and safe;
 - bring to the attention of the employer unsafe situations and make recommendations for improvements;
 - resolve any health and safety problems, if possible. If the committee cannot resolve the problem it can ask for an inspector from the State Authority to help;
 - help to develop a system to record accidents and hazardous situations in the workplace;
 - help to develop a health and safety policy for the workplace;
 - monitor procedures for ensuring the proper use and proper maintenance of protective equipment.
8. Committee members can:
 - inspect the workplace routinely, or at intervals agreed to by the employer or whenever an accident or possible hazardous situation occurs and not fixing the problem would cause injury in the immediate future
 - obtain details of proposed changes to the workplace that could affect health or safety;
 - have access to all information kept by the employer on accidents and occupational disease in the workplace;
 - have access to all information kept by the employer about the risks to health and safety of any equipment or substance;
 - recommend to the employer the training and education required for any

- particular groups at the workplace;
 - inform the convenor of the committee of any breach of OH&S law.
9. (a) Permanent disabilities, loss of income
(b) Increased workers compensation costs, litigations
(c) Higher taxation to support welfare payments, legal system, medical system.
10. No
11. Employees must take reasonable care of the health and safety of others.
Employees must cooperate with employers in their efforts to comply with occupational health and safety requirements.
No person:
- may interfere with or misuse anything provided for the health, safety or welfare of persons at work;
 - obstruct attempts to give aid or attempts to prevent a serious risk to health and safety of a person at work;
 - refuse a reasonable request to assist in giving aid or preventing a risk to health and safety.
12. Employers and self-employed *people* must ensure the health and safety of visitors to the workplace, that is, people who are not employees.
13. Employers must ensure the health, safety and welfare of their employees and all persons on their site by:
- providing or maintaining equipment and systems of work that are safe and without risks to health;
 - making arrangements for ensuring the safe use, handling, storage and transport of equipment and substances;
 - providing the information, instruction, training and supervision necessary to ensure the health and safety at work of employees;
 - maintaining places of work under their control in a safe condition and providing and maintaining safe entrances and exits;

Section 2

1. Housekeeping is maintaining a clean, tidy and orderly workshop. It is concerned with layout of machines, proper working procedures, proper storage facilities, disposal of waste materials, proper safety signage and line markings. Hazards occurring as a result of poor housekeeping include slips and falls, collisions, falling objects, personal danger when using tools.
2. Workplace emergencies include fires, chemical spills, accidents, explosions, gas leaks, bomb scares and the medical casualties that result.
3.
 - as well as equipment for respiratory protection
 - other types of protective gear includes overalls and aprons
 - earmuffs and earplugs
 - gloves and mittens, safety shoes and boots
 - safety glasses and shields, barrier and sunburn creams and hard hats.
4. Foam, dry chemical or carbon dioxide types.
5. Stored pressure water type.
6. The major steps are:
Fight the fire (if fire is small); **Inform** necessary personnel, phone emergency;
Return (if safe to do so); **Evacuate** (if fire cannot be contained).
7.
 - plan the lift (assess load; where is it going?; are there any obstructions)
 - assess best way of lifting (is a mechanical lifting device required?)
 - get a secure grip on the object to be lifted
 - keep the load close to the body
 - is a team lift needed?
8. 1 metre
9.
 - by ingestion, inhalation
 - through the skin
 - via the eyes and mucous membranes.
10. Material safety data sheet: Information supplied by the manufacturer/supplier of a substance giving its properties, uses, health effects, precautions to be taken, safe handling and emergency procedures.
11. As many as possible of the following: signal words and/or dangerous class and subsidiary risk; product name, chemical name, safety phrases, first aid procedures, reference to MSDS, manufacturer/supplier.
12. Skin irritation, dermatitis, vapours cause respiratory irritation, kidney damage.

Section 3

1. The inability of the human body to dissipate excess heat and so maintain normal body temperature.
2. Mild heat illness, heat syncope (fainting), heat exhaustion (serious), heat stroke (very serious), salt deficiency, skin rash, psychological stress.
3. Provision of adequate clothing, not working alone in cold rooms, regular warm drinks, warm up rooms for rest breaks, limiting air velocity in cold rooms, thermal insulation of tools and work place.
4. Fingers become 'tingly', swollen or stiff fingers loss of dexterity, weakened grip, bone cysts in fingers and wrists, back ache, balance problems, dizziness, sleeplessness, motion sickness.
 - use minimum grip on tool by hand
 - hold tools away from body
 - use of padded gloves
 - regular breaks
 - proper maintenance of equipment (to minimise vibration).
6. Noise is any unwanted or damaging sound in the environment.
7. Hearing loss, tinnitus (continual ringing in the ears).
8. There are two general approaches to noise reduction: Limit noise at its source; provide personal hearing protection such as ear plugs or ear muffs. Both general approaches can be used simultaneously.
9. Irritability, forgetfulness, anger, depression, anxiety, loss of self esteem, worry.
10. Depressed immune system, blood pressure, general ill health, strokes, heart attacks, asthma, headache, sleeplessness.
11. Slurred speech, blurred vision, loss of coordination, risk taking.
12. Muscle fatigue, pain, swelling, numbness, restricted function.

Section 5

1. Effects include muscle spasm, burns, tissue damage, breathing difficulties, ventricular fibrillation of the heart muscles.
2. The three major hazards are:
 - shock hazards
 - excessive heat
 - induction hazards which cause dielectric heating.

3. Before any portable electric tool is used, check for faulty flexible cord, cracks and dents in the casing, faulty switch and broken or damaged plug. Note that plug and sockets for extension cords on building sites must be transparent for ease of inspection. Where possible use a battery operated or 'cordless' drill.

Do not use any tool which has damage, or which emits a burnt smell. Such a tool should be labelled *Danger-Do Not Use* and it should be reported to a supervisor.

Do not overload tools when using them. If a portable tool slows down noticeably when in use, it is being overloaded.

Never carry or suspend a portable tool by its lead.

Avoid getting the tool wet and take great care that neither the plug, extension socket or the tool lies in water when you are working in a damp situation.

If at all possible use double insulated tools. These are usually labelled 'Double Insulated - Do Not Earth'. They are fitted with two pins only as the earth pin is **not** used.

Always use a portable power tool from an outlet protected by a residual current device (safety switch). If the outlet to which it is connected is not protected, then use a portable safety switch.

4. Safety interlocks either switch off the power when a door is opened or a cover is removed or prevents the opening of a door until the main switch is turned off.
5. Residual current devices detect earth leakage currents which in the case of a faulty handheld tool or appliance would flow through the human operator to earth. The safety switch is designed to detect this current and isolate the supply in a very short time.
6. No. RCDs only detect earth leakage current. They do not protect against electric shock obtained by contact between 'phases' in an electrical system. However electric shock obtained from earth leakage is much more common.
7. The person doing the maintenance.
8. Whenever it is suspected that the tool is faulty, any damage is evident. It must not be removed until the tool is checked and/or repaired by an authorised person.
9. The attempt to provide an earthing connection to double insulated tools or appliances can induce an electrical hazard.

Section 6

1. If the appropriate switch or circuit breaker can be quickly identified and readily reached, switch off supply, remove the victim from the hazard area and begin artificial resuscitation without delay. When the switch cannot be positively identified, open all switches or circuit breakers.

In the absence of a positive indication that the circuit has been de-energised, assume that the circuit is still live and adopt the procedure described below.

If the switch or switches cannot be operated readily, the action to be taken depends on the voltage to which the victim is connected. For low voltage (exceeding 32 V but not exceeding 1 000 V ac), removal from the point of contact (taking care that no skin contact is made between rescuer and victim) may be made using dry non-conducting material such as rubber gloves, plastic or rubber sheeting, dry cloth, wood or rope.

Loose portions of dry clothing may also be used to pull the victim clear of the live conductor, and sometimes the rescuer's foot may be applied to 'kick' clear the portion of the victim's body that is in contact with the live conductor. Should rescue be required above ground level, due care must be exercised to prevent the victim from falling to the ground when released from the live conductor or when the circuit is de-energised.

2. Release from contact with live high-voltage conductors: Most supply authorities recommend that no attempt be made to aid a victim in contact with high voltage (exceeding 1000 V) until the circuit has been switched off. It is considered that there is a high risk of the rescuer becoming a victim also.

Section 7

1. No further injury occurs to the victim.
2. Airway, breathing, conscious.
3. Side of the Adam's apple.
4. All of the above.
5. Danger
Response
Airway
Breathing
Circulation
6. Stabilise the victim and then phone.
7. There is no pulse.

ADDITIONAL REVIEW QUESTIONS

For the following questions circle the letter adjacent to the correct response.

1. OH&S laws are necessary because they provide: *(tick the correct box)*
 - ☐ a set of minimum standards to protect the health and safety of workers
 - ☐ a complete set of laws that cover every workplace situation and activity
 - ☐ protection against prosecution
 - ☐ national standards.
2. NSW OH&S laws are contained in documents called: *(tick the correct box)*
 - ☐ reference books
 - ☐ federal legislation
 - ☐ acts and regulations
 - ☐ occupational health and safety committees manual.
3. Documents containing NSW OH&S laws are readily available from: *(tick the correct box)*
 - ☐ most bookshops
 - ☐ Standards Australia
 - ☐ lawyers
 - ☐ Workcover Authority.
4. A function of the OH&S workplace committee is to review measures taken to ensure the health and safety of at the workplace. *(tick the correct box)*
 - ☐ inspectors
 - ☐ staff
 - ☐ everyone
 - ☐ visitors.
5. A function of the OH&S workplace committee is to assist in the development of a/an system for accidents and hazardous workplace situations. *(tick the correct box)*
 - ☐ recording
 - ☐ improved
 - ☐ detailed
 - ☐ recommended.

Additional review questions

6. The major function of the OH&S Committee is to help develop:
(tick the correct box)
- ☐ a safe working environment
 - ☐ safe systems of work
 - ☐ occupational health and safety policy suitable for that place of work
 - ☐ all of the above.
7. Select from the hazards listed below, a potential ergonomic workplace hazard (tick the correct box)
- ☐ noise
 - ☐ microwaves
 - ☐ bacteria
 - ☐ tool design.
8. Select from the hazards listed below, a potential physical workplace hazard (tick the correct box)
- ☐ machine guarding
 - ☐ gases
 - ☐ stress
 - ☐ vapours.
9. Substituting is considered to be an acceptable procedure for hazard prevention and control. Select the example of substituting from the list below: (tick the correct box)
- ☐ extract dangerous fumes
 - ☐ wear protective equipment
 - ☐ limit time spent with hazardous fumes
 - ☐ use a less hazardous substance.
10. Identify from the list below the meaning of the term Industrial Housekeeping. (tick the correct box)
- ☐ keeping workplaces and access ways clean, neat and orderly
 - ☐ quality control
 - ☐ project management
 - ☐ material requirement planning.

Additional review questions

11. Attention to good housekeeping will result in: (tick the correct box)
- ☐ improved quality
 - ☐ improved management
 - ☐ improved safety
 - ☐ all of the above.
12. Industrial housekeeping is the responsibility of: (tick the correct box)
- ☐ the boss
 - ☐ every member of staff
 - ☐ selected members of staff
 - ☐ the government.
13. A Material Safety Data Sheet (MSDS) provides: (tick the correct box)
- ☐ safe handling information for hazardous substances or materials
 - ☐ occupational health and safety regulations
 - ☐ limited information
 - ☐ interpretations of industrial law.
14. The workplace health and safety hazards of excessive noise could be best controlled or eliminated by: (tick the correct box)
- ☐ changing jobs
 - ☐ soundproofing
 - ☐ complaining
 - ☐ reducing production levels.
15. An emergency workplace evacuation plan is the responsibility of: (tick the correct box)
- ☐ the supervisor
 - ☐ the government
 - ☐ the occupational health and safety committee
 - ☐ individual employees.
16. Evacuation plans should be practised: (tick the correct box)
- ☐ never
 - ☐ very rarely
 - ☐ weekly
 - ☐ occasionally.

Additional review questions

17. Select from the list of fire extinguishers below the one most suitable for a textile, wood and/or paper fire: *(tick the correct box)*
- ☐ A class - Water fire extinguisher
 - ☐ B class - Foam fire extinguisher
 - ☐ A, B and C class - BCF fire extinguisher
 - ☐ B and C class - Carbon dioxide extinguisher.
18. Select from the list of fire extinguishers below the one most suitable for a flammable liquid fire: *(tick the correct box)*
- ☐ A, B and C class - BCF fire extinguisher
 - ☐ A class - Water fire extinguisher
 - ☐ B and C class - Carbon dioxide extinguisher
 - ☐ B class - Foam fire extinguisher.
19. Workcover Authority Inspectors: *(tick the correct box)*
- ☐ have little authority to enter the workplace
 - ☐ can issue small on the spot fines
 - ☐ have a basic understanding of OH&S issues
 - ☐ can help OH&S committees plan for a safe workplace.
20. The OH&S (first aid) regulation sets down the requirements for the provision of first aid in the workplace. Select from the list below the major items in this regulation: *(tick the correct box)*
- ☐ first aid equipment and personnel
 - ☐ a first aid facility
 - ☐ a register of injuries and treatments
 - ☐ all of the above

Answers to additional review questions

1. A set of minimum standards to protect the health and safety of workers.
2. Acts and regulations.
3. Workcover Authority.
4. Everyone
5. Recording
6. Occupational health and safety policy suitable for that place of work.
7. Tool design.
8. Machine guarding.
9. Use a less hazardous substance.
10. Keeping workplaces and access ways clean, neat and orderly.
11. All of the above.
12. Every member of staff.
13. Safe handling information for hazardous substances or materials.
14. Soundproofing.
15. The occupational health and safety committee.
16. Occasionally.
17. A class 0 Water fire extinguisher.
18. B class - Foam fire extinguisher.
19. Can help O H & S issues.
20. All of the above.

APPENDIX

Sample materials safety data sheet

CHEMICALS GROUP

ICI Australia Operations Pty Ltd
ACN: 004 117 828
1 Nicholson Street
MELBOURNE 3000 TEL: 03-9665 7111
EMERGENCY: 1 800 033 111 (ALL HOURS)

CDS: 04079

ISSUED: APR94

PAGE: 01

MERCURY

U.N. NO : 2809
HAZCHEM : 22
PACKAGING GP: III
EPG : 8A1

CLASS : 8 CORROSIVE

POISONS SCHEDULE: S7

IDENTIFICATION

CORRECT SHIPPING NAME
MERCURY

OTHER NAMES
Quicksilver

MOLECULAR FORMULA
Hg

USES
Amalgams; catalyst; cathodes for production of chlorine and sodium hydroxide; lamps; extractive metallurgy; mirror coating; arc lamps.

PHYSICAL DESCRIPTION/PROPERTIES

Specific Gravity	: 13.59	Melting Point	: -39.0 C
		Boiling Point	: 357.0 C
Vapour Pressure (20 C)	: 0.00016 kPa		
Rel Vapour Density (air=1)	: N App	Decomp. Point (C)	: N Av
Flash Point (C)	: None	Sublimation Point	: N App
Flammability Limits (%)	: N App	pH	: N App
Autoignition Temp (C)	: N App	Viscosity	: N Av
% Volatile by volume	: Nil	Evaporation Rate	: N App
Solubility in water (g/L)	: 0.002	(n-Butyl acetate=1)	

(Typical values only - consult specification sheet)

N Av = Not available

N App = Not applicable

Appearance, odour: Odourless, dense silvery mobile liquid.

Solubility: Insoluble in water, alcohol and ether. Soluble in lipids.

Reactivity: Forms explosive compounds with ammonia, amines and acetylene. Amalgamates with some metals. Can attack copper and its alloys.

HEALTH HAZARD INFORMATION

HEALTH EFFECTS

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms that may arise if the product is mishandled are:

ACUTE EFFECTS

ICI Australia Operations Pty Ltd
ACN: 004 117 828
1 Nicholson Street
MELBOURNE 3000 TEL: 03-9665 7111
EMERGENCY: 1 800 033 111 (ALL HOURS)

CHEMICALS GROUP

MERCURY

CDS: 04079

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HEALTH EFFECTS

(CONT.)

SWALLOWED: Swallowing can result in metallic taste thirst, severe abdominal pain, vomiting, bloody diarrhea and kidney damage.

EYE: Not an eye irritant. (1)

SKIN: Liquid contact with skin may result in irritation. Repeated or prolonged skin contact may lead to irritant contact dermatitis. Repeated or prolonged skin contact may lead to allergic contact dermatitis. Can be absorbed through the skin with resultant toxic effects (see 'INHALED').

INHALED: Inhalation of high concentrations of vapour causes severe respiratory irritation, digestive disturbances, and marked kidney damage. Inhalation of mercury vapour may cause headaches, cough, chest pains and tightness, and difficulty in breathing. May also cause soreness of the mouth, loss of teeth, nausea, diarrhoea, and chemical pneumonitis. (1)

CHRONIC EFFECTS

Evidence from animal tests and studies on exposed workers indicate that repeated or prolonged exposure to this chemical could result in kidney damage, central nervous system effects, and immune disorders.

Repeated or prolonged exposure to liquid or vapour produces gradually developing effects. The first to occur are often shaking of hands, eyelids, lips, tongue, or jaw. Other effects are allergic dermatitis, headache, mouth sores, swollen gums, loose teeth, insomnia, excessive salivation, personality change, irritability, indecision, loss of memory, and intellectual deterioration. (1)

FIRST AID

SWALLOWED: Immediately rinse mouth with water. Give plenty of water to drink. If more than 15 minutes from a hospital induce vomiting using fingers in the throat or Ipecac Syrup APF. Seek immediate medical assistance.

EYE: Irrigate with copious quantities of water for 15 minutes. In all cases of eye contamination it is a sensible precaution to seek medical advice.

SKIN: Immediately wash contaminated skin with plenty of soap and water. Remove contaminated clothing and wash before re-use. Can be absorbed through the skin with resultant toxic effects. Seek immediate medical advice.

INHALED: Remove victim from exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. If breathing laboured and patient cyanotic (blue), ensure airways are clear and have qualified person give oxygen

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FIRST AID (CONT.)

through a face mask. If breathing has stopped apply artificial respiration at once. In event of cardiac arrest, apply external cardiac massage. Seek medical advice.

Poison Information Centres in each State capital city can provide additional assistance for scheduled poisons.

ADVICE TO DOCTOR

Treat symptomatically. Antidote - Give dimercaprol. Hemodialysis will speed the removal of the mercury-dimercaprol complex.

TOXICITY

- Inhalation Lowest Toxic Concentration (woman): 150 ug/m³/46 days
- wakefulness; anorexia; hypermotility; diarrhoea. (3)
Inhalation Lowest Toxic Concentration (man): 44300 ug/kg/8 hr
- muscle weakness; body temperature increase. (3)
Inhalation Lowest Lethal Concentration (rabbit): 29 mg/m³/30 hr (3)
Dermal Lowest Toxic Dose (man): 129/kg/5 hr - C
- tinnitus; headache; allergic dermatitis. (3)

Occupational exposure to mercury has been associated with the development of proteinuria and less commonly nephrotic syndrome. (4)

The central nervous system is the critical organ for mercury vapour exposure. Subacute exposure has given rise to delirium, hallucinations, and suicidal tendency. Occupational exposure has been associated with erethism, tremor and mental deterioration. (4)

Urine mercury peaks in excess of 500 ug/l have been associated with neurological signs and symptoms. Urine mercury peaks of 100 ug/l have been associated with impaired performance in mechanical and visual memory tasks and psychomotor ability tests. (4)

Experimental studies in rats have shown that inorganic mercury may induce auto-immune glomerulonephritis in all species tested but not all strains, indicating a genetic disposition. (4)

PRECAUTIONS FOR USE

EXPOSURE STANDARDS

TWA		STEL	
PPM	MG/M3	PPM	MG/M3
-	0.05	-	-

As published by the National Occupational Health & Safety Commission (Worksafe Australia).

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EXPOSURE STANDARDS (CONT.)

Exposure Standard (TWA) is the time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life. According to current knowledge this concentration should neither impair the health of, nor cause undue discomfort to, nearly all workers.

STEL (Short Term Exposure Limit) - the average airborne concentration over a 15 minute period which should not be exceeded at any time during a normal eight-hour work day.

These Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Metallic mercury volatilises readily at room temperature. Saturated air at 20 C contains about 15 mg/m³ mercury. (2)

Prior to 1991 Mercury vapour had a 'Skin absorption' notation. This notation has been deleted by the National Occupational Health and Safety Commission. However the above deletion does not extend to special exposure conditions, such as air saturation concentration of mercury, and local skin areas exposed to mercury droplets trapped in footwear or clothing. (5)

ENGINEERING CONTROLS

Ensure ventilation is adequate to maintain air concentrations below exposure standards. Use with local exhaust ventilation or while wearing respirator. Keep containers closed when not in use.

PERSONAL PROTECTION

ICI PERSONAL PROTECTION GUIDE (NO. 2, 1990): CODE H -
O/ALLS, SAFETY SHOES, GOGGLES, GLOVES(S), RESPIRATOR
Avoid all contact. Wear overalls, full face shield, elbow-length impervious gloves, splash apron and rubber boots. Use with adequate ventilation. If inhalation risk exists wear air supplied mask meeting the requirements of AS 1715 and AS 1716. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

FLAMMABILITY

Non combustible material.

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SAFE HANDLING INFORMATION

STORAGE AND TRANSPORT

Correct Shipping Name MERCURY
Packaging Group: III

Classified as an 8 (CORROSIVE) Dangerous Substance for the purpose of transport. Refer to relevant regulations for storage and transport requirements.

Not to be loaded with explosives (class 1), dangerous when wet substances (class 4.3), oxidising agents (class 5.1), organic peroxides (class 5.2), radioactive substances (class 7), foodstuffs and foodstuff empties, however exemptions may apply.
This material is a Scheduled Poison (S7) and must be stored, maintained and used in accordance with the relevant regulations.

Store in a cool place and out of direct sunlight. Store in well ventilated area. Store away from ammonia, amines, acetylene, copper and copper alloys. Store away from sources of heat. Keep containers closed at all times - check regularly for leaks.

SPIILLS

Clean up spills IMMEDIATELY. Vapour equilibrium at room temperature is well above Exposure Standard. Wear protective equipment to prevent skin and eye contamination and inhalation of vapours. Increase ventilation. Contain - prevent contamination of drains and waterways. Collect droplets using specialised vacuum cleaner fitted with a trap to prevent recirculation of mercury vapour. Dust sulphur powder over any residue which cannot be collected. Allow sufficient time for mercury/sulphur compound to form and sweep up, but avoid generating dust. Collect and seal in properly labelled containers for disposal.

DISPOSAL

Refer to State Land Waste Management Authority.

FIRE/EXPLOSION HAZARDS

Not combustible. However, volatilises on heating liberating toxic mercury vapour. Fire fighters to wear self-contained breathing apparatus.

ENVIRONMENTAL IMPACT

Avoid contaminating waterways.

Mercury is toxic to microorganisms. Effects reported at 5 ug/l in culture medium. (4)

Aquatic plants affected by mercury at concentrations approaching 1 mg/l. (4)

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ENVIRONMENTAL IMPACT (CONT.)

96 hour LC50's for freshwater fish vary between 33-400 ug/l. (4)

OTHER INFORMATION & REFERENCES

PRINCIPAL REFERENCES

(1) Occupational Health Guideline for Inorganic Mercury
OSHA - US Dept of Labor; September, 1978

(2) Handbook of Poisoning 12th ed
R Dreisbach; Appleton & Lange 1987

(3), In 'Registry of Toxic Effects of Chemical Substances 1993' (Ed. D.Sweet), (US Dept. of Health & Human Services: Cincinnati 1993).

(4) International Programme on Chemical Safety, Environmental Health Criteria 118, Inorganic Mercury, WHO 1991.

(5) In 'Documentation of the Exposure Standards' (Ed Worksafe Australia), (Australian Government Publishing Service: Canberra 07/91).

This chemical is listed on the Australian Inventory of Chemical Substances (AICS).

CONTACT POINT: Toxicology Information Section,
ICI Operations Pty Ltd. (03) 9665 7143

Issue Date: 11/APR/94/JF Supersedes Issue Date: 08/91

Reason(s) For Issue: Three yearly update. Change to Dangerous Goods Requirements.

Safety Data Sheets are current for a maximum of three years but may be updated more frequently. Please ensure that you have a current copy.

SAMPLE ASSESSMENT

The example assessment events included below are to help you judge if you are ready for assessment. The actual methods used in assessing you may vary from this example.

Specific guidelines on each assessment event, including the variety of possible assessment methods, are available in the Student Assessment Guide from the NSW TAFE Commission Course Information System (CIS).

Sample project: Conducting a workplace inspection

Instructions to students

Using the principles and information outlined in the textbook Hazards at Work, including the section on housekeeping (p.225), select an industrial workshop or worksite and perform the following functions:

1. Seek permission of a person in authority at the workplace (supervisor or manager) to conduct a workplace inspection,
2. Conduct a workplace inspection to determine, by observation, what hazards exist,
3. Suggest appropriate control measures to eliminate or minimise the hazard.
4. Collate your findings on the task sheet provided.
5. Include a short summary report which may comment on the effectiveness of suggested controls and comment on any hazard controls already in place.

Note: Where permission cannot be obtained to conduct a workplace inspection, discuss this with your teacher who may find an alternative site.

Workplace Safety Inspection

Student Name _____ Class _____

Worksite location _____

[illegible]

Sample theory test

Time allowed: 1 hour and 30 minutes

1. State the name of the legislation relation to OH&S in your state.

(Marks / 2)

2. What are the **two** main bodies which produce standards and technical documents relevant to OH&S in Australia?

-
-

(Marks / 2)

3. Give **three** examples of *rights* that an employee has in the workplace.

-
-
-

(Marks / 3)

4. Give **three** examples of *responsibilities* that an employee has in the workplace.

-
-
-

(Marks / 3)

5. List **three** common issues that would come under an OH&S committee.

-
-
-

(Marks / 3)

6. What is meant by the term housekeeping?

(Marks / 2)

Sample theory test

7. What must be done in the case of a workplace fire?

(Marks / 3)

8. What type of fire extinguisher should be used to put out a fire in an electrical switchboard?

(Marks / 1)

9. State **four** hazards often associated with *confined spaces*.

-
-
-
-

(Marks / 4)

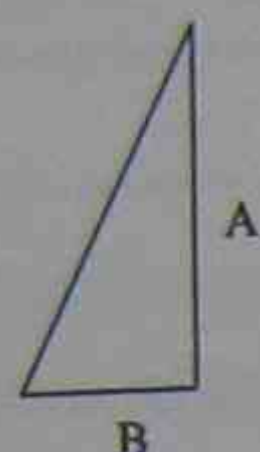
10. List **four** things that should be checked on a ladder before it is used.

-
-
-
-

(Marks / 4)

Sample theory test

11. An extension ladder is placed against a wall.



The ratio A:B should not exceed _____: _____ 1 (Marks / 1)

12. How should a ladder be stored?

(Marks / 2)

13. A small pump weighting about 10kg is to be manually lifted from the floor to a workbench. Describe the technique for doing this.

(Marks / 3)

14. List **five** categories of substances that come under the area of chemical hazards.

- _____
- _____
- _____
- _____
- _____

(Marks / 5)

15. What is an *MSDS*? What is its purpose?

(Marks / 2)

Sample theory test

16. What *particular* effects does exposure to noise have on hearing?

(Marks / 3)

17. Apart from the wearing of hearing protectors what else can be done to minimise hearing loss due to industrial noise.

(Marks / 2)

18. Describe **three** symptoms induced in the hand/arm as a consequence of excessive exposure to *vibration*.

- _____
- _____
- _____

(Marks / 3)

19. What precautions should be taken when working in areas of high temperature and humidity?

(Marks / 2)

20. List **three** factors that can contribute to *stress* in the workplace.

- _____
- _____
- _____

(Marks / 3)

21. Explain what is meant by the term *occupational overuse syndrome*.

(Marks / 2)

Sample theory test

22. Extension leads are often used to supply electrical equipment or electric tools in the workplace. List **three** precautions to be used when using extension leads.

- _____
- _____
- _____

(Marks / 3)

23. Describe briefly the function of a residual current device or safety switch.

(Marks / 2)

24. Describe the purpose of a danger tag.

(Marks / 1)

25. Who may remove a danger tag?

(Marks / 1)

26. Consider the following situation:

An electrician is found slumped into the electrical control cubicle of an industrial machine and is responding to your calls. You don't know if the panel is alive. Describe the actions you would undertake to remove the person from the situation.

(Marks / 3)

Sample theory test

For the following questions tick the correct box. (1 Mark each)

27. OH&S laws are necessary because they provide:

- ☐ a set of minimum standards to protect the health and safety of workers
- ☐ a complete set of laws that cover every workplace situation and activity
- ☐ protection against prosecution
- ☐ national standards identical in every state.

28. The major function of the OH&S committee is to help develop:

- ☐ a safe working environment
- ☐ safe systems of work
- ☐ occupational health and safety policy suitable for that place of work
- ☐ all of the above.

29. Select from the hazards listed below, select a potential *ergonomic* workplace hazard.

- ☐ noise
- ☐ microwaves
- ☐ bacteria
- ☐ tool design.

30. Select from the hazards listed below, select a potential *physical* workplace hazard.

- ☐ machining
- ☐ asbestos
- ☐ psychological stress
- ☐ chemical vapours.

31. Substituting is considered to be an acceptable procedure for hazard prevention and control. Select the example of substituting from the list below.

- ☐ extract dangerous fumes
- ☐ wear protective equipment
- ☐ limit time spend with hazard
- ☐ use a less hazardous substance.

Answers to sample theory test

1. Australian Capital Territory Occupational Health & Safety Act, 1989
New South Wales Occupational Health & Safety Act, 1983
Northern Territory Work Health Act, 1986
Queensland Workplace Health & Safety Act, 1989
South Australia Occupational Health, Safety and Welfare Act, 1986
Tasmania Industrial Safety, Health & Welfare Act, 1977
Victoria Occupational Health & Safety Act, 1985
2.
 - Standards Australia
 - Worksafe Australia
3.
 - work in safe environment, safe equipment
 - suitable safety training provided
 - provide safe access and exit
4.
 - follow correct work practices
 - not endanger other
 - assist others with first aid, observing all safety signs
5.
 - handling of dangerous substances
 - eye strain from poor lighting
 - greasy floors, missing guards
6. Housekeeping is the maintenance of a clean, tidy and orderly workplace.
7. Fire response: fight fire, inform others, return to fight fire if safe, evacuate in orderly manner.
8. Dry chemical or carbon dioxide NOT water or foam types.
9.
 - Oxygen deficiency
 - dangerous gasses
 - possibility of fire or explosion (gasses)
 - absence of emergency assistance
10.
 - loose steps or rungs
 - cracks or splits
 - loose hinges, screws, straps
 - broken or worn ropes
11. 4:1
12. Out of weather, horizontally

13. Avoid bending (straining) back; feed apart over load; use semi squat rather than full squat; lift smoothly.
14.
 - Explosives
 - Flammable liquids
 - Oxidising substances
 - Radioactive substances
 - Poisonous and infectious substances
15. Material safety data sheet: provides information about properties and uses, health effects, precautions, safe handling and emergency procedures for a particular substance.
16. Can produce temporary threshold shift, permanent hearing loss or tinnitus.
17. Remove source of noise to another location; enclose noise producing equipment.
18.
 - Tingling sensation
 - Swelling, stiffness in joints
 - Lose sense of touch
19. Drink ample (non alcoholic) fluids often; have sufficient breaks; wear appropriate clothing.
20.
 - Shift work
 - Long or unpredictable working hours
 - fear of job loss, technological change, high levels of responsibility
21. OOS: collective term for a range of conditions characterised by discomfort or persistent pain in muscles, tendons and other soft tissues.
22.
 - Check for damage to sheath or plug, socket; do not place on floors without protection
 - Don't use double adaptors or piggy back plugs
 - Uncoil leads from drums before use
23. Detects earth leakage current in fault equipment and disconnects supply.
24. Provides warning and disallows the use of equipment, circuit breakers, switches and buttons.
25. Only the person whose signature is on the tag. A qualified supervisor may remove it only under strict conditions.
26. Assume panel is alive; open main switch if possible but still assume alive; call for assistance; use dry or synthetic rope or dry timber to pry person away from situation; when clear provide standard first aid.
27. A set of minimum standards to protect the health and safety of workers.

28. All of the above.
29. Tool design.
30. Machine guarding.
31. Use a less hazardous substance.