

# Topic 5 Section 3

# General Safety Initiatives

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# Construction Workplace Plans

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**Note!**

*This section is based on Queensland legislation that existed as at 31 December, 2004. Trainees are advised to consult current legislative provisions in addition to those mentioned here.*

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Section 62 of the Workplace Health and Safety Regulation 1997 requires the principal contractor to ensure that a construction workplace plan is prepared for the workplace, and that it is written in 'a way likely to be understood by the persons likely to do construction work at the workplace'. The principal contractor must sign and date the plan.

The construction workplace plan (also known as a project safety plan) is therefore an important document, and is required reading for all employed on site and applies (with amendments) for the duration of the contract.

The Workplace Health and Safety Division of the Department of Industrial Relations, Queensland Government has set a minimum standard for safety plans to be used in the civil construction industry.

The relevant document is the Guide to Safety in the Civil Construction Industry, which was compiled jointly by the department and the Civil Construction Federation.

The guide can be downloaded from <http://www.whs.qld.gov.au/subject/construction.htm> where it is located under Guides/Safety in the Civil Construction Industry.

The headings and content of the construction workplace plan must meet the requirements for content spelled out in Section 56 of the Regulation.

## Headings in a Construction Workplace Plan

The following page shows indicative headings for a project safety plan. The actual headings and content of the sections will vary from company to company, and from project to project.

**PROJECT SAFETY PLAN****ABC PROJECT, 2004**

- 1.0** Health and Safety Policy
- 2.0** Project Information
- 3.0** Duties and Responsibilities
- 4.0** Accident & Emergency Procedures
- 5.0** Accident/Incident Investigation & Reporting
- 6.0** Statistical Information
- 7.0** Safety Induction & Promotion
- 8.0** Workplace Health and Safety Consultation
- 9.0** Site Inspections & Audits
- 10.0** Sub-Contractor Controls
- 11.0** Risk Management & Work Procedures
- 12.0** Specific Workplace Procedures

Each of the main headings shown may be subdivided into sections (e.g. 1.1, 3.24), as required by the content that is to be included in the plan.

Paragraphs following the list of headings describe some of the content that may be included under the main headings.

### *Health and Safety Policy*

The contractor has a health and safety policy, aimed at informing all employees of the company's attitudes towards and objectives for workplace health and safety.

A sample policy statement follows.

### XYZ CO. HEALTH AND SAFETY POLICY

At XYZ Co., we are committed to providing a safe environment for all persons and throughout our operations. To achieve this goal, all persons who work for XYZ Co. have responsibilities that must be fulfilled. This applies to managers, workers, contractors and suppliers.

XYZ Co. provides:

- pro-active leadership
- safety management and planning
- safe work procedures
- training and instruction
- adequate staff with specific health and safety responsibilities
- sufficient resources

All staff and contractors are required:

- to fulfil all health and safety legislative obligations
- to co-operate with fellow staff and supervisors in safe work practices
- to report all workplace hazards and incidents
- not to wilfully place themselves or others in danger

All persons have a right to a healthy and safe workplace. At XYZ Co., we will aspire to and expect nothing less.

(signed)

General Manager

### *Project Information*

The project information section of the plan may include:

- a description of the project—
  - job number
  - type of work (e.g. widening and rehabilitation)
  - identification of the relevant section of road (e.g. “two sections of the A–B road, between chainages 33.85 km to 35.64 km and 36.54 to 38.75km”)
  - scope of work (e.g. clearing, fencing and topsoil stripping; excavation and embankment construction; culvert demolition, installation of new culverts and extending existing culverts...)

- health and safety hazards expected on the job (e.g. falls of people or materials; trenching and pipe laying; working on and around earthmoving plant; working adjacent to traffic...)
- health and safety documentation available to workers on the project—
  - copies of acts and regulations
  - advisory standards
  - company safety manual
  - contract requirements
- names of key personnel on the job—
  - project manager
  - contractor’s quality representative
  - foreman
  - WH&S officer
  - first aid officers
- availability of site layout plans (e.g. ‘Copies are held at the site office, crib room...’)
- location of other site facilities—
  - drinking water
  - fire extinguishers
  - site communications, including contact numbers for key personnel
- contract review requirements (i.e. list of health and safety submissions, notifications and approvals required by the contract and legislation).

### *Duties and Responsibilities*

This section of the plan covers the workplace health and safety duties and responsibilities of the contractor’s personnel, including the following:

- project manager
- construction manager
- site engineer
- foremans
- employees
- subcontractors
- health and safety officers.

## Accident and Emergency Procedures

The accident and emergency procedures section of the plan may include:

- contact details for emergency personnel (e.g. police, local doctor/medical centre, fire brigade, ambulance, hospital, government safety authority)
- procedures for first aid treatment and evaluation, including role of the first aid officer
- response in the event of serious injury (e.g. stop work, names of contact personnel, organising emergency transport)
- evacuation procedures
- procedure in the event of fire
- hazardous materials procedures
- media procedures.



## Accident/Incident Investigation and Reporting

The accident/incident investigation and reporting section of the plan may include requirements for advising, recording and reporting details of:

- minor injuries treated on site
- serious bodily injury, where the injury is treated off-site but is not notifiable
- serious bodily injury, where the injury is not notifiable
- dangerous incidents/events
- fatalities.

## Statistical Information

The statistical information section of the plan may include the company's requirements for:

- submission of health and safety reports
- collection and reporting of safety statistics.

## Safety Induction & Promotion

Under Section 65K of the Workplace Health and Safety Regulation 1997, principal contractors are required to:

- Not allow a person to commence work on a construction site unless they have sighted general induction evidence
- Give a site-specific induction (as prescribed) to all persons who are starting work on site
- Keep records (as prescribed) of inductions.

The safety induction and promotion section of the plan may include the company's requirements for:

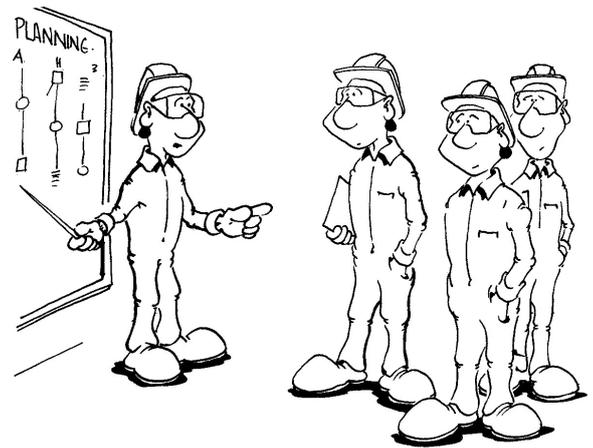
- recording details of licences, inductions, etc held by subcontractors, employees and others
- conducting general safety inductions of employees and subcontractors
- conducting site-specific safety inductions
- consulting employees about the best methods for promoting safety in the workplace
- workplace safety training.

For more information refer to Workplace Health and Safety Regulation 1997, Section 65k.

## Workplace Health and Safety Consultation

The workplace health and safety consultation section of the plan may include the company's requirements for:

- toolbox safety meetings
- health and safety committee meetings.



## Site Inspections & Audits

The safety inspections and audits section of the plan may include details of:

- the company's audit objectives
- requirements for daily inspections
- requirements for weekly inspections
- hazard reporting procedures
- internal audit requirements

### *Sub-Contractor Controls*

The sub-contractor controls section of the plan may include:

- requirements for subcontractors to submit safety plans
- procedures for handling and responding to subcontractors’ safety plans
- responsibilities for implementing safety plans
- provision for inspection of subcontractors’ work.

### *Risk Management and Work Procedures*

The risk management and work procedures section of the plan may include lists of activities for which the company or its subcontractors are required to prepare

- risk assessments
- work procedures.

### *Specific Workplace Procedures*

The specific workplace procedures section of the plan may include lists of:

- activities for which the company has developed work procedures
- work procedures applicable to the specific work site.

These are covered in more detail in a later section.

## Relationships of Headings in the Construction Workplace Plan to Section 56 Requirements

<b>Heading in Construction Workplace Plan</b>	<b>Requirements in Section 56* that might be addressed</b>
Health and Safety Policy	—
Project Information	56(a) 56(e) 56(h) 56(i) 56(j) 56(k) 56(l)
Duties and Responsibilities	56(e) 56(j) 56(k) 56(l)
Accident and Emergency Procedures	56(n) 56(o)
Accident/Incident Investigation and Reporting	56(l) 56(n)
Statistical Information	56(k)
Safety Induction and Promotion	56(d) 56(j) 56(k) 56(l)
Workplace Health and Safety Consultation	56(d) 56(e)
Site Inspections and Audits	56(k) 56(l)
Sub-Contractor Controls	56(k) 56(l)
Risk Management and Work Procedures	56(j) 56(k) 56(l)
Specific Workplace Procedures	56(j) 56(m)
Annexures to plan	56(b) 56(c) 56(o)

\*See Section 2 of this Topic for a complete list of requirements 56(a) to 56(p).

With regard to the remaining requirements [56(f), 56(g) and 56(p)]:

- the starting date [56(f)] and estimated duration of the works [56(g)] are addressed in the general project documentation and works program
- the plant provided for common use [56(p)] is addressed in the plant register, which may be an annexure to the plan.

## Accident Checklist

The following checklist describes the action you must take when an accident occurs on the job.

The important thing to understand is that, regardless of whether (or not) an accident results in injury to a person or loss or damage to equipment, it may be repeated if a similar set of circumstances arises again. Next time, the accident may cause injury, loss or damage, just as it did this time. Therefore all accidents must be investigated with a view to eliminating the cause.

When an accident occurs and it involves people and/or plant or vehicles, you should:

- Remember DRABC (Danger—Response—Airway—Breathing—Circulation)
- Remove any injured person to safety, if necessary, and if it is safe for you to do so.
- Treat the injured person or persons.
- Take care not to aggravate injuries.
- Switch off plant, vehicle or machinery.
- Extinguish fires, if necessary, and if it is safe for you to do so.
- Redirect road and job traffic.
- Set up warning signals (e.g. cones, traffic controllers)
- Make decisions where needed, such as—
  - Can the victim be moved?
  - Do we call the ambulance?
  - Otherwise, how do get the victim to the hospital or nearest doctor (i.e. which vehicle? where is it?)
  - Do we call the police?
  - Is the matter reportable?
  - Do we start the investigation now or later?

Remember the following points:

- Always contact the ambulance as soon as possible, and make sure you give them clear directions to the site.
- Do not disturb the accident site unless it is absolutely necessary, for example to treat an injured person or extract personnel from the wreckage.
- You cannot perform all of the checklist items yourself, so it is better to stand aside (where appropriate), consider the whole situation, make decisions and organise others, as well as doing your part.
- When the emergency has passed and it is appropriate to do so, sit down quietly for a few minutes and write down as much as you can remember about the accident— who, how, when, where why. This information will be needed later, if there is an investigation.

## Signage and Barrier Tape

### Safety Signs

Safety signs draw attention to objects and situations that may affect health and safety. They are placed in strategic locations, as close as possible to hazardous areas.

If a safety sign becomes damaged or unreadable, you should report the matter to your supervisor so that the sign can be replaced as soon as possible.

If a sign displays a safety message, it carries the same authority as a direct instruction from your supervisor.

All safety signs should be designed in a way so that people with reading difficulties or those whose language is other than English can clearly understand the message.

The main types of safety signs encountered on construction sites are:

- mandatory
- prohibitory
- warning
- danger
- emergency information
- fire-related
- hazchem
- pipe markers
- hazard/barrier demarcation tape



### Mandatory

Mandatory signs indicate an instruction that must be carried out. The colour scheme for mandatory signs is blue symbols on a white background.



### Prohibitory

Prohibitory signs indicate an activity or action that is not permitted. The most familiar example is a ‘No Smoking’ sign.

The colour scheme for prohibitory signs is red and black on a white background.



### Warning

Warning signs indicate a hazard or hazardous condition that is not likely to be life-threatening.

The colour scheme for warning signs is black on a yellow background.



### Danger

Danger signs indicate a hazard or hazardous condition that is likely to be life-threatening.

The colour scheme for danger signs includes the word DANGER in white letters in a red oval with black background, and other lettering in black on a white background.



### Emergency Information

Emergency information signs indicate the location of, or direction to, emergency-related facilities such as exits, safety equipment or first-aid kits.

The colour scheme for emergency information signs is white on a green background.



### Fire-Related

Fire-related signs indicate the location of fire alarms and fire-fighting equipment.

The general colour scheme for fire-related signs is white on a red background; however, other colours may be used (e.g. black letters on red).



### Hazchem

Hazchem signs identify dangerous goods, wherever they are packaged, transported or stored.

The colour scheme is specific to the type of dangerous goods (e.g. radioactive, corrosive or flammable), and may include red, white, black or yellow.



### Pipe Markers

Pipe markers are painted labels that indicate the purpose or contents of a pipe, conduit or duct. This information is essential in an emergency, or where several pipes are located in close proximity.

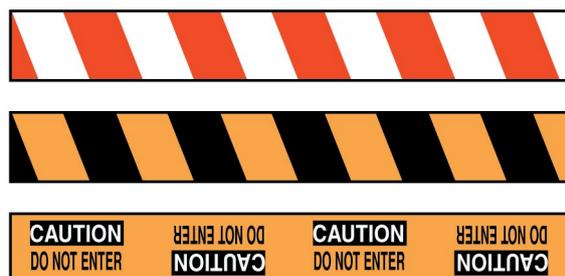
The colour scheme for pipe markers is shown below.

<b>FIRE</b>	<b>(RED)</b>
<b>WATER</b>	<b>(GREEN)</b>
<b>AIR</b>	<b>(LIGHT BLUE)</b>
<b>OILS</b>	<b>(BROWN)</b>
<b>GASES</b>	<b>(YELLOW OCHRE)</b>
<b>ACID</b>	<b>(VIOLET)</b>
<b>STEAM</b>	<b>(SILVER)</b>
<b>ELECTRICAL</b>	<b>(ORANGE)</b>
<b>MISCELLANEOUS</b>	<b>(BLACK)</b>

### Hazard/Barrier Demarcation Tape

Hazard/barrier demarcation tapes temporarily identify safety hazards, or define an area that you may not enter.

The colour scheme for hazard/barrier demarcation tapes is shown below.



Demarcation tape is used to define the boundaries of areas such as:

- safe areas, including walkways and muster points
- clearance areas (e.g. within the zone of automatic movement of machinery)
- clear access areas, such as those around fire extinguishers and exits, which must be clear and available at all times
- set-down areas, where materials or equipment may be safely deposited and left.

## Personal Protective Equipment (PPE)

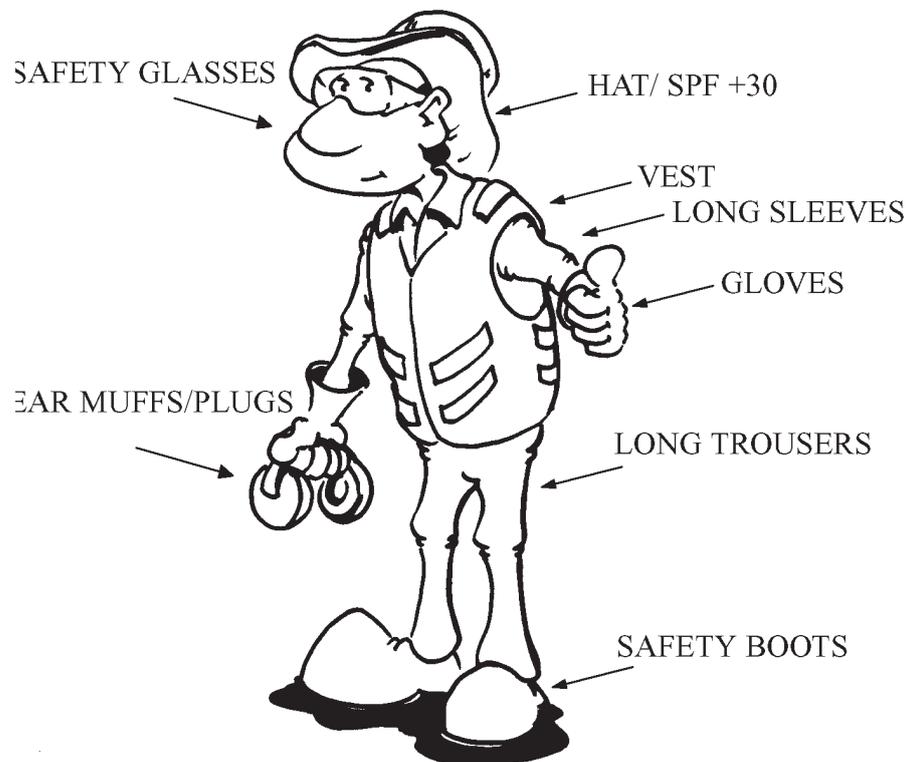
PPE is your last line of protection against injury. It is worn for your personal protection.

### Requirements for Use of PPE

Where the use of a particular item of personal protective equipment (PPE) is required, it must be:

- suited to the intended task or risk exposure
- inspected properly before use
- worn correctly (i.e. properly fitted and adjusted)
- hygienic.

Each individual employee is responsible for meeting these requirements.



## Legislative Obligations

Workers are required, under the *Workplace Health and Safety Act 1995*, to use PPE if it is provided and they have been trained in its use. They must not deliberately interfere with, or misuse, anything that has been provided for workplace health and safety— this includes PPE.

Most employers have a policy of supplying PPE without cost to the employee. However, employees are required to take only what they need.

## Hygiene

Hygiene is an important factor in the use of PPE. This means keeping your PPE clean, and ensuring your hands are clean before fitting sponge-type ear plugs. It also means regularly replacing respirator filters.

Generally, you should not use another person's items of PPE.

## Specific PPE Items

Suitable safety gear for construction work may include any or all of the following, depending on the nature of the job:

- Safety helmets, when there is danger of injury from falling or flying objects.
- Coloured and reflective jackets, when workers may be exposed to risk of injury from passing vehicles and mobile equipment.
- Safety boots
- Ear muffs or plugs when noise levels are high.
- Gloves, goggles and face shields when handling dangerous substances or irritants.

The following sections provide information about commonly encountered types of PPE, and their uses and limitations.

### Safety Helmets

AS/NZS 1801–1997: *Occupational Protective Helmets* specifies requirements for the construction and materials of the helmet shell and head harness, mechanical strength of the shell and finish of the helmet.

Safety helmets are important, because they protect your head from impacts by falling or flying objects. Safety helmets must be worn at all times where such dangers exist on construction sites, except when you are in offices, crib rooms, etc.

Safety helmets must be adjusted correctly before use, so that they fit correctly and are not prone to falling off. For more information refer to AS 1801: 1997.

Do not:

- paint the helmet
- drill or punch holes in the helmet
- wear a chipped or cracked helmet
- wear the helmet again after a solid impact.

Helmets have a use-by date, as indicated by a mark stamped on the underside of the front visor. Do not use the helmet once it has passed the use-by date— take the expired helmet to the issue point for replacement.

### *Safety Boots*

Safety boots must be worn on construction sites. They must be of an approved type and maintained in good condition.

If the boots have laces, you must ensure they are tied up securely at all times on the job.

Bare feet and thongs are not permitted on construction sites.

### *Safety Glasses/Goggles*

AS/NZS 1337–1992: *Eye Protectors for Industrial Applications* specifies minimum requirements for eye protectors and associated lenses designed to provide protection for the eyes of persons in industrial undertakings against common industrial hazards such as flying particles and fragments, dusts, splashing materials and molten metals, harmful gases, vapours and aerosols.

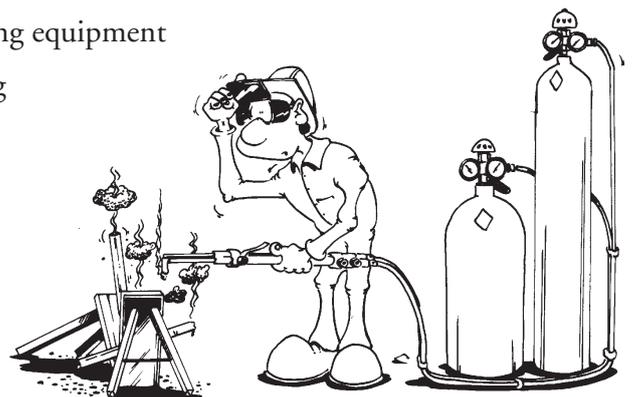
No-one can afford to be complacent about eye protection. Eyesight is one of your most valuable faculties and also one of your most vulnerable.

You should wear safety glasses at all times on a construction site, except when you are in offices, etc. Tinted-lens versions are available for outdoor work, where direct or reflected glare from the sun may cause discomfort or damage.

The use of other types of eye protection, generally to give greater protection than that available from safety glasses, may be mandatory for some tasks. For example:

- mono-goggles, when using grinders or power tools
- oxy-goggles, when oxy-acetylene cutting equipment
- face shields, when welding or handling chemicals.

Always consult your supervisor if you are unsure about the required level of protection for a job. For more information refer to AS 1337: 1992.



### Hearing Protection

Exposure to loud noise causes hearing loss. Without protection, your hearing is easily damaged. In most cases, damage occurs gradually and you will not be aware of the problem until significant hearing loss has occurred.

Once your hearing has been damaged, the damage cannot be reversed.

It is estimated that as many as 3 million Australians, or 15% of the population, suffer from hearing loss. In many cases, the cause is unprotected exposure to loud noise.

A need to wear hearing protection in a work area is indicated by:

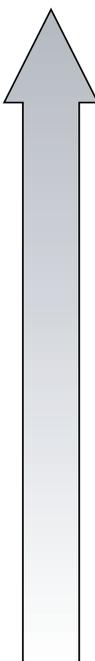
- frequently speaking louder to be heard
- temporary loss of hearing on leaving a noisy area
- ringing in the ears on leaving a noisy area.

The wearing of hearing protection is mandatory where indicated by signage. On construction sites, it should be worn at any time you are working around noisy vehicles or machinery.

The injurious effects of noise include:

- impairment of the sense of balance
- stress, resulting in fatigue, irritability, headache, higher blood pressure, etc.

The Australian Standard for maximum daily dose of noise without hearing protection is 85 decibels (dBA). The maximum instantaneous dose without hearing protection is 115 dBA.

Effect	Sound Level dB(A)	Source	
 Highly Injurious	140	Jet engine	Hearing protection must be worn
	130	Rivet hammer	
	120	Pain threshold	
	115	Maximum instantaneous dose without protection	
	110	Chainsaw	
	100	Sheetmetal workshop	
	85	General standard in Australia for 8 hours exposure	
	80	Heavy traffic	Acceptable limit without hearing protection
	70		
	60	Normal conversation	
50	Low conversation		
40	Quiet radio music		
30	Whispering		
20	Quiet urban room		
10	Rustling leaves		
Non Injurious	0	Hearing threshold	

## Ear Plugs

Ear plugs are convenient and easily fitted, but you must observe the following hygiene precautions when using them:

- fit ear plugs only when your hands are clean
- do not re-use disposable plugs
- keep your own ear plugs.

## Ear Muffs

Always check that the ear muffs you are wearing:

- meet the Australian Standard
- provide sufficient noise attenuation for the environment you are working in.

Consult your supervisor if unsure about the required level of protection.



## Hand Protection

Hand injuries are very common in the construction industry, making gloves an essential item for many tasks.

Hazards that may affect the hands include:

- heat
- cold
- wire ropes
- chemicals
- rough or abrasive materials
- electricity
- radiation, including sunlight
- biological infection.



## Gloves

Many types of safety gloves are available, including:

- leather— for sparks, moderate heat, rough surfaces and bruising
- rubber, vinyl or neoprene— for corrosive substances such as acids, solvents and petroleum products
- heat-resistant— for flames and other sources of intense heat

- insulated— for use with other types of gloves, to add protection against electricity
- cloth— for moderate heat or cold, and moderately rough or sharp surfaces
- metal mesh— for protection against cuts and scratches, especially when working with sharp objects and tools
- latex medical gloves— for use when providing first-aid treatment.

The appropriate type of glove should be used in each situation where hand protection is required.

An important point to note in the construction industry is that exposure to wet cement can cause severe skin inflammation and peeling, unless hand protection and barrier creams are used.

### Barrier Creams

Barrier creams help to prevent skin irritation or soreness and dermatitis, a common skin inflammation. Possible causes of dermatitis include:

- chemicals that injure or irritate the skin
- exposure to allergenic substances such as paints, detergents, insecticides, and some metals and textiles
- biological agents (e.g. fungi, bacteria).

Make sure you choose the correct type of barrier cream for the type of exposure. For example:

- dry creams are used to coat the skin and make clean-up easier
- wet creams protect against irritants that have been dissolved in water, such as mild acids and alkalis
- solvent-repellent creams protect against irritating solvents and oils.

For barrier creams to work effectively, you must apply them correctly. This means:

- applying only to clean skin
- reapplying often
- using lanolin to replenish natural skin oils after using barrier creams.

## Respiratory Protection

Contaminants in the air may cause lung damage, which may be either short or long-term. Examples include:

- dusts
- mists
- smoke
- gases
- paint fumes
- chemical fumes.

Employers usually make all reasonable efforts to remove contaminants from the air in the workplace; however, air-borne particulate matter may remain in some situations or working environments. In such cases, the correct respirator must be worn, such as:

- disposable respirator or dust mask
- half-face respirator with single or double filters
- half-face respirator with single or double canisters
- full-face respirator with canister masks, hoods and helmets
- self-contained breathing apparatus.

The correct type is identified in the material safety data sheet (MSDS) for the chemical causing the contamination. However, you should not attempt to select the correct type unless you have been trained in the use of respiratory protection, or are under direction of a trained person.

The period of protection provided by a respiratory protection device varies, depending on the:

- type of canister
- concentration of gas or vapour to which you are exposed
- user's level of activity.

Where used, a respirator must be in good condition and properly fitted.

## Dust Masks

Disposable dust masks are used for 'nuisance' dusts, i.e. those that are non-toxic. They provide limited, short-term protection only, and are intended for single use. Once you have used a dust mask, dispose of it in the appropriate place.



## High-Visibility Clothing

AS/NZS 4602–1999: *High Visibility Safety Garments* specifies the visual requirements for high visibility safety garments to be worn by people in situations where they may be exposed to hazard from moving traffic or from moving plant or equipment.

High-visibility clothing incorporates bands of brightly coloured cloth to increase the visibility of the road worker to passing traffic. It should always be worn in daylight hours. When work takes place at night, workers should be supplied with, and wear, clothing that includes reflective strips and complies with AS 4602: 1999.

## Wet Weather Clothing

Specialised wet-weather clothing, such as rain jackets or raincoats, is worn when you are working outdoors in poor weather. When you are working on muddy or water-covered surfaces, this may include gum boots.

The use of approved boots, incorporating a steel toe-cap and non-slip soles is recommended.

## Safety Harnesses

AS/NZS 1891.1–1995: *Industrial Fall-Arrest Systems and Devices — Safety Belts and Harnesses* specifies requirements for the materials, design, manufacture and testing of industrial safety belts and harnesses, and ancillary equipment including energy absorbers and lanyards.

Legislative requirements apply to any work conducted at more than a specified height above ground, where personnel must operate outside protective guard rails. In such cases, safety devices, including one or more of the following, must be worn:

- safety harnesses (anchor point, inertia-reel, limited free-fall)
- restraint harnesses (but not where there is free fall)
- static lines (to which a safety harness is connected).

For more information refer to AS 1891: 1995.

## Life Jackets

In some situations, construction workers may be required to work above deep water (e.g. bridge construction over rivers or dams). In such cases, life jackets must be worn.



## UV Protection

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### Note!

The following is a brief coverage of the subjects of sun hazards and skin cancer. For more detailed discussion, the following are recommended:

- [www.qldcancer.com.au](http://www.qldcancer.com.au)
  - Workplace Health and Safety Brochure 26, available from [www.whs.qld.gov.au](http://www.whs.qld.gov.au)
- 

The prevention of skin cancer is important in Australia, because we have the highest incidence of skin cancer in the world. Two out of three Australians living to the age of 75 can expect to develop some kind of skin cancer; prolonged exposure to sunlight is the most common cause. In many cases skin cancer symptoms do not develop for some years, or even decades, after exposure.

Sunlight includes radiation of a number of wavelengths, including two types of ultra-violet (UV) radiation:

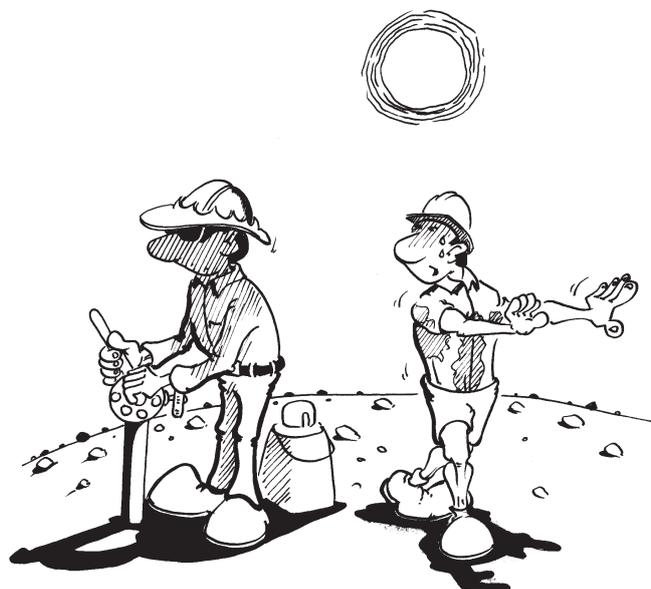
- UV-B, which reaches the top layer of skin and causes burning as well as cancer
- UV-A, which penetrates to deeper layers and adds to the burning effect.

Solar UV radiation is greatest between 10 a.m. and 3 p.m. each day, including cloudy days. The risk of skin cancer is greatest in people with fair complexion, blue eyes or red hair, and freckles; people in these groups tend to tan poorly and burn easily. People who have already been diagnosed with skin cancer are at additional risk.

In addition to burning and skin cancer, the other major hazard arising from exposure to sunlight is eye damage. UV radiation can cause both short-term and long-term eye injury, including inflammation, swelling and increased sensitivity to light, followed (later) by damage to the cornea and lens of the eye.

For outdoor workers, the main defences against the damaging effects of sunlight are:

- sunscreens
- clothing
- protective eyewear.



## Sunscreens

These are of two types:

- Chemical sunscreens that absorb UV rays. Some, known as broad-spectrum screens, absorb both UV-A and UV-B rays; others absorb UV-B only.
- Physical barrier creams, such as zinc cream, are used for extra protection to ‘danger spots’, such as lips, nose, tops of ears and cheeks.

In Queensland, exposure of skin to sunlight in the middle of the day causes sunburn. This is true at any time of year; however, the time taken for exposed skin to burn is as short as 12 minutes during the hottest months, from November to March.

The sunscreen protection rating or SPF of a cream tells you how long protection against sunburn lasts once the cream has been applied. The rating number (e.g. 15+, 30+) indicates how much longer your skin will take to burn compared to unprotected skin. For example, if your skin burns after 15 minutes when unprotected during the middle of the day, an SPF of 15 indicates that you may be able stay in the sun for 15 times this period (i.e.  $15 \times 15 = 225$  minutes, or a maximum of  $3\frac{3}{4}$  hours) without burning.

Always check the sun-protection capability of any sunscreen before using it, and observe any recommendations made by the manufacturer to ensure maximum effectiveness. Generally, you will receive the specified level of protection only if you have applied sufficient cream to all exposed areas before going out into the sun, and if the cream has not been washed off or removed by sweat.

Broad-spectrum products with an SPF of 30+, re-applied every two hours, are recommended for outdoor workers. This means maintaining adequate supplies of sunscreen lotions on the job.

## Clothing

Covering your skin with clothing is your best protection against sunburn, and (in the longer term) against skin cancer.

Construction workers are advised to wear:

- long-sleeved shirts with the sleeves rolled down and buttoned, and long trousers
- either helmets with detachable neck flaps and brim extensions, or broad-brimmed hats (i.e. hats with a brim of 10–12 cm).

Generally, lightweight clothing (e.g. a tee shirt) does not provide adequate skin protection.

Some types of clothing now include a label showing the SPF factor of the fabric.

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### **Note!**

*A hat will not protect you against solar rays reflecting upwards from water, corrugated iron or aluminium sheeting.*

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## Protective Eyewear

The combined use of hat and sunglasses gives maximum eye protection, especially during the middle of the day and in summer. Use of sunglasses complying with Australian Standard 1067— Sunglasses and Fashion Spectacles Non-Prescription) is recommended. Alternatively, safety glasses that incorporate UV protection are available, and may have a label indicating the level of protection they provide.

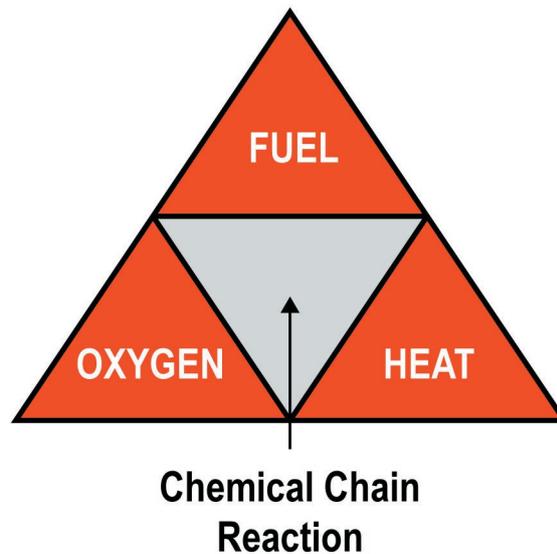
# Fire Prevention and Fire Fighting

## Fire Basics

### *Definition of Fire*

Fire (or combustion) is a rapid, self-sustaining oxidation process. It usually results in the release of heat and light from the fuel, in varying amounts and intensities that depend on the conditions existing at the time.

### *Fire Tetrahedron*



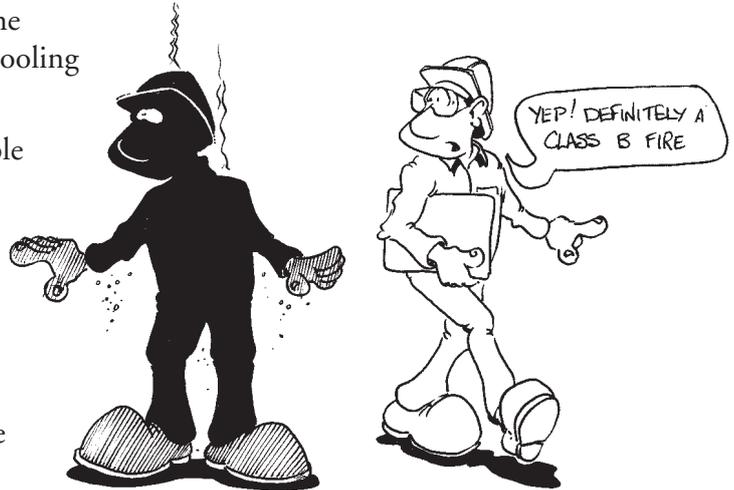
Four elements, referred to as the fire tetrahedron, are necessary for a fire to start and for combustion to be sustained. As shown in the above diagram, these elements are:

- heat
- fuel
- oxygen
- chemical chain reaction.

## Classes of Fire

You must be able to identify the class of fire in order to identify the correct extinguishing agent and the most efficient method of putting it out.

- A Class Fires involve solid carbonaceous materials like wood, cloth, paper and packing materials. They may be extinguished with any of the extinguishing mediums, but cooling water is the most efficient.
- B Class Fires involve flammable liquids such as fuel, diesel, hydraulic oil, greases or chemicals.
  - They must be extinguished with a medium that will float on the surface of the flammable liquid and starve the fire of oxygen.
  - Usually, this means smothering the fire with foam or CO<sub>2</sub>.
- C Class Fires involve flammable gases such as acetylene, LPG or hydrogen.
- D Class Fires involve burning metals such as magnesium, sodium or potassium. Special extinguishers are required.
- E Class Fires involve electricity. Generally, an item of electrical equipment on fire can be classed as an A, B, C, or D fire, with live electricity involved.
  - The capital letter (E) shown in brackets on an extinguisher indicates that the extinguishing medium is suitable for use on the live electrical equipment.
  - To extinguish Class E fires, first isolate the power source to remove the hazard of electrocution. Only then should you attack the fire, using the appropriate extinguishing medium.
- F Class Fires involve cooking oils and fats. Where significant potential exists for such fires, wet chemical type fire extinguishers and fire blankets should be provided.



## Fire Extinguishers

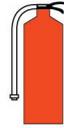
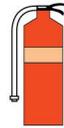
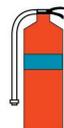
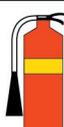
AS 1851.1–1995: *Maintenance of Fire Protection Equipment — Portable Fire Extinguishers and Fire Blankets* sets out requirements for the regular inspection, testing, recharging and general servicing of portable fire extinguishers.

The fire extinguisher is the first line of defence against fire. If used properly, an extinguisher can stop a small fire from escalating into a catastrophic event.

You should ensure that you become familiar with the locations and types of fire extinguishers available in your work place.

All extinguishers are required to have 6-monthly, yearly, 3-yearly, 6-yearly as well as after-use maintenance conducted in accordance with AS 1851.1: 1995.

As shown in the drawing below, there is an Australian standard colour coding for fire extinguishers.

CLASS OF FIRE		A	B	C	(E)	F	
TYPE OF FIRE		Ordinary combustibles (wood, paper, plastics etc.)	Flammable and combustible liquids	Flammable gases	Fire involving energised electrical equipment	Fire involving cooking oils and fats	
Colour Coding	Type of Extinguisher	Extinguisher Suitability					Caution
 Red	Water	Yes	No	No	No	No	Electrically Conductive
 Red/Oatmeal Band	Wet Chemical	Yes	No	No	No	Yes Most Suitable	Electrically Conductive
 Red/Blue Band	Alcohol Resistant Foam	Yes	Yes Suitable For Alcohol Fires	No	No	Yes	Electrically Conductive
	AFF Type Foam	Yes	Yes Not Suitable For Alcohol Fires	No	No	Yes	Electrically Conductive
 Red/Yellow Band	NAF PIII Vaporising Liquid	Yes	Yes	No	Yes	No	
 Red/White Band	AB (E) Dry Chemical Powder	Yes	Yes	Yes	Yes	No	
	B (E) Dry Chemical Powder	No	Yes	Yes	Yes	Yes	
 Red/Black Band	Carbon Dioxide (CO <sub>2</sub> )	Yes*	Yes	No	Yes	Yes	Depletes Oxygen in Confined Spaces

\* Carbon Dioxide type extinguishers are unsuitable for deep seated smouldering A class fires.

### Fire Extinguisher Identification

If you take the time to become familiar with the various fire extinguishers and their correct uses, you will always be able to select the right type for the job. It will enable you to extinguish a minor fire quickly.

## Fire Prevention

The following rules will assist in prevention and containment of fires.

### *General Recommended Practices*

- Observe all 'No Smoking' designations, and signs forbidding flames and sparks.
- Keep aisles and exits clear at all times.
- Ensure fire extinguishers are accessible at all times.
- Clean up and report all spills of fuel, oil or chemicals immediately.
- Dispose of waste by placing it only in the bins provided for that purpose.
- Ensure that the following are available before commencing any hot work such as oxy-acetylene cutting or welding:
  - an adequate supply of water
  - correct type of fire extinguisher
  - supply of fire blankets
- Ensure that electrical leads and appliances are in good condition and that circuits are not overloaded.
- Keep all electrical equipment dry.

### *Practices to Avoid*

- Keep flammable materials well clear of electrical equipment and refuelling points.
- Do not make unauthorised electrical or LPG connections. Only trained, authorised persons are permitted to make or modify such connections.
- Do not smoke:
  - within 6 m of any explosives
  - within 6 m of vehicle refuelling operations
  - in or near any flammable liquid storage area
  - while working on or near vehicle batteries
  - near bitumen that is being sprayed or carted
  - near line-marking plant and paint.



## *Bush Fire Safety*

The need to prevent bushfires, and to protect persons and property from bushfires, applies to all outdoor workers in rural areas, including those involved in road construction. The following is a brief treatment of the subject. More information is available from two Queensland Government websites:

[www.fire.qld.gov.au](http://www.fire.qld.gov.au)

[www.ruralfire.qld.gov.au/commsafety/resources.htm](http://www.ruralfire.qld.gov.au/commsafety/resources.htm)

## Fire Prevention

Construction workers can take many positive steps to protect against, and help prevent, bushfires:

- Be aware of the fuel loadings present in grass and forest areas surrounding the job, and of the state of curing of the fuel.
- Take note of fire weather warnings and be alert to adverse weather conditions that lead to extreme fire danger (e.g. high temperatures, low humidity, strong winds).
- Do not use a vehicle to force a path through dry grass, where it may accumulate around the exhaust system. A vehicle stalled or bogged in such conditions can start a fire.

## Protecting Property

- Keep the camp or site office area clear of flammable materials, such as accumulations of leaves and dry grass.
- Ensure that fire-fighting equipment (e.g. truck or tractor-mounted tanks and pumps) are well maintained and ready for use.
- Identify sources of water that may be used for fire-fighting as part of job planning, and before the fire season arrives.
- Make sure that storage areas for fuel and other flammable materials are protected by fire breaks, bunding, fire extinguishers and other required protective measures.

## Protecting Personnel

- Set up muster areas and advise all personnel of their locations, so that people can be accounted for in the event of fire.
- Have an evacuation plan, so that staff can move away from the area in an orderly manner, if required.

In the event of a bushfire:

- Stay calm. Don't panic.
- Never attempt to run through, or outrun, a fire.
- Protect yourself from radiant heat.
- Use a wet handkerchief over the mouth to prevent smoke inhalation.
- Obey directions given by emergency services personnel.

## Fire Fighting

Fire-fighting is a dangerous activity and should only be undertaken by persons who are physically fit, and well aware of the dangers involved and the consequences of their actions.

If it is necessary to fight a bush fire, there are two dangers that you must constantly keep in mind:

- Radiant heat from a fire rapidly leads to heat exhaustion or heat stroke, and can cause severe burns. Cover as much of your skin as possible. Never attempt to fight a fire in shorts, or in short-sleeved or lightweight clothing, or while wearing thongs or open-toed footwear. Boots are essential.
- Inhalation of smoke is extremely dangerous. It can lead to loss of judgement, lack of awareness of danger, erratic behaviour and collapse.

Both of these dangers are present in any fire, regardless of whether it involves a building, vegetation, or a vehicle.



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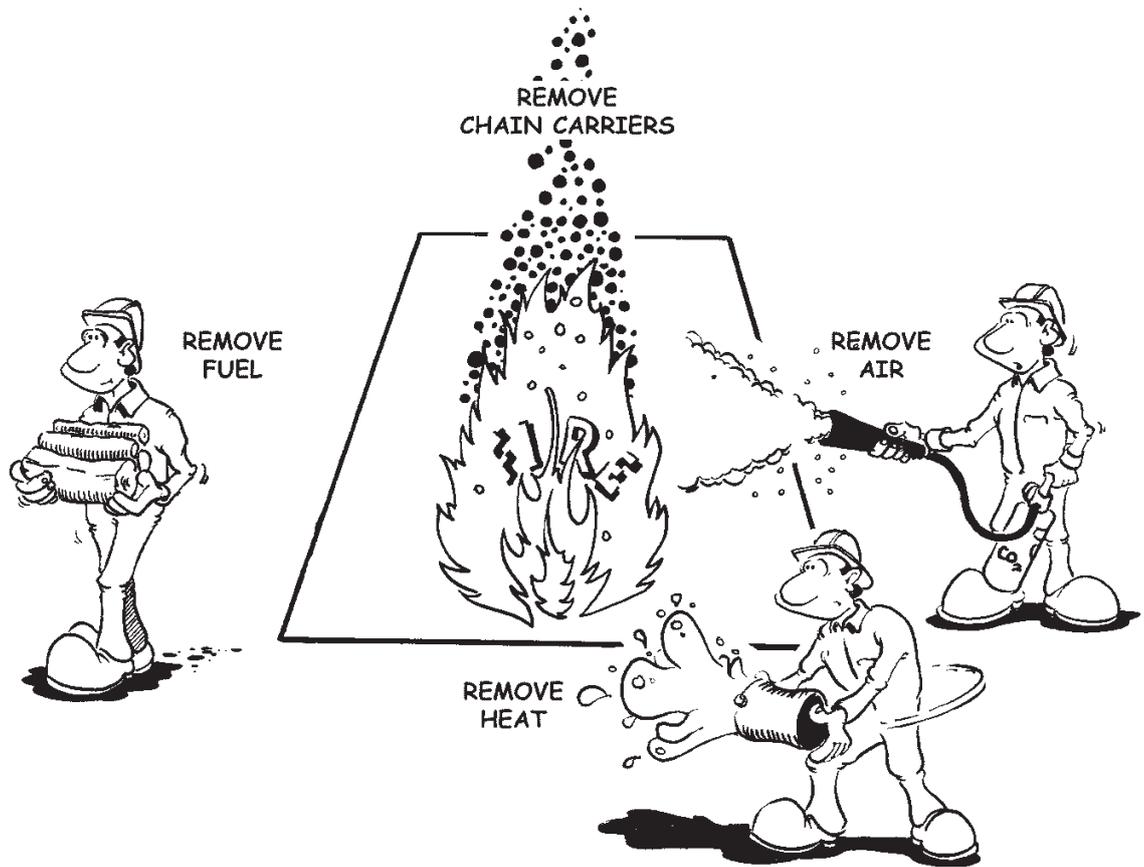
### **Note!**

*Only trained persons with self-contained breathing apparatus may enter a smoke-filled building.*

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## Methods of Extinguishing a Fire

To extinguish a fire remove one of the four elements of combustion, as shown in the cartoon:



- The removal of fuel from the combustion process is called starvation. This is the process of limiting or removing the source of fuel from the fire.
  - Once the fuel has been removed the fire will be extinguished.
  - For example, turning off a valve to a leaking gas pipe.
- The removal of oxygen from the combustion process is called smothering. This is the process of removing the source of oxygen from the fire or preventing oxygen from reaching the fire.
  - The smothering agent must be less dense than the fuel on which it is to be applied. This enables the smothering agent to float on the fuel.
  - Smothering is not an effective method if used on a fuel source that produces its own oxygen during the combustion process.
  - Ensure that the smothering agent is not removed too soon. If the fuel is above its ignition temperature, it can reignite.
- The removal of heat from the combustion process is called cooling.
  - Water on a fire reduces the temperature of the fuel below its flashpoint. As a result, no flammable vapours can be produced.

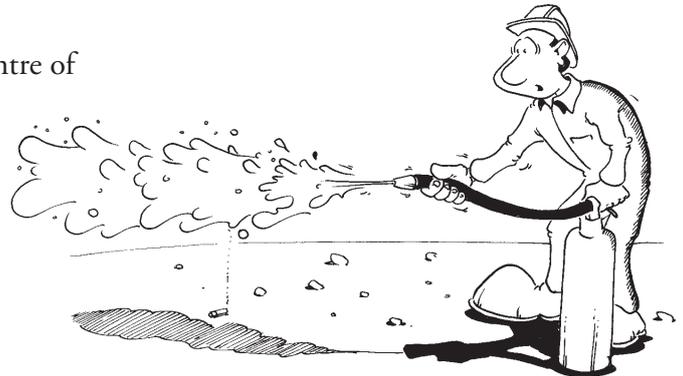
- The fire is extinguished because water absorbs the heat faster than the combustion chain can produce it.
- The removal of chain reaction from the combustion process is called inhibition.
  - There must be a chain reaction for combustion to take place.
  - Remove the chain reaction and the fire is extinguished (e.g. applying dry chemical powder to a fire removes the oxygen from the chain reaction.)

### Using Fire Extinguishers

Section 11 of the Building Fire Safety Regulation 1991 requires the occupier of a building to give to every person permanently working in a building instructions on... the location and method of operation of fire-fighting equipment and fire alarms.

The following procedure should be adopted if you are required to fight a fire using a hand-held extinguisher:

- Check the extinguisher pressure gauge to ensure it is charged.
- Remove the extinguisher from its retaining bracket on the wall or vehicle.
- Remove the safety pin.
- Prove that the extinguisher works by quick activation, before approaching the flames.
- Do not aim the output nozzle at the centre of the fire, as this action may spread the fire.
- Aim at the base of the fire, working from the near edge. With sweeping motions, drive the fire to the far edge.
- Do not stand down-wind of a fire. Minimise your exposure to smoke and flames.
- Do not stand downhill from a fire, as runoff of hot or flaming liquid can be dangerous.
- Evacuate the area if there is any chance that chemicals or explosives will burn. Never fight an explosives fire.
- If there is any doubt, treat any fire as an electrical fire until you are certain that it is not. In case of electrical fire, you must first disconnect the power source before attempting to fight the fire.



For further information refer to Building Fire safety Regulation 1991

### Fire Hoses and Hydrants

Where hydrants, hoses or other fire-fighting appliances have been installed, make yourself familiar with their location before commencing work. These devices may only be used for fire fighting, or for approved training purposes authorised by an appropriate authority.

## General Fire-Fighting Procedures

If you are called on to fight a fire:

- Attack the fire using the fire-fighting equipment that is available and suitable.
- Send another person to raise the alarm.
- If possible, arrange for power and fuel supplies to the area to be turned off.
- Approach a fire from a safe direction— upwind if possible. Do not consciously place yourself in the way of smoke or flames.
- If possible, send other people to obtain additional fire extinguishers in case they are needed.
- Use available resources, such as sand, earth or green vegetation, to smother a fire.

## Vehicle and Heavy Machinery Fires

Fire in a vehicle is possible, for example, in the engine bay following a vehicle rollover. The best defences are to check that a fire extinguisher is fitted before starting the journey, drive carefully, know the whereabouts of the fire extinguisher, and ensure that it is readily accessible at all times.

Where flammable materials, such as fuel drums or gas cylinders, are carried on a vehicle, they must be packed carefully and properly secured. (Gas cylinders should be carried vertically).

A fire extinguisher is carried on most items of heavy equipment— be aware of its location.

If a vehicle or machinery fire occurs, stay well clear. The fire may burn with great intensity. In such cases, the down-wind air can become superheated, causing damage to airway and lung tissue.

## Construction Site-Specific Rules

As mentioned in earlier discussion, the company may develop rules or work procedures applicable to the specific work site.

These may apply, but are not limited, to any of the following:

- Personal protective equipment
- Trenching
- Working within the road reserve
- Working with plant and equipment
- Concrete works
- On-site stressing
- Any site specific activity.

Where developed, procedures can be based on:

- Company construction procedures, or variations of the procedures
- A statutory requirement, advisory standard or Australian Standard
- A project specific risk assessment.

The contractor usually compiles a list of site-specific procedures, and of standard procedures applicable to the site, and circulates the list to staff.

## Safety Officers

Part 8 of the Workplace Health and Safety Act prescribes the method of appointing WH&S officers and their functions.

The contractor may nominate a health and safety officer for each works site. The role of the site nominee may include any or all of the following:

- Advising the project manager and supervisory staff on the overall state of health and safety in the workplace.
- Liaising with the project manager and supervisory staff on matters relating to health and safety
- Ensuring 'tool-box' meetings are held and health and safety matters are included in management meetings.
- Conducting inspections of the workplace to ensure health and safety standards are maintained.
- Checking plant and equipment to ensure maintenance and records are current.
- Ensuring all injuries, work-related illnesses and dangerous events are investigated and recorded.
- Chairing safety committee meetings
- Preparing and maintaining the following records:
  - Safety induction records
  - Safety statistics
  - Accident investigations
  - Certificates of competency
  - Material safety data sheets
  - Workplace inspections and audits
  - Health and safety reports.



For further information refer to Workplace Health and Safety Act 1995, Part 8.

## Section 3 – Assessment Activities

For information on how these assessment activities may be used as part of the learning process, see the section on ‘Assessment’ in the ‘Topic Descriptor’ section at the front of this topic.

### Theory Questions

The following questions allow you to assess your progress in understanding the material presented in Section 3. The questions may be of any of the following types:

- multiple choice (identify correct answer or answers)
- multiple choice (identify incorrect answer or answers)
- fill in the gaps in a sentence or statement
- identify a sentence or statement as TRUE or FALSE
- write a few sentences or a short paragraph.

Answers to the question are shown in the separate ‘Answer’ section.

#### Question 1

Identify four of the main headings under which safety information may be listed in the Project Safety Plan.

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#### Question 2

DRABC is the first step in an accident checklist when an accident occurs and it involves people and/or plant or vehicles. What does it stand for?

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**Question 3**

When you are dealing with an emergency situation, what are two important steps you can take to facilitate a future investigation of the causes?

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**Question 4**

Safety signs draw attention to objects and situations that may affect health and safety. Five of the main types of signs are listed below; complete the missing words to describe the colour scheme of each:

1. Mandatory: \_\_\_\_\_ symbols on a white background.
2. Prohibitory: \_\_\_\_\_ and \_\_\_\_\_ symbols on a white background.
3. Warning: Black symbols on a ..... background.
4. Danger: The word DANGER in white letters in a red oval with black background, and other lettering is black on a \_\_\_\_\_ background.
5. Emergency information: white symbols on a \_\_\_\_\_ background.

**Question 5**

Name two types of areas that may need to be defined by barrier tapes.

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**Question 6**

Personal protective equipment (PPE) is your last line of protection against injury. Give examples of PPE that may be worn to protect your:

- 1. eyesight \_\_\_\_\_
- 2. hearing \_\_\_\_\_
- 3. feet \_\_\_\_\_
- 4. hands \_\_\_\_\_
- 5. face \_\_\_\_\_
- 6. head \_\_\_\_\_
- 7. skin \_\_\_\_\_
- 8. breathing \_\_\_\_\_
- 9. person (in conditions of poor visibility) \_\_\_\_\_

**Question 7**

What steps should you take to ensure that PPE is used hygienically?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Question 8**

From the following list, identify those practices that are approved methods of treating a safety helmet.

- Painting the helmet to increase visibility.
- Drilling or punching holes in the helmet.
- Correctly adjusting the helmet before use.
- Wearing a chipped or cracked helmet.
- Replacing the helmet when it reaches the use-by date.

**Question 9**

What is the correct procedure if you are not sure about the correct type of safety glasses or goggles to wear?

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**Question 10**

List three indications that there is a need to wear hearing protection in a work area.

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**Question 11**

The Australian Standard for maximum daily dose of noise without hearing protection is:

- 40 dBA
- 85 dBA
- 120 dBA
- 140 dBA

**Question 12**

Name four workplace hazards that may affect the hands.

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**Question 13**

Briefly describe the guidelines for using barrier creams.

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**Question 14**

Name four types of atmospheric contaminants that may cause lung damage.

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**Question 15**

If your skin normally burns after 10 minutes when unprotected during the middle of the day, for how long should you be able to stay in the sun without burning if you have correctly applied a cream with an SPF of 30?

- One hour
- Two and a half hours
- Five hours
- Ten hours.

### Question 16

How would you modify this figure if you were in a workplace where solar rays were reflecting upwards from water and you were wearing a hat as well as sunscreen?

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### Question 17

Four elements, referred to as the fire tetrahedron, are necessary for a fire to start and for combustion to be sustained. Fill in the missing elements:

1. heat
2. \_\_\_\_\_
3. \_\_\_\_\_
4. chemical chain reaction

### Question 18

Indicate whether you think that the following statements are true (T) or false (F).

1. Water is the most efficient extinguishing agent for A Class fires —  
e.g. wood, cloth, paper etc. ( )
2. B Class fires involve flammable gases such as acetylene, LPG or  
hydrogen ( )
3. The capital letter (E) shown in brackets on an extinguisher indicates  
that the extinguishing medium is suitable for use on live electrical  
equipment ( )
4. To extinguish E Class fires, immediately spray the fire with a chemical  
powder or carbon dioxide (CO<sub>2</sub>) extinguisher ( )
5. Water or wet chemical extinguishers are suitable for use on any type  
of fire ( )

**Question 19**

Name four areas on a construction site in which smoking would normally be prohibited.

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**Question 20**

What are the two dangers that you must constantly keep in mind if called on to fight a bush fire, and what preventative measures can you take?

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**Question 21**

Complete the following statements about methods of extinguishing a fire.

The removal of fuel from the combustion process is called \_\_\_\_\_.

The removal of oxygen from the combustion process is called \_\_\_\_\_.

The removal of heat from the combustion process is called \_\_\_\_\_.

The removal of chain reaction from the combustion process is called \_\_\_\_\_.

**Question 22**

What additional factors may be involved if there is a fire involving a vehicle or heavy machinery?

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**Question 23**

Construction companies or contractors may nominate a health and safety officer for each work site. List three activities that the officer may undertake to promote health and safety on the site.

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## Practical Exercises

### *Practical Exercise 1*

Obtain and read a copy of the construction workplace plan for your site. What are the main headings? Would you add any information to that shown in the plan?

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**NOTE!**

*Practical Exercises 2, 3, 4, and 5 may only be undertaken after you have consulted your supervisor and any other relevant persons in your organisation, such as workplace health and safety officer and/or fire protection officer. Section 12 of the Building Fire Safety Regulation 1991 requires the occupier of a building to keep a record of fire instruction given to employees.*

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### *Practical Exercise 2*

Under supervision, set up barrier tape around a hazard on site. What type of tape did you use and why?

### *Practical Exercise 3*

Discuss with your supervisor the correct procedure that should be adopted if you are required to fight a fire using a hand-held extinguisher:

### *Practical Exercise 4*

Obtain a copy of the Building Fire Safety Regulations 1991, Section 11. Under supervision, organise and conduct a fire drill at your workplace. Did everyone know what to do when the evacuation siren sounded? What could be done to improve evacuation procedures?

### *Practical Exercise 5*

Under supervision and by arrangement with you supervisor, conduct a demonstration of the use of common types of fire extinguisher found in your workplace (e.g. to extinguish a small, contained fire). How confident did people feel about using a fire extinguisher?

### *Practical Exercise 6*

Conduct an inspection of you workplace for fire hazards and check the condition of the fire-fighting equipment. Report your findings. What improvements would you recommend to your supervisor?