

## **Approved Code of Practice for the Storage and Handling of Dangerous Goods**

I, KEVIN JAMES ANDREWS, Minister for Employment and Workplace Relations, approve the following Code of Practice under subsection 70(1) of the *Occupational Health and Safety (Commonwealth Employment) Act 1991.* 

Dated 28<sup>th</sup> June 2006

## **KEVIN ANDREWS**

Minister for Employment and Workplace Relations

**1** Name of Code of Practice This instrument is the *Approved Code of Practice for the Storage and Handling of Dangerous Goods.* 

## 2 Application

Pursuant to paragraph 70(4)(a) of the *Occupational Health and Safety* (*Commonwealth Employment*) *Act 1991*, this Code of Practice is to apply generally.

## **3** Commencement

This Code of Practice commences the day after it is registered.

#### **Foreword**

The Safety, Rehabilitation and Compensation Commission (the SRCC) oversees the operation of the *Safety, Rehabilitation and Compensation Act 1988* and the *Occupational Health and Safety (Commonwealth Employment) Act 1991* (the OHS(CE) Act).

Functions of the SRCC include: developing occupational health and safety (OHS) policies and strategies and ensuring compliance with the OHS (CE) Act, overseeing legislative policy in relation to the OHS (CE) Act and advising the Minister for Employment and Workplace Relations on matters relating to the OHS (CE) Act.

Comcare is a statutory body established by the Australian Government to lead and promote efforts to prevent and reduce the incidence of occupational injury and disease as well as promote safety by producing a healthy and safe workplace.

Comcare undertakes a number of functions on behalf of the SRCC. Comcare's activities include education, regulation, enforcement, research and provision of relevant policy advice to both the SRCC and persons covered by the OHS (CE) Act.

Comcare developed this approved code of practice of behalf of the SRCC.

## **Table of Contents**

Purpose		6
What is an approved code of practice?		6
Authority		6
Who this code applies to		6
How this code applies		6
Relationship of this code to other legislation	on	6
Definitions		7
1. Introduction		9
What are dangerous goods?		9
Dangerous goods v hazardous substances		9
Dangerous goods covered		9
2. Duties of manufacturers, importers an	d suppliers of dangerous goods	11
Duties of manufacturers and importers		11
Determination that a substance is a	dangerous good	11
Duty to provide safety information		11
Duty to contain, package and label	dangerous goods	12
Duties of Suppliers		13
Duty to contain, package and label	dangerous goods	13
Duty to provide safety information	ers with dangerous goods	13 14
Duties of suppliers or installers of plant or	r structures	14
3. Duties of Employers		15
Risk management		15
Step 1 - Hazard identification		16
Collecting information		16
Useful sources		16
Reviewing the information		18
Step 2 - Risk Assessment		18
Conducting a risk assessment		19
Reviewing and revising risk assess	ments	19
Record of the assessment		19
Step 3 - Control the risk		20
Step 4 – Review		20
4. Risk control strategies	4 1 1	20
Strategy 1 - Eliminate the hazard fi	om the workplace	21
Strategy 3 - Isolate the hazard	ic nazaru	21 22
Strategy 4 - Use engineering metho	ods to control the hazard at its source	23
Strategy 5 - Use administrative cor	itrols	$\frac{-3}{23}$
Strategy 6 - Introduce Personal Pro	tective Equipment (PPE)	24
Strategy 7 - Control risk at the desi	gn stage	24
Implementation of risk control stra	tegies	26

5. Specific risk control duties	26
Physical separation of dangerous goods from people, protected places, and other	,
property	27
Separation of dangerous goods from incompatible substances	27
Keeping dangerous goods stable	
Impact protection – structures and plant	28
Impact protection - containers for bulk dangerous goods	29
Spills and containment of dangerous goods	30
Transfer of dangerous goods	30
<b>Fire protection</b>	31
The fire protection system	32
Fire fighting equipment	33
Emergency Preparedness	34
Emergency procedures	34
Emergency plans	35
Elimination of ignition sources in hazardous areas	37
Safety Equipment	39
Control of hazardous atmosphere	39
Lighting	40 41
Disposal etc of plant equipment and containers	41
6 Employer's duties - provision of information	42
Provision of information for health and safety procedures	42
Material Safety Data Sheets	43
Risk assessment	44
Information for plant and structures	44
Register of manifest quantities of dangerous goods for emergency purposes	45
Site Plan	45
7. Notification of storage and handling of dangerous goods	46
8. Marking and identification of containers	46
Marking of containers — dangerous goods received by employer	46
Marking of containers at the workplace	47
Containers for short-term storage of dangerous goods not required to be marked	i 47
Placards	47
Calculating quantities of dangerous goods.	48
Types of placards	48
Other placards – quantity of packaged dangerous goods or combustible liqui	ids
exceeds placarding quantity	49
Accuracy of placards	50
9. Duties to employees	50
Consultation	
Induction, information, training and supervision	51
Induction	51

Training	51
Supervision	53
Visitors	53
Register of information about dangerous goods	53
10. Duties of an employer who builds, owns or operates a pipeline	54
11. Duties of employees	55
Appendixes	55
Appendix 1 Schedule 7 of the Regulations	56
Appendix 2 Schedule 8 - Placard requirements	57
Appendix 3 Standards and Codes	61

## Purpose

The purpose of this Approved Code of Practice (code of practice) is to provide practical guidance on the storage and handling of dangerous goods for persons covered by the OHS (CE) Act.

## What is an approved code of practice?

An approved code of practice is a source of expert practical information about safe work practices in specific circumstances. Detailed obligations are contained in the <u>Occupational Health and Safety (Commonwealth Employment) (National Standards)</u> <u>Regulations 1994</u> (the regulations). Where there are any inconsistencies between the code and the regulations, the regulations will apply.

## Authority

The Minister for Employment and Workplace Relations approved this code under section 70 of the *Occupational Health and Safety (Commonwealth Employment) Act 1991* (the OHS (CE) Act). This code came into effect the day after it was registered with the Federal Register of Legislative Instruments.

## Who this code applies to

This code applies to employers and employees covered by the OHS(CE) Act, and manufacturers and suppliers that provide dangerous goods that are stored or handled in workplaces within the Commonwealth jurisdiction.

## How this code applies

**Sub-section 16(1)** of the OHS(CE) Act states that:

An employer must take all reasonably practicable steps to protect the health and safety at work of the employer's employees.

This code:

- provides practical guidance to people with a duty of care under the OHS(CE) Act;
- should be followed unless there is another means of achieving the same or better standards of health and safety; and
- is admissible as evidence in proceedings under the OHS(CE) Act and supporting regulations.

This code may be cited by:

- an investigator; and/or
- a health and safety representative in a provisional improvement notice.

## Relationship of this code to other legislation

Under the current Commonwealth OHS framework, employers have a general duty of care to protect the health and safety of their employees. Employers must have an understanding of their general obligations under the OHS(CE) Act and all relevant regulations.

Where a particular obligation is not imposed in Part 8 of the OHS (NS) regulations, an employer must continue to implement procedures that are imposed under other parts of the Commonwealth OHS legislation. An example of this may pertain to the licensing requirements of plant, which are used with dangerous goods.

Further more, Part 4 of the regulations outlines the general requirements of plant safety and licensing requirements. Employers must continue to implement the requirements under other relevant parts of the OHS(NS) regulations as well as the requirements under Part 8.

Much of the terminologies used to describe dangerous goods are defined in the Australian Dangerous Goods Code (ADG Code). The ADG Code provides information to people involved with dangerous goods. The information is used to:

- correctly handle and store dangerous goods;
- segregate incompatible goods; and
- provide emergency services with vital information on hazard, fire fighting and personal protective equipment.

The ADG Code classifies dangerous goods according to the predominant type of risk involved. There are 9 classes of dangerous goods and these classes can be further subdivided to describe the risk more accurately. In addition to the predominant risk, dangerous goods can have other risks associated with them. The ADG Code refers to these risks as subsidiary risks.

The Australian Dangerous Goods Code, sixth edition (ADG Code 6th Ed), is

administered by the Department of Transport and Regional Services and is available for purchase from CanPrint in paperback and on CD -

https://secure.canprint.com.au/publicationsales/productline.php/0009.html

Persons covered by this code of practice will also find most of the information needed to classify dangerous goods, identify packaging groups, and correctly label dangerous goods. Notes contained within the regulations may identify references to items that can be found in the ADG code.

#### Definitions

The interpretations contained in the following legislation apply in this *Approved Code of Practice for the Storage and Handling of Dangerous Goods* in Commonwealth employment:

- a) OHS(CE) Act;
- b) The OHS(NS) Regulations Part 8 The Storage and Handling of Dangerous Goods; and
- c) The ADG Code provides information on the classification of dangerous goods, identification of packaging groups, and correctly labelling dangerous goods. A note in the regulations may identify references to items that can be found in the ADG code.



## **Dangerous Goods regulatory framework flow chart**

## 1. Introduction

- 1.1 Part 8 of the <u>Occupational Health and Safety (Commonwealth Employment)</u> (<u>National Standards) Regulations 1994</u> (the regulations) outlines the specific duties of manufacturers, suppliers, employers, and operators of pipelines in relation to the manufacture, supply, storage and handling of dangerous goods in the workplace.
- 1.2 The regulations are designed to ensure that workplaces, which store and handle significant amounts of dangerous goods, assess and manage all identified risks and hazards by controlling them through work practices such as training, correct labelling and implementing effective emergency plans and procedures.
- 1.3 This approved code of practice should be read in conjunction with the regulations.

## What are dangerous goods?

- 1.4 Dangerous goods are those substances that may be hazardous to people, property or the environment, and may cause accidents with disastrous consequences. Dangerous goods may be corrosive, flammable, explosive, oxidising or reactive with water.
- 1.5 **Regulation 8.04(3)** defines dangerous goods as goods that:
  - (a) are named in column 2 of Appendix 2 to the ADG Code; or
  - (b) meet the criteria in Chapter 2 of the ADG Code; or
  - (c) are determined by a relevant Competent Authority to be dangerous goods; or
  - (d) are C1 combustible liquids; or
  - (e) are C2 combustible liquids, if stored and handled with fire risk dangerous goods (within the meaning of sub regulation (4)); or
  - (f) are goods too dangerous to be transported.

#### Dangerous goods v hazardous substances

- 1.6 In many cases, dangerous goods are confused with hazardous substances. Dangerous goods are classified according to their immediate physical or chemical hazards, such as fire, explosion, corrosion and toxicity that may affect life, health, property or the environment. Hazardous substances are classified only based on immediate or long-term health effects.
- 1.7 Dangerous goods and hazardous substances are covered by separate parts of the regulations to control the different risks involved. Part 6 of the regulations covers hazardous substances whilst Part 8 covers dangerous goods.
- 1.8 Many hazardous substances are also classified as dangerous goods, therefore, employers are required to comply with both sets of regulations.

## **Dangerous goods covered**

1.9 **Regulation 8.05** outlines the different classes of dangerous goods. **Table 1** below summarises the dangerous goods covered by the regulations and therefore, this code.

Classes of Goods	Description	Reference
Dangerous goods:		
Class 2	Gases	ADG Code
Class 2.1	Flammable gas	
Class 2.2	Non-flammable, non-toxic gases	
Class 2.3	Toxic gases	
Class 3	Flammable liquids	
Class 4	Flammable solids, etc.	
Class 4.1	Flammable solids, self-reactive, desensitised	
Class 4.2	Substances liable to spontaneous combustion	
Class 4.3	Substances in contact with water emit	
	flammable gases	
Class 5	Oxidizing substances; organic peroxides	
Class 5.1	Oxidizing substances	
Class 5.2	Organics peroxides	
Class 6	Toxic and infectious substances	
Class 6.1	Toxic substances	
Class 8	Corrosive substances	
Class 9	Miscellaneous substances and articles	
Goods too dangerous to be transported	Goods listed in Appendix 5 of the ADG Code and goods determined to be so by the Authority	ADG Code
Combustible Liquid:	Any liquid other than a flammable liquid that has a flashpoint, and that has a fire point less than its boiling point.	AS 1940 – The storage and handling of
C1	Combustible Liquid with a flashpoint $> 60.5$ °C and $\le 150$ °C	tiammable and combustible
C2	Combustible Liquid with flashpoint > 150°C	liquids

Table 1 Classes of dangerous goods

1.10 Three classes of goods are not covered by this part of the regulations. These classes include:

- Classes 1 (explosives);
- Class 6.2 (infectious substances);
- Class 7 (radioactive substances); and
- Asbestos.
- 1.11 Other Commonwealth, State or Territory legislation may apply in relation to these goods.
- 1.12 **Regulation 8.02(2)** specifies other dangerous goods that are not covered by this part of the regulations and therefore, this code:

#### Dangerous goods in transit.

• Dangerous goods are in transit if they are supplied to a workplace in a container that is not opened or are used at the workplace and the goods will be kept for no more than five (5) consecutive days.

# Dangerous goods in a fuel system or equipment or that are essential to the operation of a fuel system or equipment.

- batteries connected to and are essential for the operation of mobile plant, equipment, vehicles, boats, aircraft and appliances;
- fuel in fuel tanks and systems connected to and are essential for the operation of mobile plant, equipment, vehicles, boats, aircraft and appliances; and
- dangerous goods contained in portable firefighting or medical equipment deployed for use at the premises.
- 1.13 Even though these goods are not specifically covered under Part 8, the OHS (CE) Act general duty of care still applies.
- 1.14 It is a requirement that the amount and location of goods in transit are included on the manifest register and site plan and they are properly packaged and labelled.

## 2. Duties of manufacturers, importers and suppliers of dangerous goods

- 2.1 **Division 8.2** of the regulations outlines duties for those persons who manufacture, import or supply dangerous goods to Commonwealth workplaces.
- 2.2 Under the OHS(CE) Act, where a person who is not the manufacturer, imports goods, but does not have a place of business in Australia at the time the goods are imported, they are deemed to be the manufacturer.
- 2.3 The importer of dangerous goods is subject to complying with all manufacturers duties in the regulations.

## **Duties of manufacturers and importers**

- 2.4 **Subdivision 8.2.1** outlines the duties of manufacturers of dangerous goods including, but not limited to:
  - determining substances as dangerous goods; and
  - providing safety information.

## Determination that a substance is a dangerous good

- 2.5 **Regulation 8.09** specifies that where a manufacturer of dangerous goods is aware that employees at work will use a substance, the manufacturer be required to determine whether that substance is a dangerous good or not.
- 2.6 To make a determination, if the goods are specifically listed, the manufacturer should refer to chapter 2 of the ADG code. If the goods are not listed, the determination should be made according to the criteria in the ADG code.
- 2.7 The manufacturer is required to make this determination as soon as possible prior to the goods being manufactured. The determination of a dangerous good must be in writing and kept for the whole period the goods are manufactured.
- 2.8 The same process applies in relation to combustible and flammable liquids, however, AS 1940-2004 is the reference source rather than the ADG Code.

#### Duty to provide safety information

2.9 **Regulation 8.10(1)** Prior to, or at the time of delivery, a manufacturer must prepare and provide a material safety data sheet (MSDS) and other safety information to suppliers and employers where it is expected that employees will be

using the supplied dangerous goods. This part does not apply to those manufacturers who supply C1 or C2 combustible liquids.

2.10 If requested, the manufacturer must provide any relevant and available information on the dangerous goods that is not contained in the MSDS.

#### **Content of MSDS**

- 2.11 An MSDS provides information to a person to assist with the safe storage and handling of dangerous goods. It also provides information to persons required to enter a workplace following an accident, with the exact properties of the dangerous goods used at that workplace.
- 2.12 An MSDS must include the name of every ingredient of the dangerous goods unless the identity of an ingredient is commercially confidential. Ingredients include diluents, solvents, wetting agents, stabilisers, inhibitors, and adulterants.
- 2.14 **Regulation 8.10(7)** allows a manufacturer to use the generic name of the ingredient if naming the goods would cause commercial disadvantage. This only applies if the ingredient is not a dangerous good and it does not have a known flow on effect.
- 2.15 Instead of naming the ingredient, the manufacturer may include a statement in the MSDS that the ingredient has been determined not to be a dangerous good. However, if there is a medical emergency involving the goods listed on the MSDS the manufacturer must disclose the name of the ingredient.

## **Review of MSDS**

2.16 **Regulation 8.10(5)** says an MSDS must be accurate, kept up to date, and contain enough information to provide comprehensive advice on the dangerous goods. An MSDS should be reviewed at least every five (5) years, and it should be updated immediately when new information becomes available.

#### **Guidance on MSDS**

- 2.17 **Regulation 8.10(2)** clarifies that all MSDS must comply with the new *National Code of Practice for the Preparation of Material Safety Data Sheets NOHSC:* 2011 (2003) after 24 April 2006.
- 2.18 Other safety information may include, but is not limited to:
  - summary reports produced under the *Industrial Chemicals (Notification and Assessment) Act 1989 (Commonwealth);* and
  - where it is available, other users may have specific information relating to the conditions for safe use, compatibility and chemical stability under particular conditions.

#### Duty to contain, package and label dangerous goods

- 2.19 **Regulation 8.11(1)** specifies that manufacturers of dangerous goods must contain, package, and label goods in accordance with the ADG Code before supplying the goods for use.
- 2.20 The manufacturer must ensure all information important to protect the health and safety of employees is included on the label.

## **Duties of Suppliers**

- 2.21 **Subdivision 8.2.2** outlines the duties of suppliers of dangerous goods including but not limited to:
  - containing the goods;
  - packaging and labelling the goods;
  - filling gas cylinders; and
  - providing safety information.

## Duty to contain, package and label dangerous goods

- 2.22 **Regulation 8.11(2)** specifies that any person, who supplies dangerous goods, must ensure the goods have been contained, packaged and labelled in accordance with the ADG Code before supplying the goods for use.
- 2.23 **Regulation 8.11(2)** does not apply in cases where retailers receive packaged dangerous goods in a container provided by the purchaser. However, retailers must ensure that the container:
  - will not react with the dangerous goods;
  - was constructed to contain the dangerous goods;
  - is not damaged;
  - is clearly marked with the name of the dangerous goods; and
  - cannot be mistaken for containing foodstuffs.

## Duty in filling cylinders or containers with dangerous goods

- 2.24 **Regulation 8.11(5)** requires that when a person fills a cylinder, disposable container or aerosol container with Class 2 dangerous goods, such as gas, the cylinder or container must comply with paragraph 3.8.2 and Appendix 2 of the ADG Code.
- 2.25 The cylinder or container must be labelled and packaged in accordance with the ADG Code and provide all necessary information to protect the health and safety of persons using the cylinder or container.

## Filling the cylinder

- 2.26 Cylinders are:
  - generally designed to be used with a specific gas or group of gases;
  - distinctively painted or marked to identify their contents; and
  - have fittings that are only suitable for a particular gas.
- 2.27 Before filling the cylinder, an inspection of the valves, fittings, and protective devices such as neck rings and shrouds should be checked to ensure good working order. The use of adaptors are discouraged unless approved adaptors have been authorised by the original supplier of the gas or the manufacturer of the cylinder.
- 2.28 Cylinders must be marked appropriately to indicate they have been tested to withstand design pressures and display the period that the test is valid, (which can be up to 10 years). An imported gas cylinder should only be filled if it complies with *AS 2030.1-1999 Cylinders for compressed gases*.
- 2.29 A cylinder should not be filled if it:
  - is not designed to be filled with gas;
  - shows evidence of excessive corrosion or other damage

- shows any indication of leakage ; and
- is outside its current test date.

## Duty to provide safety information

- 2.30 **Regulation 8.12** requires suppliers to provide an MSDS the first time dangerous goods are supplied to a workplace. The supplier must also provide a copy of the current MSDS at any time the employer requests one.
- 2.31 This does not apply to a person who is a retailer and supplies packaged dangerous goods that are intended for retail display and sale.
- 2.32 **Regulation 8.13** states that when requested, the supplier must provide any further information that is not contained in the MSDS, if it is relevant to the safe storage and handling of the goods.

## Duties of suppliers or installers of plant or structures

- 2.33 **Regulation 8.14** requires a person, who installs or supplies structures or plant at a workplace, which is expected to be used by employees, to ensure the plant or structure:
  - is suitable for use with the dangerous goods it is intended to contain;
  - conforms with the original design of the plant or structure without modifications; and
  - is prevented from unintentional movement.
- 2.34 The supplier or installer must provide the employer with all information relating to:
  - the installation, testing, commissioning, use, inspection, maintenance, dismantling and disposal of the plant or structure;
  - explaining how the plant or structure should be operated and maintained; and
  - stating any conditions or specifications that should be complied with to ensure the safety and health of employees when the plant or structure is in operation.

#### Initial design stage

- 2.35 The initial design of a plant or structure is an important stage to control the hazards and risks associated with storing and handling dangerous goods. If an employer engages a person to design plant for use by employees at work, the employer must ensure that the person is provided with relevant information about matters relating to the plant that may affect health and safety.
- 2.36 Where a structure or plant has been designed and built for use with a specific dangerous good, care should be taken if the plant is to be used with different goods. The employer should re-assess whether the plant is suitable for use with that good.
- 2.37 It may be necessary to put in place additional safeguards, such as barriers to guard against the plant or structure being damaged. If different risks are present, any decision to use the plant will need to take into account whether these risks can be controlled.
- 2.38 Part 4 of the regulations provides further guidance on the supply, installation and maintenance of plant and structures.

## 3. Duties of Employers

- 3.1 **Division 8.3** outlines the duties of employers in relation to the storage and handling of dangerous goods.
- 3.2 This part of the code is designed to assist employers to meet the requirements of the regulations. Duties of employers include:
  - control risks and hazards through a risk management process;
  - provide safety information;
  - provide induction and training sessions;
  - supervise employees;
  - ensuring placards are positioned within the workplace correctly;
  - prepare a register of emergency procedures where there are large quantities of dangerous goods;
  - provide notification as required to Comcare in relation to dangerous goods; and
  - consult with employees.

## **Risk management**

- 3.3 The SRCC recommends risk management as the preferable method for controlling risks. Risk management may be defined as:
  - a method of assessing and controlling risks associated with an activity, function or process;
  - the systematic application of organisational resources to the tasks of identifying, analysing, assessing, controlling and monitoring exposures to risk and adverse effects of such risks;
  - the employer's responsibility and should be conducted in consultation with employees and/or their representatives;
  - an examination of what could harm a person which allows employers and employees to assess what precautions should be taken to prevent harm at work. In making such assessments employers and employees may:
    - compare its control to other similar working environments,
    - consult with industry associations and/or involved unions,
    - consult with specialists, and
    - consult with Comcare.
  - a system which allows employers flexibility to devise tailor-made solutions to control risks in their workplace;
  - a process which need not be awkward or complicated ; and
  - an opportunity which allows all persons in the workplace to be consulted and possibly agree on what rules should apply.
- 3.4 Incidents from the storage and handling of dangerous goods can be prevented and managed by observing the following principles of risk management:
  - hazard identification (Subdivision 8.3.1);
  - risk assessment (Subdivision 8.3.1); and
  - risk control (Subdivision 8.3.2).

## **Step 1 - Hazard identification**

- 3.5 **Regulation 8.15** requires an employer to identify any hazard associated with the storage or handling of dangerous goods foreseeable.
- 3.6 Hazard identification should highlight activities in the workplace that may affect persons involved with storing and handling dangerous goods.
- 3.7 In order to identify the hazards associated with the storage and handling of dangerous goods the employer should:
  - collect information on potential hazards using sources such as MSDS, consult with employees, suppliers or other persons with expertise;
  - conduct regular inspections of the workplace and the methods of storage and handling;
  - examine plans of the workplace including buildings, water, gas, electricity, compressed air, steam, drains, fire services, chemical pipelines, roads, access ways and engineering specifications of relevant plant; and
  - discuss risks with the employers of nearby workplaces and the emergency services authority.
- 3.8 Employers must keep a written record of each hazard identified.

## **Collecting information**

- 3.9 Hazard identification for structures, plant, equipment, systems of work and activities used in the storage and handling of dangerous goods involves collecting information on:
  - physical components or characteristics that have the potential to harm the safety and health of a person and/or cause damage to property and the environment, either in their own right or in conjunction with the dangerous goods;
  - systems of work, including normal operating procedures and unusual operating conditions which could give rise to harm or damage; and
  - activities that may pose a threat to the dangerous goods.
- 3.10 When identifying the hazards, the employer should be aware of:
  - the chemical and physical reactions of dangerous goods;
  - possible reactions between dangerous goods and any plant, structures or other substances;
  - manufacturing, transfer or transport processes at the workplace involving dangerous goods;
  - plant and other structures used in the storage or handling of dangerous goods
  - any information about the hazardous properties;
  - the kind and characteristics of incidents which may be associated with dangerous goods;
  - the location of dangerous goods; and
  - environmental factors that may have an effect on the goods.

#### **Useful sources**

3.11 A number of important sources that may assist employers to identify hazards include safety information, inherent hazards, incidents and external factors.

## Safety information

- 3.12 Safety information such as MSDS can provide the employer with information on the chemical and physical properties for use and safe handling requirements for the dangerous goods.
- 3.13 The chemical and physical properties of the dangerous goods that may represent or contribute to hazards in the particular storage and handling situation include:
  - physical state;
  - flashpoint, fire point and explosive limits;
  - viscosity;
  - density;
  - particle size;
  - vapour pressure;
  - solubility and pH;
  - reactivity;
  - boiling and/or freezing point or range;
  - electrical and/or heat conductivity; and
  - the nature and concentration of combustible products.

## **Inherent hazards**

- 3.14 The secondary dangerous goods hazards such as Subsidiary Risks are equally important as the primary dangerous goods classification. The inherent hazards of dangerous goods may include:
  - fire;
  - explosion; and
  - toxic effects such as inhalation, ingestion, absorption through the skin or eyes, or corrosive action.

## Incidents

- 3.15 Records or historical data related to injuries and illness may prove to be valuable sources of information.
- 3.16 Both internal and external incidents including dangerous occurrences and near misses that have occurred can provide useful information about the hazards or risks associated with dangerous goods.

## **External factors**

- 3.17 Hazards may arise from sources outside the workplace.
- 3.18 Other hazards surrounding the workplace which are not related to dangerous goods may have the capacity to directly impact on the goods in a hazardous way. Fire risks are increased from areas where grass has been left to over grow or combustible items such as timber or cardboard boxes have been stored or dumped.
- 3.19 The proximity of railway lines, pipelines, mobile phone repeater towers, and protected places such as schools and public buildings are required to be taken into consideration when assessing the hazards associated with the storage and handling of dangerous goods at a workplace.

## Other sources

- 3.20 Other activities which are not directly related to the storage and handling of dangerous goods may generate potential hazards within the workplace. This may require the consideration of any adjacent storage areas that contain dangerous goods or the proximity of other work areas when identifying hazards.
- 3.21 Other sources of information which may provide the employer with information on the hazards and risks associated with dangerous goods include:
  - package markings and labels;
  - manufacturers or suppliers of dangerous goods or equipment;
  - dangerous goods authorities;
  - National Industrial Chemical Notification and Assessment Scheme (NICNAS) summary reports;<sup>1</sup>
  - sources listed in the National Code of Practice for the Preparation of Material Safety Data Sheets NOHSC: 2011 (2003);
  - fire services;
  - Office of the Australian Safety and Compensation Council (OASCC) (formerly NOHSC);
  - trade union, employer and/or industry associations; and
  - occupational health and safety consultants.

## **Reviewing the information**

- 3.22 Having collected information about the dangerous goods and their potential hazards, the next step is to consider all processes and activities at the workplace, in relation to the storage and handling of dangerous goods.
- 3.23 All processes should be examined in detail. The employer should consider not only the official process but also how the procedures are actually performed and any short cuts that may occur. It is valuable to conduct a periodic walk through inspection of the workplace to observe actual practices relating to the storage and handling of dangerous goods.

#### Step 2 - Risk Assessment

- 3.24 A risk assessment determines whether there is a risk of injury to people or damage to the property from the storage and handling of dangerous goods. The purpose of a risk assessment is to:
  - identify those risks that are required to be controlled;
  - assist in making decisions regarding the priority in which risks need to be controlled; and
  - develop a schedule for controlling all risks as soon as practicable.
- 3.25 **Regulation 8.16(1)** requires that every hazard is identified under Regulation 8.15; the employer must assess all risks associated with each hazard associated with dangerous goods.

<sup>&</sup>lt;sup>1</sup> NICNAS summary reports are produced under the Commonwealth *Industrial Chemical (Notification and Assessment) Act 1989* 

## Conducting a risk assessment

- 3.26 The employer should decide if there is sufficient expertise within the workplace to conduct the risk assessment or whether external advice is required. This decision will depend on the skills and experience available to undertake the risk assessment. The expertise required will depend on the classes of dangerous goods involved and the complexity of processes employed in the particular workplace.
- 3.27 At workplaces where complex dangerous goods processes are involved, it may be more effective to use a more highly structured process such as *Hazard and Operability Studies (HAZOP)* or *Hazard Analysis (HAZAN)* to guide the hazard identification and risk assessment process. In some situations, it may be necessary to undertake a quantitative risk analysis (QRA) to assist in understanding the risks involved.

## Reviewing and revising risk assessments

- 3.28 **Regulation 8.16(3)** requires that a review of each risk assessment should occur at least once every 5 years. A review must be carried out prior to the introduction of changes such as when:
  - dangerous goods not normally kept at a workplace are introduced;
  - dangerous goods are stored and handled in different areas since the last assessment was completed;
  - new or improved control measures have become more practicable or safer; or
  - plant or structures are modified.

#### **Record of the assessment**

- 3.29 **Regulation 8.16(4)** requires the employer to keep a written record of each risk assessment. The employer must keep the records up-to-date and those records must be made available to:
  - Comcare on request;
  - employees which may be affected by any risk contained in the assessment; and
  - all health and safety representatives.
- 3.30 The amount of detail required to be recorded will vary depending on the nature and severity of the risks identified. If a risk does not need to be controlled, it may not be necessary to maintain an extensive record of the risk.
- 3.31 Generally, risk assessment records should include the:
  - name of the workplace;
  - names of assessors and their appointments;
  - date the assessment was conducted;
  - areas within the workplace that were assessed;
  - dangerous goods for which the MSDS or other information were reviewed;
  - processes or activities that were assessed;
  - details of all risks identified;
  - decisions about the risk and why they were made;
  - practicality of reducing the risk; and
  - controls in place to eliminate risks however if this is not possible, employers must control the risk.

## **Step 3 - Control the risk**

- 3.32 **Subdivision 8.3.2** outlines the necessity for a risk control process to be in place.
- 3.33 After completion of a risk assessment, consideration must be given to controlling the risks. The three main steps in risk control are:
  - development and implementation of control policies and procedures, in consultation with employees;
  - monitoring the effectiveness of the control strategies; and
  - reviewing as necessary.
- 3.34 Part 4 of this code discusses risk control strategies in further detail.

## **Step 4 – Review**

- 3.35 A risk management program is a repeating cycle even though one hazard may be eliminated or controlled, the process continues. You will require a systematic monitoring and review system to identify the potential for new hazards which may be introduced into a workplace. These hazards can be due to circumstances such as:
  - new technology, equipment or substances;
  - new work practices or procedures;
  - changes in work environment, e.g. moving offices, staff reduction; and
  - new staff with different skill/knowledge levels.

## 4. Risk control strategies

- 4.1 **Regulation 8.17** specifies that risks can be controlled by either:
  - eliminating the hazard; or
  - if this is not practicable, reducing the risk as far as is practicable.
- 4.2 A focus should be placed upon eliminating risks, for example, not using the dangerous goods at all. However, where the risk cannot be eliminated, it is necessary to implement a strategy that will reduce the risk as far as practicable. This may be achieved by:
  - using dangerous goods with a lower risk; and
  - reducing the quantity of dangerous goods at the workplace.
- 4.3 If a risk cannot be eliminated or reduced, the employer must implement appropriate engineering controls and systems of work to assist in reducing the risk.
- 4.4 Effective control strategies should be introduced based on hazard identification and risk assessment process along side other activities in the workplace.
- 4.5 When developing risk control strategies, the action to control one risk should not create another. A particular risk control should not be applied in isolation unless the employer is satisfied that the other risk controls implemented will not be jeopardised.
- 4.6 Documents specifying risk controls generally apply to particular classes of dangerous goods. When using these documents, employers are to be aware that most of the risk control systems have been prepared as an integrated package, which involves engineering and administrative controls in addition to personal protection equipment. The application of risk controls is therefore likely to satisfy

the risk control duty imposed by the regulations if all of the associated controls specified in the standard, having a bearing on the particular risk, are adopted.

#### Strategy 1 - Eliminate the hazard from the workplace

4.7 The most effective method of risk reduction is eliminating hazards and risks at the source which may include either the dangerous goods or activities which increases the level of the risk.

#### Eliminate the use of dangerous goods

- 4.8 Dangerous goods maybe essential for the operation of the workplace and therefore, elimination is not practicable. However, there may be situations where eliminating some dangerous goods may be appropriate. Some examples are:
  - An employer could use a physical process rather than a chemical process to clean an object such as using high-pressure water or steam rather than solvents or use water based paints rather than solvent based paints;
  - Where appropriate, use clips, clamps, bolts or rivets rather than adhesive; and
  - Chlorine may be produced by electrolysis rather than storing/handling other dangerous goods which are comprised of chlorine or its compounds at the workplace.

#### Eliminate the activity

- 4.9 Designing the layout of a workplace is an effective way of minimising risks and hazards. Considerations to workplace layout may include:
  - Ensuring that storage and handling areas are not used as thoroughfares to reduce the risk of collisions at the workplace; and
  - Restricting employees from carrying ignition sources or prohibiting employees from having matches, lighters, mobile phones, or spark producing tools in work areas.

#### Strategy 2 - Substitute or modify the hazard

- 4.10 Substitution is the replacement of dangerous goods or hazardous activities that present a higher degree of risk associated with other dangerous goods, substances or activities of a lower risk. Substitution of a dangerous good for a product that is not dangerous can often be cost effective. The employer may be required to consider the following examples:
  - Substituting a less volatile material to control a vapour hazard may cost less than the installation and maintenance of a mechanical ventilation system;
  - It may be reasonable to substitute a non-dangerous good for a dangerous good by degreasing with a detergent instead of a chlorinated or volatile solvent;
  - Substitute a flammable liquid with a combustible liquid; and
  - Use dangerous goods with a single hazard as indicated by a single class without a subsidiary, risk rather than mixing goods that have one or more subsidiary risks.

## Safer activities

- 4.11 Processes should be designed for activities which have higher risks and goods involved may be substituted for those which have a lower risk. These may include:
  - using diluted acids and alkalis rather than concentrates;
  - use stretch wrapping rather than flame heat shrink to palletised goods;
  - use a pallet cage rather than stretch wrapping in areas where static electricity generated during the wrapping process would increase hazards;
  - use a solid in paste or pellet form rather than as dust/powder;
  - apply paint by brush rather than spray
  - transfer packages by conveyor rather than forklift
  - use non-sparking tools in a hazardous atmosphere

## **Reducing quantities**

- 4.12 Reducing quantities of dangerous goods at the workplace usually leads to an overall reduction in risk. Methods of inventory reduction to minimise the risks of storage of dangerous goods at the workplace include:
  - just in time ordering rather than storing large quantities of dangerous goods; and
  - prompt disposal of dangerous goods which are no longer required.
- 4.13 Where a workplace does not have the appropriate facilities to store dangerous goods safely, an alternative storage location that is appropriate should be used to store the goods when the goods are not in use.
- 4.14 Careful planning is required to achieve an optimum inventory level. It may not always be possible to reduce the quantities of dangerous goods that are stored and handled at a workplace, even though this will usually reduce risk.
- 4.15 The additional movement associated with frequent delivery of dangerous goods that are required to stabilise other dangerous goods stored and handled at the workplace may create further risk.

## Strategy 3 - Isolate the hazard

- 4.16 Isolation is the separation of dangerous goods from people and other property, including other dangerous goods. Isolation may be achieved by enclosing, separating by distance or by the use of barriers. The principles of isolation should be a high priority when establishing new workplaces for the storage and handling of large quantities of dangerous goods. Isolation methods may include:
  - Distancing the dangerous goods from protected works, other dangerous goods people and other properties so interaction is not possible;
  - Enclosing a hazardous activity;
  - Storing incompatible dangerous goods, such as Class 5.1 oxidizing agents and flammable or combustible materials, in separate buildings which are separated by sufficient distances so that interaction is impossible and an incident in one area will not involve another; and
  - Installing a screen wall such as a vapour barrier that has an appropriate fire resistance level to provide additional isolation.

## Strategy 4 - Use engineering methods to control the hazard at its source

- 4.17 Engineering controls including structures, plant, equipment and processes that are designed to reduce the hazards associated with the storage and handling of dangerous goods, such as:
  - minimising the generation of dangerous goods;
  - containing or suppressing dangerous goods including their vapours and dusts;
  - eliminating, confining or controlling hazardous processes, plant or equipment that may pose some threat to the dangerous goods;
  - protecting dangerous goods and installations from external factors such as rain or sunshine; and
  - limiting the area of contamination in the event of spills or leaks.

#### 4.18 **Examples of engineering controls may include:**

- Enclosing the dangerous goods or external hazard;
- Providing adequate ventilation;
- Sparging or blanketing exposed liquid surfaces with an inert atmosphere to prevent an explosive atmosphere forming;
- Developing automatic processes to eliminate human error;
- Fitting sensors and controls for liquid levels, pressure or temperature to minimise loss and formation of hazardous atmospheres and eliminate overflow and uncontrolled reactions;
- Specify the right electrical circuitry;
- Construct barriers between incompatible goods; and
- Install suitable devices to protect installations from external hazards.

#### **Strategy 5 - Use administrative controls**

- 4.19 Administrative controls are systems of work that can eliminate or reduce risks that consist of properly designed, implemented work practices and procedures that are often used in support of engineering controls.
- 4.20 The most important aspect of introducing effective administrative controls is ensuring people are properly informed and trained to implement the controls.
- 4.21 Administrative controls rely on agreed work practices and procedures between the employer and employee. It is important that these controls are simple and developed to match the skills and capabilities of the people who will use them.

#### 4.22 **Examples of administrative controls may include:**

- document safe work procedures that describe the correct methods for performing all activities;
- implementing operating procedures that ensure the integrity of structures, plant and equipment are maintained at all times;
- conduct training and supervision to provide the necessary knowledge and skills required to ensure correct procedures are followed safely;
- introduce procedures that limit the number of people in the dangerous work area but also prevent lone occupancy;
- introduce job rotation for employees to limit the period of exposure;
- introduce procedures to ensure that work involving inspection, maintenance, repair testing and cleaning is carried out to minimise risk;

- regularly clean contamination from walls and surfaces, dust and drip removal from all work areas and ensuring lids on containers are in place when not in use or when being moved;
- monitor workplaces to ensure that safe working conditions are maintained;
- develop procedures for waste disposal and effective decontamination and inventory control;
- develop well designed and rehearsed emergency procedures; and
- enforce controls on activities that are inconsistent with the safe storage and handling of dangerous goods, such as eating, drinking, and smoking.

## **Strategy 6 - Introduce Personal Protective Equipment (PPE)**

- 4.23 PPE consists of devices and clothing that provide individual employees with additional protection from hazards. When used correctly, they are used in conjunction with other control measures to further reduce risk.
- 4.24 As a matter of principle, PPE should not be used as the sole control measure except where no other measures are practicable. However, its use with other control measures may often reduce the risk of personal injury.
- 4.25 For PPE to be effective, an employer must ensure protective devices are selected that provide the required level of protection from risks associated with the particular task. Only approved clothing and equipment are to be used.
- 4.26 It is imperative that all employees understand the proper use of the equipment and the circumstances where it should be used. Detailed instruction for the correct use of personal protective equipment and the circumstances it is used are essential.
- 4.27 All equipment is to be readily available, clean and sized correctly for all employees who are required to use it. An effective system of cleaning and maintenance should be devised and implemented by trained staff in accordance with a maintenance and servicing schedule.
- 4.28 In some cases, it will not be possible to reduce the risks to an acceptable level without the use of PPE. An MSDS for dangerous goods will normally contain recommendations on the selection and use of personal protection equipment for that particular dangerous good. This advice should be followed unless the employer determines, following a risk management assessment and in consultation with employees, that other protection measures would be more appropriate. More guidance appropriate to particular types of PPE can be located in Australian Standards AS1940-2004 (Storage and handling of combustible material).

#### Strategy 7 - Control risk at the design stage

- 4.29 One of the best times to develop a risk control strategy is at the design stage. Well-considered design can reduce establishment costs and help avoid ongoing operational costs that can result from a poorly set out and complex systems of work. Considerations at the design stage may be:
  - Designing the workplace layouts by ensuring the storage of incompatible substances and fire risk goods are located away from any bulk storage of combustible goods; and

- Buildings can be purpose designed and constructed of materials suitable for the types of goods to be stored and handled at the workplace.
- 4.30 It is not always possible to design the workplace from a blank canvas. In many cases, the storage and handling of dangerous goods must be accommodated within an existing workplace where there are constraints with the location of buildings and outside storage areas.
- 4.31 There is often limited scope for redesigning access to the workplace or within the workplace. However, it will still be possible to redesign systems of work and processes to reduce the risks associated with the storage and handling of dangerous goods.

#### **Process design**

- 4.32 Risks associated with a chemical or a physical process should be designed out by adopting the most appropriate work method or system of work.
- 4.33 Where there is a choice of chemical reactions that involve dangerous goods, each possible reaction pathway will have certain inherent hazards and risks associated with it.
- 4.34 Similarly, there may be a choice of physical processes that are available to achieve the same result. For each of the alternatives, the hazards should be identified and their relative risks assessed. The processes that result in the lowest overall risk should be selected.

#### Design of structures and plant

- 4.35 All structures and plant associated with the storage and handling of dangerous goods should be:
  - designed so the risks associated with each item are eliminated as far as practicable, while ensuring the risks of the total system are minimised;
  - manufactured to a high standard within the design specification, and from quality, durable materials which will not be adversely affected by the planned storage and handling of the dangerous goods;
  - installed only after all hazards associated with the installation have been identified, their risks assessed and control measures implemented as required;
  - commissioned only after undergoing thorough testing to ensure that any unpredicted hazards have been identified, control measures implemented and agreed procedures developed to ensure safe operation;
  - operated only in accordance with the agreed procedures by authorised personnel who have received appropriate training in the correct procedures;
  - maintained and repaired as required to ensure additional hazards or increased risks are prevented during normal operation or breakdown; and
  - if required, decommissioned in a manner which does not introduce additional risks or, where this is not practicable, the additional risks are minimised and controlled.
- 4.36 It is more effective to incorporate isolation and engineering controls into structures and plant at the design stage, rather than to attempting to modify existing designs

and installations. It may not be practicable to retrofit control features such as spill containment or natural ventilation once the plant or structure has been installed.

#### Implementation of risk control strategies

- 4.37 Once the employer has determined the risk control measures mechanisms should be implemented, applied and practised on a continuous basis.
- 4.38 Over time, there is an ever-increasing risk of familiarity when working with a hazard. This may lead to complacency and shortcuts with potentially tragic outcomes may result. Employers should consult employees and their representatives regarding ways to guard against this occurring.
- 4.39 Where there are a number of risks and administrative control measures to be implemented in a workplace, a further administrative control such as a Safety Management System (SMS) may be required to monitor the compliance and effectiveness of these controls.
- 4.46 Whether or not a SMS should be developed and the detail that it contains is dependent on the nature of activities at the workplace. Many corporate and proprietary systems exist, which have common features, such as:
  - scope, policy and objectives;
  - assignment of responsibilities;
  - operating procedures;
  - standards, codes and laws;
  - management of change;
  - scheduling and establishing procedures for reviews; and
  - system auditing and corrective action.
- 4.47 Only people who have the appropriate levels of qualifications, knowledge, skills and experience should be in control of work areas. Arrangements for adequate supervision of all workers should be in place at all times where dangerous goods are stored and handled.
- 4.48 All risks with unacceptable consequences must be actioned immediately. It may be necessary to close down operations to eliminate the risk in the short term until effective risk control measures are in place.
- 4.49 If breaches of the regulations occur, action must be taken as soon as practicable to address the breach and any risk resulting from that breach must be eliminated or reduced as far as is practicable.

#### 5. Specific risk control duties

- 5.1 **Regulations 8.18 to 8.27** relate to the duties employers must adopt to control risks, including:
  - physical separation;
  - keeping dangerous goods stable;
  - impact protection of structures, plant and containers;
  - maintaining the integrity of containers;
  - transfer of dangerous goods;
  - fire protection; and
  - emergency preparedness.

# Physical separation of dangerous goods from people, protected places, and other property

- 5.2 **Regulation 8.18** requires an employer to eliminate any risk to a person, protected place or any property at, or outside the workplace which may result from a dangerous occurrence, involving the storage or handling of dangerous goods.
- 5.3 If it is not reasonably practicable to eliminate the risk, the employer must reduce any risk by separating the dangerous goods from the person, protected place or other property.
- 5.4 Physical separation is the principal method by which risks to other occupancies are minimised. Separation fulfils a dual purpose by:
  - protecting other occupancies from dangerous goods; and
  - protecting dangerous goods from the other occupancies.
- 5.5 Separation may include:
  - isolating the dangerous goods, by distance;
  - using effective barriers; and
  - a combination of both.
- 5.6 In deciding what may be effective to control a specific risk, an employer should consider the types of hazard and risks the dangerous goods stored and handled in the workplace may pose to adjacent properties. This analysis should include:
  - the quantity of dangerous goods stored and handled in the work area;
  - the type of installation and the processes applied to the dangerous goods in the work area and their associated hazards;
  - all other activities in the work area which may increase the risks; and
  - any control measures in place that will reduce the risks.
- 5.7 If possible, separation distances should be applied in a way that risks would not require additional control measures. However, if this is not possible, barriers may be required.
- 5.8 The employer should consider any risk posed to a barrier used instead of or, in conjunction with separation, when used to isolate dangerous goods. For example:
  - the effect that climatic elements may have on a barrier and its effectiveness;
  - the level of fire resistance provided by the barrier; and
  - the structural capability which may be required to withstand weather and overpressure resulting from internal or external incidents.

#### Separation of dangerous goods from incompatible substances

- 5.9 **Regulation 8.19** requires employers to separate dangerous goods from all other goods they are not compatible with to assist in the prevention of any dangerous interaction.
- 5.10 Segregation would generally apply in this instance as it involves storing and handling incompatible goods in separate areas, or using physical barriers or distances if they must be stored within the same area.
- 5.11 As a rule, dangerous goods should not be stored above or below other goods with which they may interact.
- 5.12 As far as is practicable, an employer must not allow dangerous goods to:

- interact with incompatible goods; and
- contaminate food, food packaging and personal use products, such as cosmetics, cigarettes, medication and toiletries.
- 5.13 Workplace systems and procedures must be developed and enforced which includes the training and supervision of personnel to ensure the segregation of incompatible substances at all times.

#### Keeping dangerous goods stable

- 5.14 **Regulation 8.20** requires that unless the goods are about to be used in a manufacturing process, an employer must ensure that as far as is practicable they are stored or handled to ensure they do not accidentally become unstable, decompose or change. This will assist in avoiding increased risks associated with the goods, or creating a different hazard from those already identified as many dangerous goods can be highly reactive, unstable, or self-reactive except under controlled conditions.
- 5.15 An employer must make sure the dangerous goods are stored in accordance with the ADG Code or the manufacturer's specifications, if the stability of the goods depends on the employer:
  - maintaining specified proportions of substances that constitute the dangerous goods;
  - including a stabilising ingredient; and
  - keeping the goods at or below a control temperature.
- 5.16 This regulation does not apply to goods if they are about to be used in a manufacturing process.

#### Impact protection – structures and plant

- 5.17 **Regulation 8.21** requires that to prevent damage from the movement of the structure or plant including any attached pipe work or equipment, an employer must ensure that structures or plant used for the storage or handling of dangerous goods are appropriately located and fixed to a stable foundation if necessary.
- 5.18 The most likely source of impact are vehicles or other mobile plant, an employer should also consider any threats from external sources such as nearby railways, airports or construction activities.
- 5.19 Measures required for preventing or controlling impact normally depends on the nature of risks. Impact protection measures may be necessary for:
  - structures containing dangerous goods;
  - plant and equipment including storage and process vessels, associated pipe work, pumps and controls;
  - storage areas (including transit storage) for packages, IBCs and associated shelves and racks; and
  - exposed parts of the fire protection systems.
- 5.20 Installation of crash protection measures, such as bollards and guardrails may provide impact protection. The design of these measures should absorb the energy of any reasonably foreseeable impact and minimise the likelihood of injury to anyone involved in the incident.

#### Impact protection - containers for bulk dangerous goods

- 5.21 **Regulation 8.22** requires that a container and the pipe work or equipment attached must be protected from damage, which may result from activities in the workplace.
- 5.22 Bulk containers are usually designed focussing on the storage of the goods rather than the impact from other objects. The employer should be aware of:
  - the integrity of the container;
  - location of the container; and
  - any underground tanks.

## **Integrity of container**

- 5.23 Understanding the risks associated with leaks from bulk containers, employers should pay particular care to factors that are required to maintain the integrity of the storage container in all operating conditions. Factors to consider include:
  - structural soundness to withstand stresses from the product being stored;
  - stability, rigidity and suitability of foundations;
  - stresses imposed by pipe work and other attachments;
  - atmospheric conditions including sun, wind and rain;
  - the effects of external impacts; and
  - the extent to which an acceptable level of corrosion is to be allowed for over the service life of the container.

## Location

5.24 Bulk containers should be located to provide the minimum separation from other occupancies.

## **Underground Tanks**

- 5.25 Underground tanks should be constructed, located and protected to eliminate risks and threats to the environment from:
  - failure, usually due to corrosion or stress loading which may allow the escape of dangerous goods into the water table; and
  - spills from above ground pipe work and filling points.
- 5.26 The seepage of dangerous goods from an underground tank, or through faulty foundations of an underground tank, may go undetected for years. Leaked material can migrate through the water table and present a risk to people and property for considerable distances from the leaking tank.
- 5.27 Other risks involved with the seepage of underground tanks are the threat of dangerous goods building up in locations such as telecommunication pits or basements of buildings. This may endanger the people who are required to access these locations for the purpose of employment or residence.
- 5.28 Underground storage installations for bulk dangerous goods and combustible liquids are usually subject to additional controls from environmental authorities, and local government.

## Spills and containment of dangerous goods

- 5.29 **Regulation 8.23** requires that if a spill, leak or accidental release of dangerous goods occurs, appropriate actions must be taken to contain the dangerous goods within the workplace.
- 5.30 Leaving containers open when not in use is one of the principal sources of dangerous goods incidents. This leads to spillages, generation of 'hazardous atmosphere' and fire. Procedures, supervision and training should ensure containers are sealed when not in use.
- 5.31 The design of a spill containment system should ensure that the risks associated have been assessed and it is large enough that all spills can be held safely until cleaned up. Factors the employer should be aware of include:
  - the nature of the dangerous goods (whether liquid or solid);
  - the quantity of the dangerous goods;
  - the size of the largest container or reasonably foreseeable largest spill;
  - the potential impact if the dangerous goods escape to the environment;
  - whether it is necessary to provide for the management of firewater at an incident;
  - a separate spill containment is provided for incompatible goods;
  - the materials used to construct the containment system, as well as any materials used for absorption, are compatible with the dangerous goods;
  - other materials in the vicinity that will prevent contamination of groundwater or soil; and
  - the systems integrity will be maintained in any foreseeable incident.

#### **Transfer of dangerous goods**

- 5.32 Transferring dangerous goods generally poses a far greater risk than those experienced in static storage areas. The goods will frequently be unconfined at some stage of the transfer process that may include pouring or pumping dangerous goods from one contained to another.
- 5.33 **Regulation 8.24** requires employers to ensure any risks associated with the transfer of dangerous goods to, from or within the workplace are eliminated. If elimination is not possible, the employer must control the risk by avoiding spillage or overflow, reducing static electricity, vapour generation, ensuring transfer fittings are compatible, avoiding sources of ignition and ensuring that the dangerous goods remain stable.
- 5.34 The transfer system design and its operation should achieve the safe transfer of dangerous goods and take into account factors including:
  - hazards associated with dangerous goods and the proposed method of transfer;
  - required flow or transfer rates and quantities; and
  - external hazards and adjacent activities.
- 5.35 It is essential that all components of the transfer system are compatible with, or suitably protected from, the goods being transferred. The ADG Code also includes specific requirements for the transfer of dangerous goods.

## **Preventing spills**

- 5.36 Particular care is required where spillage may occur away from spill containment installations, such as the transfer by pipe work through areas without bunding.
- 5.37 Methods for preventing spills and overflow include:
  - overflow protection equipment on receiving vessels;
  - flow and pressure regulators on pipe work or pumps;
  - interlocking of valves and switches; and
  - systems for detecting losses from pipe work and fittings, such as static pressure loss detectors, measurement to determine losses in transfer or external sensors.

## Static electricity

5.38 The prevention of static electricity generation must be controlled when transferring non-conductive flammable and combustible liquids, finely divided combustible powders and any other dangerous goods with a flammability hazard.

## Vapour emissions

- 5.39 Vapour emissions resulting from transfer can be minimised by considering the following:
  - the use of enclosed transfer systems;
  - keeping lids open only for the minimum period required for transfer;
  - minimising exposed surface areas;
  - avoidance of splash filling;
  - minimising the temperature of liquids being transferred; and
  - providing extraction ventilation for all sources of vapour.
- 5.40 Compatibility is required for all items that may need to interconnect, including:
  - hoses, couplings and associated fittings;
  - earthing connections;
  - vapour recovery connections; and
  - telemetry where required.

## **Fire protection**

- 5.41 **Regulation 8.25** outlines the requirement to have a fire prevention and fire protection system in the workplace.
- 5.42 Workplaces must have fire protection and fire fighting equipment that is designed for use in relation to the types and quantities of dangerous goods, which are stored or handled at the workplace.
- 5.43 When assessing the appropriate fire protection methods, the employer must consider:
  - the conditions under which the goods are stored and handled at the workplace;
  - the fire load of the dangerous goods;
  - the compatibility of the dangerous goods with other goods;
  - risks from other sources; and
  - proximity to other workplaces or premises.

## The fire protection system

- 5.44 The fire protection system must provide the capacity to quickly control and extinguish any fire that occurs involving the dangerous goods. It must also, effectively protect the dangerous goods stored within the workplace from any fire in adjacent properties.
- 5.45 The Building Code of Australia may not be sufficient for fire protection of different types of buildings. For the storage and handling of dangerous goods, additional fire protection from the goods and the particular hazards and associated fire loads are required.
- 5.46 The fire load will depend on the particular hazards of the dangerous goods and combustible liquids and on the quantities being stored and handled in the work area. Other factors that may influence the fire load and the amount and type of protection needed include:
  - storage configuration, height, and density of the dangerous goods;
  - location, design, type of construction and total floor area of the building or work area;
  - nature of any structures, plant, and equipment including their materials of construction;
  - type of operations in the building or work area, with particular attention to whether the goods are bulk, or in open or closed packages;
  - if any processing of dangerous goods occurs within the workplace.
- 5.47 The fire protection system should provide protection on and off the premises for:
  - dangerous goods installation from other exposure
  - other exposure from the dangerous goods.
- 5.48 Attention should be given to the types of structures present, with current and future activities.

#### Water supply

- 5.49 A reliable water supply will be required for the protection system at most premises where dangerous goods and/or combustible liquids are stored and handled. The supply must be sufficient to supply both the internal fire protection equipment and additional equipment, used by the emergency services authority controlling a fire at the premises.
- 5.50 Where sufficient supply is not available from the main water supply, it may be necessary to supplement this with additional water storage and/or pumps. If the local authorities permit it, water may be obtained from reliable alternative sources such as close by rivers and dams, using whatever resources are suitable.
- 5.51 The emergency services authority that is attending a fire at the workplace should be requested to conduct regular checks on the adequacy of the local water supply and pressure within the workplace.

#### Fire alarm systems

5.52 The design and installation of the fire alarm system should contain:

- automatic systems capable of being operated manually through the use of clearly identified alarm activators at convenient and safe locations, easily accessible to work areas;
- alarm signals that are distinguishable from any other signal to permit ready recognition, and is clearly audible throughout the premises;
- an effective visual system as an alternative, should be installed where there are high noise levels or the use of protective clothing may prevent the recognition of an alarm signal; and
- a system that remains operable if the main power supply fails.

## Fire fighting equipment

- 5.53 Fire fighting equipment should be located so that:
  - it is in a conspicuous position;
  - it is readily accessible in the event of an incident, preferably being sited adjacent to exit doors or on exit routes;
  - it is convenient to, and readily accessible from, the risk being protected; and
  - all dangerous goods and other items being protected can be directly reached by the fire-fighting medium.
- 5.54 Installation, testing and maintenance of fire fighting equipment must be in accordance with the manufacturer's specifications.
- 5.55 All fire fighting equipment is to be appropriately labelled. It may prove to be beneficial to the employer to confirm the labelling is correct with the relevant emergency services authority.
- 5.56 If at any stage the fire protection or fire fighting equipment becomes ineffective, the employer must ensure that any risk resulting from the loss of these items are assessed. If alternative resources cannot be obtained to provide the required level of protection, it may be necessary to cease operating until effective fire protection can be restored.

#### Hose reel systems

- 5.57 Hose reel systems must be located on each storey of a building where dangerous goods are stored and handled. Where the total floor area exceeds 300m<sup>2</sup>, hose reels should reach every location and installations within the building. Appropriate hydrant hose systems may be substituted for fire hose reels, if there are trained persons capable of safely using the equipment.
- 5.58 Hose reels should be provided with a hose length of 36m, have appropriate signage, and are protected by a cabinet or other suitable means if it is in an environment where it may be damaged.
- 5.59 Foam hose reels should be capable of producing satisfactory foam that meets the manufacturers' specifications, suitable for the risks being protected and are to be identified by appropriate signage.

## **Fire hydrants**

- 5.60 Fire hydrants should be equipped with hose branch and nozzle except where it is not appropriate and prudent to do so, for example:
  - where this equipment may be susceptible to theft; and
  - there are no personnel properly trained to operate them.
- 5.61 External hydrants should be:
  - in a convenient position, but in a safe distance from exit doors and hard standing areas;
  - easily visible with appropriate identification signs; and
  - capable of providing the appropriate coverage.

## Monitors

- 5.62 Monitors are to be installed in accordance with manufacturers' specifications and should be installed where fire control may require the direction of large quantities of firewater (or equivalent) at a fixed installation, with minimum exposure to risks for fire fighters.
- 5.63 Monitors should be installed in consultation with the relevant fire brigade.

## Automatic sprinkler systems

- 5.64 Automatic sprinkler systems may comprise of:
  - individual-actuation sprinklers;
  - deluge sprinklers;
  - foam sprinklers; and
  - a combination of any of the above.

## **Portable fire extinguishers**

5.65 Portable fire extinguishers should be clearly visible, readily available, unobstructed and convenient to the relevant risk but not adversely affected by hazardous or climatic conditions. AS (2444-2001) provides relevant information on the selection and storage of fire extinguishers.

#### **Emergency Preparedness**

5.66 Emergency procedures and a written emergency plan should be prepared where quantities of dangerous goods in a workplace are greater than the manifest levels set out in Schedule 7 of the regulations.

#### **Emergency procedures**

- 5.67 **Regulation 8.26(a)** requires emergency procedures be developed, implemented and maintained for all workplaces that store and handle dangerous goods. This ensures the safe handling of all assessed emergencies such as fire, spillage, vapour release, uncontrolled reaction and external threats.
- 5.68 The extent of emergency procedures required will depend on the size and complexity of the workplace, types and quantities of dangerous goods and the processes involved when the goods are in use.

- 5.69 Employers must communicate and train all employees and other relevant persons who may be affected if emergency procedures are required.
- 5.70 Emergency procedures should include:
  - the means of raising the alarm;
  - the method for the summoning the appropriate emergency services; and
  - any actions to be taken by employees in an emergency to ensure the safety and health of all persons and to minimise damage to property and the environment.
- 5.71 An example of an effective emergency procedure is a simple one-page document; in point form, suitable for display on signs or carrying by employees or visitors as a pocket card.
- 5.72 **Regulation 8.26(b)** requires that appropriate clean-up equipment is available for use in case of an emergency.

#### **Emergency plans**

- 5.73 **Regulation 8.27** requires employers to ensure that an emergency plan is developed, implemented and maintained at the workplace where:
  - dangerous goods with amounts larger than the manifest quantity in Schedule 7, are being stored and handled at the workplace; and
  - dangerous goods of a Class mentioned in column 2 of an item of Schedule 7 are being stored and handled at the workplace.

#### Purpose of a plan

- 5.74 The purpose of an emergency plan is to minimise the effects of any dangerous occurrence or near miss at a workplace. The emergency plan should enable the employer to prioritise and focus on the most likely incidents. It should incorporate actions required for worst-case scenarios and should be adaptable in all circumstances dependent upon the severity and the type of incident.
- 5.75 The emergency plan should also ensure that appropriate clean-up equipment and material, such as absorbents and neutralisers are available for use in case of an emergency.

#### **Consultation and communication**

- 5.76 During the development of the emergency plan, employers should:
  - consult with employees, employee representatives, and the relevant emergency service authority; and
  - provide a copy of the plan to the emergency services who may then issue written advice to the employer about the plan. If this occurs, the employer should consider the advice.
- 5.77 Employers should consult with local government authorities for environment and planning to ensure compliance with any legislation and emergency planning in the jurisdiction. The employer should also consider consulting with neighbours if an emergency may affect adjoining properties.
- 5.78 The emergency plan should be communicated to all persons who may be affected by an emergency.

## Content of emergency plan

- 5.79 The emergency plan should be comprehensive and should coordinate all aspects of emergency management, including:
  - copies of all emergency procedures;
  - responsibilities of key persons in managing emergencies;
  - circumstances to activate the plan;
  - systems for raising the alarm;
  - estimating the extent of the emergency;
  - summoning emergency services authorities in the event of an emergency is, or has the potential to become a dangerous occurrence;
  - protection of all persons including detailed evacuation procedures and methods for accounting for all people at the workplace;
  - isolation of the emergency area to prevent entry by non-essential personnel;
  - roles of on-site emergency response teams;
  - containment of any spillage;
  - the requirement for fire-water retention to ensure that contaminated fire-water cannot enter waterways, drains or ground water;
  - disconnection of power supplies and other energy sources except when required to maintain safety of a critical operation or to run emergency equipment such as fire booster pumps;
  - prevention of dangerous goods or contaminated material of any kind from entering drains or waterways;
  - provision of relevant information and assistance to the emergency services authority, both in anticipation of emergencies and when they occur;
  - maintenance of site security throughout the emergency;
  - provision for dealing with the public and the press; and
  - site rehabilitation requirements.

#### **Off-site considerations**

- 5.80 Where any foreseeable incident may have effects beyond the boundary of the workplace, the emergency plan should also address managing the off-site effects. Where off-site effects are a possibility, the plan should provide for providing necessary warnings or communications to neighbouring workplaces.
- 5.81 Where emergency plans include agreements with the employers of neighbouring workplaces to provide mutual aid in emergencies, these arrangements should be formalised along with consultation between the emergency services and other involved parties to determine the plans effectiveness.
- 5.82 Where the emergency plan includes activities that involve persons who reside or work adjacent to the workplace, the relevant parts of the plan should be communicated to those persons.

#### Implementation

5.83 The emergency plan should be tested when first devised and after each modification. Throughout the year, at suitable intervals, practice drills and simulated emergencies should involve all employees and emergency services. These drills should be focussed on familiarising anyone who would be involved in an accident related to the storage and handling of dangerous goods with the workplace procedures.

- 5.84 The emergency plan should be reviewed:
  - within five years of its development;
  - in intervals of no more than five years;
  - if there is a change of risk on or off the workplace;
  - when updated information becomes available; and
  - a possible deficiency is identified.
- 5.85 Emergency plans are to be readily available in hard copy form, at all times. The location of the emergency plan is to be easily located for supervisors, employees and should be discussed with the emergency services authority when it is updated or reviewed.

#### **Emergency equipment**

- 5.86 Equipment required to contain and clean up incidents will vary depending on the type and quantities of dangerous goods at the workplace.
- 5.87 Equipment should be located so it is readily accessible for all persons if, an emergency arises.
- 5.88 If safety equipment is needed to control a risk, the employer must make sure it is available and it should be regularly maintained and checked to ensure it operates effectively in accordance with the manufacturer's specifications.
- 5.89 Safety equipment for use with dangerous goods must be compatible with the dangerous goods they may come in contact with.

## 5.90 Examples of emergency equipment

- over packs such as oversized drums for containing leaking containers;
- absorbent material suitable for the substances likely to be spilled;
- booms, plates and/or flexible sheeting for preventing spillage from entering drains and waterways;
- neutralising agents such as lime and soda ash;
- suitable pumps and hoses for removing spilled material;
- hand tools such as mops, buckets, squeegees and bins; and
- suitable protective clothing and equipment to protect the safety and health of personnel involved in the clean up.

#### Elimination of ignition sources in hazardous areas

- 5.91 An ignition source is any source of energy that can ignite a flammable atmosphere. **Regulation 8.28** requires the elimination of ignition sources in hazardous areas of the workplace. Within a dangerous goods storage and handling environment, flammable or combustible gases, vapours, dusts and mists may be generated or evolve. These can form explosive mixtures with air in certain proportions.
- 5.92 Ignition sources should be identified and controlled. An employer must ensure that there are no ignition sources in a hazardous area. If it is not practicable to remove an ignition source, any risk from the ignition source must be reduced as far as practicable.

- 5.93 An employer should not permit the use of a flame or any other source of ignition during repairs on or adjacent to, a hazardous area unless:
  - close and experienced supervision is provided during the activities;
  - the area where the repair work is to be carried out has been freed of possible hazards, including toxic or flammable gases and vapours, and combustible dusts;
  - personnel involved in the operation are given precise, detailed instructions on the precautions which are to be taken before and while the ignition sources are in the area; and
  - additional controls are in place to ensure a dangerous situation does not arise, such as atmospheric monitoring, isolation of switches, pipe work and valves.
- 5.94 For work involving ignition sources in a hazardous area, a formal work permit system is recommended. This permit is usually referred to as a 'hot work permit'.
- 5.95 In all hazardous areas, appropriate measures must be taken to eliminate the generation of static electricity and to safely dissipate any static electricity that does occur from any source.
- 5.96 Static electricity is generated by a wide variety of sources including:
  - movement of dry powders and liquids that have a low electrical conductivity such as pouring, pumping, stirring, or high velocity flow;
  - moving vehicles, equipment or components of plant;
  - movements of personnel, especially when wearing clothing and footwear of low conductivity;
  - fitting or removal of clothing, including protective clothing;
  - application or removal of plastic wrap;
  - particulate or aerosol spray, including spray painting or the rapid discharge of a carbon dioxide extinguisher;
  - manual carrying of liquids in a non-conductive container or one with an insulating handle; and
  - movement of packages by conveyor or by trolleys with non-conductive wheels.
- 5.97 The following examples should be considered by employers to eliminate the generation of static electricity in all hazardous areas:
  - all tanks, pipe work, transfer systems and process plant should be earthed, or otherwise protected;
  - liquid transfer rates and splashing should be minimised;
  - the use of anti-static additives in non-conductive liquids, and to the wearing of conductive clothing, particularly footwear; and
  - operating procedures should include instructions for avoiding the risks associated with static electricity.

## 5.98 **Examples of an ignition source**

- naked flames associated with blow torches, shrink wrapping equipment, stoves, gas or oil heaters, pilot lights, driers, lighters and matches;
- incandescent materials such as glowing coals or lighted cigarettes, cigars and pipes;
- arcs from electric welding or arcing contacts on electric motors and switchgear;
- static sparks;
- mechanical sparks from grinding or from objects striking together;

- friction from moving parts such as fan blades rubbing nearby surfaces;
- heat which may be generated from appliances or from chemical and biological reaction vessels;
- internal combustion engines and vehicles;
- radio transmitters and mobile phones; and
- electrical fittings and equipment (including wiring, power points, switches, lighting, appliances and battery forklift trucks) which are not rated for safe operation in the hazardous area.

#### **Safety Equipment**

- 5.99 **Regulation 8.29** requires that safety equipment necessary for use with dangerous goods must be compatible with and suitably protected from, the dangerous goods with which it may come in contact. The equipment required to control risk should be determined through the risk assessment process.
- 5.100 The equipment must be available to relevant persons and maintained in accordance with manufacturers specifications.

## Control of hazardous atmosphere

- 5.101 **Regulation 8.30** requires that an employer must ensure that any risk to a person's health and safety associated with any atmospheric conditions is eliminated or if this is not practicable reduced.
- 5.102 Where the possibility of a hazardous atmosphere has been identified by the risk assessment process, atmospheric testing and monitoring must be carried out to ensure a safe atmosphere is maintained. A hazardous atmosphere is:
  - not a safe oxygen level for breathing;
  - concentrations of hazardous gases, vapours, mists, fumes and dusts are at or above relevant exposure standards; and
  - concentration of flammable gases, vapours, mists, fumes and dusts is at or above five per cent of the lower explosion limit.
- 5.103 The control of risk arising from a hazardous atmosphere may be achieved by:
  - preventing the entry of contaminants into the atmosphere using totally enclosed systems, or by blanketing an exposed surface with an inert atmosphere;
  - extracting the contaminants from their sources through extraction ventilation;
  - reducing the concentrations of contaminants by introducing uncontaminated air, either through general ventilation or by purging;
  - limiting the introduction of processes and equipment into the area where the hazardous atmosphere may exist to those which will not constitute a risk in that atmosphere;
  - ensuring appropriate personal protective clothing and equipment is worn by all personnel entering the area; and
  - a combination of any of the above.

## **Ventilation Considerations**

- 5.104 Local exhaust ventilation from each significant source of contamination is usually a more effective means of preventing build-up of a harmful atmosphere than an increase in general ventilation.
- 5.105 Where a storage area for closed containers of dangerous goods has adequate openings to the open air, natural ventilation may be sufficient. In other circumstances, a mechanical ventilation system may be required.
- 5.106 General ventilation should provide enough entry and exhaust capacity to provide airflow throughout the area, and to prevent pockets of harmful atmosphere from developing.
- 5.107 Where there are dangerous goods with vapours heavier than air, exhaust air must be removed from the lowest point above any spill containment while fresh air is introduced from above.
- 5.108 Fresh air should always be drawn from a source uncontaminated by exhaust air or other pollutants. The exhaust should be discharged where it will not cause other risks, and in compliance with environmental legislation concerning discharges to atmosphere.
- 5.109 The use of cross-flow ventilation with closely spaced registers is usually effective at eliminating pockets of hazardous atmosphere.
- 5.110 As far as practicable, a ventilation system for a dangerous goods area should be exclusive to the particular building, room or space. Linking of ventilation systems should only be allowed where it will not facilitate fire spread and there will not be any other increased risk that may arise from mingling of incompatible vapours.
- 5.111 Part 7 Confined Spaces of the Regulations provides further information on ventilation.

## Purging

- 5.112 Purging involves introducing air or an inert gas into a confined space to displace oxygen and/or flammable, toxic or corrosive fumes. Purging with inert gas is most commonly used above the liquid surface of reaction, mixing or bulk storage vessels to prevent surface oxidation or the formation of an explosive atmosphere.
- 5.113 Empty vessels that have contained dangerous goods may require purging with air prior to entry by personnel for the purpose of carrying out maintenance activities.
- 5.114 Because purging may reduce oxygen levels or there may be residual contamination, safe entry procedures should be developed and enforced. Entry to confined spaces must be in accordance with Part 7 of the Regulations.

#### Lighting

- 5.115 **Regulation 8.31** specifies that the employer must ensure that adequate natural or artificial lighting is provided to all work areas and access ways. Appropriate light must be provided in all areas of the workplace including internal roads, pathways, corridors, rooms and buildings where dangerous goods are stored or handled.
- 5.116 Providing safe lighting may require consideration of the effects of light on the dangerous goods that will be stored and handled including the risks of particular

types of lighting design and if they are likely to provide a hazardous ignition source.

5.117 Consideration should also be given to the need for emergency illumination.

#### Security

- 5.118 **Regulation 8.32 and 8.33** requires employers to develop procedures to ensure the safety of visitors and the prevention any unauthorised access to the workplace. When developing security systems and procedures, the employer should consider:
  - security of personnel, product, processes, equipment, plant, buildings, documentation, information systems and any areas of special risk;
  - the nature of identified hazards and their levels of risk;
  - the location of the premises, including the nature of the surrounding community and environment;
  - the likelihood of mischief or sabotage;
  - the integrity and reliability of the security system hardware and design; and
  - what back-up support is required for security systems and personnel.
- 5.119 Where it is necessary to control access of all people to the premises, the access control system should include:
  - the means to identify the extent of access to be permitted for each person;
  - the means to account for everyone on site at any given time; and
  - the issue of restricted access passes to visitors, or prohibiting unaccompanied access.
- 5.120 Depending on the size and hazards of the particular premises, examples of security measures might include:
  - fencing or enclosing areas where the dangerous goods are kept;
  - providing locks on doors, windows and other openings to buildings, rooms, compartments or containers where dangerous goods are kept;
  - continuously supervising areas where the dangerous goods are kept;
  - security checks on all vehicles entering or leaving the premises; and
  - limiting access by visitors, contractors and employees to authorised areas only.
- 5.121 Employees should receive training to ensure that they understand security measures and security signs. All visitors to the workplace should be provided with information and supervised appropriately.

#### Disposal etc of plant, equipment and containers

- 5.122 **Regulation 8.34** requires employers ensure that plant, pipe work, equipment or containers are free from dangerous goods or otherwise made safe, if it is being disposed of. Prior to commencing the decommissioning, abandoning or disposal of plant used for dangerous goods, the employer must identify the hazards in order to assess and control the risks involved in the process.
- 5.123 Plant and equipment, which have been made safe, should still be subjected to the following precautions to ensure they are free from dangerous goods:
  - identification of possible residual or resultant hazards;
  - provision of appropriate fire protection, where required;
  - ventilation to prevent build up of a hazardous atmosphere; and
  - containment of any effluent.

- 5.124 Used dangerous goods containers, such as drums must be decontaminated of dangerous goods prior to disposal, unless they are:
  - intended to be refilled;
  - being sent for refurbishment; and
  - otherwise made safe by measures that will prevent adverse health effects to people or damage to property and the environment.
- 5.125 When a container is no longer being used for the storage of dangerous goods it must be cleaned and be 'free from dangerous goods'. Employers must remove or obscure all labels, so persons in the workplace are certain about the contents of the containers. Disposal of containers that have not been cleaned free of dangerous goods may be subject to State environmental legislation.
- 5.126 Particular care must be taken if an employer becomes aware of unlabelled containers with unknown contents. It is good practice to isolate such a container until its contents are identified and it is appropriately labelled. If the contents cannot be identified, expert assistance should be obtained.
- 5.127 Containers should not be disposed of until the hazards are known and then only in an acceptable manner, after consultation with the relevant waste management authority if required.
- 5.128 Used packagings, which have not been made free of dangerous goods, should retain labelling that properly identifies the residual hazard. When they are free of dangerous goods, the labelling must be removed.

#### 6. Employer's duties - provision of information

#### Provision of information for health and safety procedures

- 6.1 **Regulation 8.35** requires that employers obtain, communicate and make available relevant information for dangerous goods being stored and handled at the workplace. This will allow health and safety procedures to be developed, adopted and maintained in order to:
  - ensure the safety and health of persons who may be affected by dangerous goods;
  - enable persons to take appropriate action in case of emergencies arising from the storage and handling of dangerous goods; and
  - prevent damage to property and the environment from the hazards arising from dangerous goods.
- 6.2 Where an employer develops and adopts health and safety procedures in accordance with the regulations, the employer should communicate those procedures to the relevant persons. People who may be affected by dangerous goods include:
  - supervisors and employees;
  - visitors and contractors;
  - · residents of adjoining properties, surrounding the workplace; and
  - emergency services personnel.
- 6.3 The employer should ensure information provided is understood by all concerned, taking into account language and other communication difficulties. The information should include:

- relevant information extracted from, or based on MSDS;
- information included on labels, safety signs, placards, registers, manifests and emergency procedure guides;
- extracts from chemical safety texts or proprietary databases;
- specific purpose guides prepared by industry groups; and
- other guides relevant to the hazards associated with the particular dangerous goods.
- 6.4 Where safety signs are used to warn persons about a hazard and a person's responsibilities, the employer must ensure that the signs are displayed in a prominent position close to the particular hazard.
- 6.5 Depending upon the situation the information may best be provided:
  - in writing, such as written procedures, signs or instructions;
  - in some form of practical training;
  - in electronic format; and
  - as a combination of any of the above.
- 6.6 Possible information sources include:
  - manufacturers or suppliers;
  - industry associations;
  - professional associations;
  - trade unions;
  - regulatory authorities;
  - academic institutions and publications;
  - consultants; and
  - emergency services.

## Material Safety Data Sheets

- 6.7 **Regulation 8.36** requires an employer to obtain a current MSDS from a supplier the first time the dangerous goods of that kind are received at a workplace. The MSDS provided by the supplier of the goods must not be changed unless it is required to be translated to a language that is easily understood and is necessary for it to comply with the Regulations.
- 6.8 The MSDS must be accessible to all employees, emergency services employees and visitors to the workplace. This may include using a microfiche and reader, computer databases, or computer links with the supplier or through web pages.
- 6.9 If an employee whose duties include storage and handling of dangerous goods or an employee representative asks for an MSDS for the goods the employer must provide to them a copy.
- 6.10 A retailer is not required to obtain an MSDS from the supplier for dangerous goods that are in consumer packages intended for retail sale. However, this exemption does not apply if:
  - it is intended that the container be opened on the workplace except for taking a sample or tinting paint; and
  - the dangerous goods are provided for trade use via a wholesale or trade supply counter or section.
- 6.11 While employers are not required to have MSDS for dangerous goods in transit, they are required to have safety and health information concerning those dangerous

goods accessible and available for their employees and any other person who may be affected by the dangerous goods while they are in transit.

#### **Risk assessment**

- 6.12 **Regulation 8.37** refers to the requirement that an assessment or review in relation to a risk associated with any hazard identified with the storage and handling of dangerous goods at a workplace must be completed in accordance with regulation 8.15.
- 6.13 The record of the result of the assessment must be accessible to any person engaged to work at the premises who could be exposed to a risk or their workplace health and safety representatives.

#### Information for plant and structures

- 6.14 **Regulation 8.38** requires that information should be provided about the plant and structures to anyone who has reason to operate access, maintain, repair, inspect or test them.
- 6.15 Persons should be provided with sufficient knowledge and understanding of the plant and structures relating to their associated hazards and risks to:
  - enable them to perform their duties efficiently and safely; and
  - guard against the plant and structures being in any way compromised or damaged.
- 6.16 Information should be relevant to activities to be performed by the person and be consistent with the extent of contact the person has with the plant or structures. Relevant information may include:
  - the purpose for the design of the relevant plant and structures;
  - testing or inspections to be carried out prior to, during, and on completion of, the intended activity;
  - concise operating procedures and systems of work necessary for the safe use of the plant;
  - warnings about particular hazards;
  - details about installation, commissioning, testing, operation, maintenance, cleaning, transport, storage and/or dismantling, as appropriate;
  - particular hazards associated with the structures, plant and their contents;
  - site specific and external risks that may impact on the plant and structures; and
  - emergency operating procedures.
- 6.17 The primary source of information should be provided to the employer by the supplier and installer. Additional information may be obtained from a variety of sources including designers, manufacturers, suppliers, statutory authorities, emergency service authorities, other users of similar systems, safety engineering consultants and relevant texts.
- 6.18 The employer should ensure the information provided is understood by all concerned, taking into account language and other communication difficulties. Depending upon the situation, the information may be best provided:
  - in writing, for example in the form of written procedures, signs or instructions;
  - verbally in some forms of training;
  - in electronic format; and

• as a combination of any of the above.

#### Register of manifest quantities of dangerous goods for emergency purposes

- 6.19 **Regulation 8.39** applies to an employer if:
  - a) dangerous goods or combustible liquids mentioned in schedule 7 are stored and handled at the workplace; and
  - b) the total quantity of any of the goods or liquids exceeds the manifest quantities in Schedule 7.
- 6.20 In these cases, the employer must ensure that:
  - a dangerous goods register be prepared;
  - the register is located in a place at the workplace, decided in consultation with emergency services; and
  - the register is readily accessible to emergency services and Comcare.
- 6.21 A register of manifest quantities of dangerous goods provides detailed information on the dangerous goods stored and location within a storage area.
- 6.22 The principle purpose of the register is to provide the emergency services authority with information about the quantity, type and location of dangerous goods stored and handled in a workplace. This allows them to respond appropriately if called to an incident.
- 6.23 Dangerous goods registers also assist employers to manage the quantities stored and handled at the workplace. If the total quantity of dangerous goods or combustible liquids is more than the manifest quantity specified in column five of schedule seven, the employer must prepare a register.
- 6.24 The register must be revised within seven days of any significant change in any of the information contained in it.
- 6.25 **Regulation 8.39(3) (a) (i)** sets out the information that must be included in register.
- 6.26 Dangerous goods shipping documents should contain the information required for dangerous goods in transit.

## Site Plan

- 6.27 **Regulation 8.39(5)** requires that in addition to the dangerous goods register, an employer must also prepare a site plan of the workplace. The site plan must be amended to reflect any change in the details of the plan within 7 days of the change. The site plan of the workplace must include a detailed description of the nature of any adjoining or adjacent properties or workplaces.
- 6.28 The site plan of the workplace must indicate the location of:
  - essential services, including fire services and isolation points for fuel and power;
  - register of dangerous goods;
  - main entrance and other entry points;
  - each class of dangerous goods;
  - combustible liquids stored and handled with fire risk dangerous goods, if:
    - the combustible liquids are in bulk

- packaged combustible liquids are in a total quantity of more than 1 000 kg or 1 000 L in a storage area
- C1 combustible liquids stored and handled in isolation from dangerous goods;
- dangerous goods in transit;
- each individual storage area and how they are identified;
- manufacturing and process areas; and
- drains.

#### 7. Notification of storage and handling of dangerous goods

- 7.1 **Regulation 8.41** applies to an employer if:
  - dangerous goods or combustible liquids in schedule 7 are stored and handled at the workplace; and
  - the total quantity of any of the goods or liquids exceeds the manifest quantity in schedule 7.
- 7.2 Comcare must be notified in writing, using the appropriate forms of:
  - the details of the class of dangerous goods to be stored or handled at the workplace; and
  - the average and maximum quantities of the dangerous goods or combustible liquids that will be stored and handled.
- 7.3 This information must be provided every two years unless there is a significant increase in amounts of dangerous goods or combustible liquids at the workplace. Comcare must also be notified as soon as possible if there is a change in risk associated with the dangerous goods at or outside the workplace. This includes when dangerous goods are no longer stored or handled by the employer.
- 7.4 The employer must provide Comcare with any information relevant to the storage or handling of dangerous goods, on request.

#### 8. Marking and identification of containers

- 8.1 **Subdivision 8.3.5** outlines the requirements of marking containers at the workplace.
- 8.2 For all dangerous goods, including those in containers, the employer should ensure that the goods are also appropriately labelled in accordance with the ADG Code.
- 8.3 The primary purpose of labels on containers of dangerous goods is to provide clear warning of the hazards of the contents. Uniformity in the ways in which dangerous goods are labelled leads to increased recognition and improved safety.

#### Marking of containers — dangerous goods received by employer

- 8.4 **Regulation 8.45** specifies that an employer has a duty to make sure that any dangerous goods stored and handled in the workplace are correctly packaged and labelled.
- 8.5 Where an employer receives dangerous goods and could reasonably be expected to know that the marking of the package does not comply with the ADG Code, the employer must either:
  - not accept the goods; or
  - mark the container in accordance with the ADG Code, if the goods have already been accepted.

8.6 If the label is defaced or not easy to read, the employer should replace it. Portable tanks and Intermediate bulk containers (IBC) must be placarded with emergency information panels containing specified information.

#### Marking of containers at the workplace

- 8.7 **Regulation 8.42** specifies that the employer must ensure containers at the workplace are marked accordingly. While the goods are at the workplace, the markings on a container of dangerous goods must be maintained. The employer is responsible for making sure the information is accurate. A container that is marked for use for particular dangerous goods must be used only for those goods.
- 8.8 An employer must also ensure that a container for storing combustible liquids is identified by being marked for combustible liquids.
- 8.9 Where the labelling of a small package is not practicable, the employer should ensure that the necessary health and safety information is provided in another effective manner. This could be achieved by labelling the shelf on which the dangerous goods are kept.
- 8.10 Different groups of people may use the dangerous goods at different times. Procedures should be in place to indicate to all persons, in contact with the dangerous goods, the contents of the containers and the dangerous goods and their particular properties.
- 8.11 Anyone who has reason to handle the unlabelled container should have access to health and safety information from another source relating to the contents of the container.
- 8.12 Information on marking of packages is available in Chapter 7 of the ADG Code.

# Containers for short-term storage of dangerous goods not required to be marked

- 8.13 **Regulation 8.43** specifies that an employer is not required to mark a container into which dangerous goods are to be transferred if:
  - the goods are to be used immediately after the goods are transferred into the container; and
  - the container is to be made free from dangerous goods immediately after the goods have been used.

#### Placards

- 8.14 **Subdivision 8.3.7** outlines the requirements for placarding dangerous goods.
- 8.15 Placarding must be part of an overall management policy for workplaces where dangerous goods are stored and handled. Placards provide primary warning of the presence of dangerous goods. Placards are signs displaying the types of dangerous goods are stored and the appropriate emergency procedures. Placards are required to alert emergency services, people at the workplace and the public to the location and nature of the substances stored.
- 8.16 Placards also provide information on emergency procedures so that emergency services personnel, employees, the public and the environment are protected. It is important that placards are maintained, are not obscured and must be replaced if they become illegible.

## Calculating quantities of dangerous goods.

- 8.17 When calculating the quantities for placarding, the amounts in Schedule 7 of the regulations must be complied with. In calculating the amount of dangerous goods stored or handled all containers must be taken into account as if they are full, even when they are not, unless they are entirely free from dangerous goods.
- 8.18 When determining the aggregate amount of dangerous goods convert all volumes to litres and all mass measurements to kilograms and add the number of kilos to the number of litres. The quantity of gas is always based on the capacity of the cylinder. To determine the mass of gas in a cylinder look for the stamp on the cylinder neck or foot ring.

## **Types of placards**

## Placarding of bulk dangerous goods received by employer

- 8.19 **Regulation 8.48** provides that if an employer receives bulk dangerous goods and the employer knows or should know that the placard does not comply with the ADG Code they should:
  - not accept the goods;
  - ensure the goods are placarded in accordance with the ADG Code after accepting them.

#### Bulk dangerous goods placard – dangerous goods stored in bulk

- 8.20 **Regulation 8.49** specifies that where dangerous goods or combustible liquids are stored in bulk the employer must ensure that a bulk dangerous goods placard and a C1 combustible liquids placard (if applicable) are displayed.
- 8.21 This does not apply to:
  - dangerous goods in bulk in an IBC or in a bulk container intended for transport;
  - C1 combustible liquids that are either in isolation from other dangerous goods, or are in a quantity of not more than 10 000L
  - Class 2.1 or Class 3 dangerous goods or C1 combustible liquids that are stored in an underground tank at a service station.
- 8.22 Placarding for bulk dangerous goods or combustible liquids should be located so that there can be no confusion as to the application of the placard. The placard should be immediately visible to emergency services personnel approaching the storage location from the most likely direction.

## HAZCHEM outer warning placards – quantity of dangerous goods or combustible liquids exceeds placarding quantity

- 8.23 **Regulation 8.50** specifies that outer warning placards are required as soon as any one of the "Placarding quantities" from Schedule 7 is exceeded.
- 8.24 An outer warning placard should be positioned at each entrance to the workplace through which emergency services could, in an emergency gain entry to the workplace.
- 8.25 These should be positioned on the main street and any other entrances those that may be used in an emergency and on neighbouring properties if they could be used

as an emergency access point. If the main entrance if set back from the road it may be necessary to provide a warning at the road.

- 8.26 At large workplaces, outer warning placards may be more effective if they are duplicated on the approaches to the particular buildings or areas where dangerous goods are located.
- 8.27 An employer may make alternative arrangements for the placement of placards, if agreed in writing with emergency services.
- 8.28 The outer warning placard may be the only dangerous goods placarding required, depending on the quantity of dangerous goods stored and handled at the workplace.

# Other placards – quantity of packaged dangerous goods or combustible liquids exceeds placarding quantity

- 8.29 Subdivision 8.3.7 applies to an employer if:
  - packaged dangerous goods from Schedule 7 are stored and handled at the workplace; and
  - the total quantity of goods is greater than the placarding quantity in Schedule 7.
- 8.30 This subdivision does not apply to liquefied petroleum gas stored in cylinders outside a building if the cylinders are connected to gas-consuming appliances inside the building.

#### **Placards** – general

- 8.31 **Regulation 8.52** requires employers to display a placard for the goods or liquids, when a placarding quantity of packaged dangerous goods or combustible are stored or handled at the workplace.
- 8.32 The placard should be located as close as practicable to the area where the dangerous goods are stored.
- 8.33 The placard must include all the applicable class and subsidiary class labels required by **Regulation 8.52(3) to (7)**. These should be grouped together and they can be displayed either vertically or horizontally on shared signs. They must be visible and easily understood by anyone approaching the area within the workplace where the packaged dangerous goods are stored.
- 8.34 For those areas where there is regular variation in the types of dangerous goods, such as areas where dangerous goods are in transit or are held, it may be more convenient to use magnetic or removable labels. Care should be exercised to ensure if the public have access to the area, the labels can be protected from tampering.
- 8.35 Where there is some doubt as to whether the placard is required, it is considered safer to provide an appropriate placard to be cautious.

#### Placard for goods too dangerous to be transported

- 8.36 **Regulation 8.53** requires employers to display goods that are too dangerous to be transported placard at the workplace if:
  - the dangerous goods in Schedule 7 are being stored and handled;
  - the total quantity of goods is more than the placarding quantity in Schedule 7.

## Placard for C1 combustible liquids

- 8.37 **Regulation 8.54** requires that a C1 combustible liquids placard is displayed in the workplace if:
  - the combustible liquids in Schedule 7 are being stored and handled;
  - the total quantity of liquids is more than the placarding quantity in Schedule 7.

#### Location of placards

- 8.38 **Regulation 8.55** requires that the employer must ensure placards required in relation to goods or liquids under Subdivision 8.3.7 are displayed:
  - as close as practicable to each outside storage area at the workplace where the goods or liquids are stored or handled; and
  - either as close as practicable to the goods or liquids, or each entrance to the workplace.
- 8.39 The placard must be clearly visible from each normal approach to the workplace.

## Accuracy of placards

8.40 **Regulation 8.56** requires that any placard required for dangerous goods stored or handled at a workplace are accurate and revised as soon as practicable if there is a change to the Class or quantity of the dangerous goods.

#### 9. Duties to employees

- 9.1 **Subdivision 8.3.9** outlines the duties that employers have to employees in the workplace. Some of these duties include:
  - consultation
  - induction
  - training
  - supervision

#### Consultation

- 9.2 **Regulation 8.57** requires that employers must consult with employees and with their representatives regarding matters, which include:
  - induction, training and supervision;
  - provision of information;
  - hazard identification, risk assessment and risk control; and
  - any proposed changes to the storage and handling of dangerous goods at the workplace that are likely to affect the safety and health of the employee.
- 9.3 Employers who consult employees on health and safety issues and implications of proposed changes at the planning stage are more likely to gain relevant information to help reduce risks and avoid harmful consequences to employees' health and safety.
- 9.4 Effective consultation relies on communication that involves understanding the people being consulted. Providing employees' with adequate information in a format appropriate to their needs will enable them to have informed views.

- 9.5 Consultation should occur early in planning of the introduction of new or modified tasks or procedures associated with the storage and handling of dangerous goods. This should allow for changes arising from consultation to be considered and if appropriate then implemented.
- 9.6 Employers should allow enough time and scope for the employees representatives' to consult with their designated work groups and discuss the issues among them and with the employers of matters relating to health and safety in order to receive appropriate feedback.
- 9.7 The process used for consultation should consider the needs of employees and employee representatives from a non-English speaking background. The employer should also have regard to the literacy needs of employees in the workplace.

#### 9.8 **Examples of consultation methods are:**

- direct discussion;
- toolbox meetings;
- quality circles;
- health and safety committee meetings;
- quality reports;
- hazard inspections; and
- special working parties.

## Induction, information, training and supervision

9.9 **Regulation 8.58** specifies that an employer must provide induction, information, training and supervision for all employees and anyone else under their control who is involved with the storage and handling of dangerous goods. This would include contractors and consultants.

#### Induction

- 9.10 To be effective induction and training should be designed to take into account the requirements of particular employees and the tasks they perform.
- 9.11 Depending on the complexity of the operation, the employer should consider the use of a formal induction program. The system must seek to ensure each person who may be involved with the storage and handling of dangerous goods, achieves the appropriate knowledge and competencies and is effectively supervised until they are capable of performing their duties safely.

## Training

- 9.12 Training must be provided for those persons who work directly with dangerous goods but should also be provided for those who:
  - purchase and distribute goods;
  - operate, test, inspect, clean, or adjust plant and equipment used with the goods; and
  - provide and maintain fire protection and personal protection equipment.

- 9.13 It is especially important to ensure managers and supervisors who manage or supervise people in tasks affecting the storage and handling of dangerous goods are properly trained.
- 9.14 Although training plays an important part in ensuring effective risk control, high levels of training and instruction cannot replace effective measures to control the risk.
- 9.15 Training for employees must enable them to perform their tasks safely in accordance with the regulations. Training and induction is required to ensure employees are aware of the properties of dangerous goods they are working with and the risks associated with them.
- 9.16 Training is to include instruction relating to the following matters:
  - the relevant provisions of the dangerous goods regulations and this code of practice;
  - the nature of the hazards and properties of dangerous goods;
  - the processes for identifying, assessing, and controlling each risk associated with the employee's duties;
  - the use and maintenance of measures for the control of each risk;
  - safety systems (if any) and the systems of work that relate to the storage and handling of the dangerous goods;
  - the safe management and safe conduct in the workplace;
  - the effective operation of the emergency plans for the workplace;
  - issues relating to plant and equipment;
  - the equipment that may be required for use in an emergency;
  - the correct use, fitting, and maintenance of personal protection equipment; and
  - specific controls, which are, required around dangerous goods installations.
- 9.17 Following training employees should be able to demonstrate:
  - an understanding of the hazards and risks associated with working with dangerous goods;
  - the processes, procedures and practices relating to their specific work area;
  - what to do if an incident/accident occurs;
  - emergency procedures relevant to their work area; and
  - reporting of incidents or other matters that may have an impact on the risks associated with the dangerous goods.
- 9.18 Training review should include the ongoing monitoring of work practices to ensure that safe practices are maintained.
- 9.19 If changes such as the introduction of new dangerous goods or plant, a change in operating procedures or changes in the layout occur in the workplace the requirement for further training should be assessed. Additional training should be undertaken before changes are implemented. Refresher training should also be undertaken regularly to ensure all persons at the workplace maintain their skills and knowledge.
- 9.20 A record of any induction and training activities for each employee must be kept for at least 5 years. Training records should include:
  - the names of the employees or other trainees;
  - dates of attendance;

- the title and content of the training course;
- the duration of training;
- the name of the training provider; and
- how outcomes of training were assessed.

#### Supervision

9.21 Only supervisors who have sufficient training and knowledge with dangerous goods should be appointed in roles that influence how employees' or contractors' apply procedures. These people should be capable of providing instructions and advice, which always lead to safe outcomes.

## Visitors

- 9.22 Visitors in the workplace may create an increased risk with storage and handling system and the dangerous goods. The employer can guard against this by providing appropriate information, controlling access and providing suitable supervision to visitors as required. Controls measures should be put in place to ensure as far as practicable the risk to visitors and others are minimised.
- 9.23 An employer must ensure that unauthorised access to the workplace is controlled by implementing effective security measures. In view of the hazards associated with the storage and handling of dangerous goods, access to premises and work areas must be restricted to those having a legitimate purpose.
- 9.24 Notwithstanding the provision of information, employers may consider keeping visitors under constant supervision while they are at the workplace.

#### **Register of information about dangerous goods**

- 9.25 **Regulation 8.59** requires an employer to keep an updated hardcopy register listing each of the dangerous goods stored or handled at the workplace.
- 9.26 The register should provide the product names of the dangerous goods that are stored or handled in the workplace. The register should also include the MSDS for each of the dangerous goods where one is required under the regulations. The register must be readily accessible to an employee who works with dangerous goods or an employee representative.
- 9.27 Dangerous goods contained in a package that under the ADG code does not have to be marked and dangerous goods in transit do not have to be included in the register.
- 9.28 The register should be updated when:
  - new dangerous goods are stored or handled in the workplace;
  - the use of existing dangerous goods are discontinued; and
  - the manufacturer or supplier of dangerous goods on the register provides a revised MSDS.
- 9.29 As the MSDS must be updated by the manufacturer every five years therefore all MSDS contained in the register should be less than five years old.
- 9.30 If an employer must keep a register under Part 6 of the regulations, the majority of the information contained in the register will be the same. It is possible to

maintain a single register as long as it meets all the requirements determined in both sets of regulations.

#### 10. Duties of an employer who builds, owns or operates a pipeline

- 10.1 **Division 8.4** of the regulations apply to an employer who builds, owns or operates a pipeline.
- 10.2 **Regulation 8.62** specifies that if an employer builds a pipeline, the employer must ensure that the pipeline is:
  - designed, manufactured, installed, commissioned, operated, maintained and decommissioned so that a risk associated with the pipeline is eliminated; or
  - if it is not practicable to eliminate the risk, the risk is reduced as far as practicable.
- 10.3 The employer must also ensure that as far as practicable, activities, structures, equipment or substances that do not form part of the pipeline do not affect the dangerous goods or the pipeline in a manner that increases risk.
- 10.4 To ensure the pipeline is located and operated in a safe manner the employer must undertake hazard identification and a risk assessment to identify and control any risks associated with operating a pipeline. Controls should be in place to reduce risks associated with a pipeline and its contents to people at a workplace or at areas, which the public may have access to.
- 10.5 Each risk assessment is to be reviewed within every five-year period. If circumstances change, new risks are introduced associated with the operation of the pipeline or other information becomes available, a new risk assessment is to be completed.
- 10.6 The employer should put in place controls to ensure that, as far as practicable:
  - unintentional movement of the pipeline is prevented;
  - the pipeline is sound and is fit for the purpose it is designed;
  - emergency shutdown devices are fitted to the pipeline; and
  - any maintenance work carried out on the pipeline does not contribute to or cause a dangerous occurrence.

## Notification in relation to pipelines

- 10.7 **Regulation 8.63** specifies if on 1 May 2006, an employer is operating a pipeline that will carry dangerous goods, Comcare must be notified by 1 August 2006. The notification must be in writing using the approved form containing the following information:
  - the name of the employing agency who owns and operates the pipeline;
  - the location of the pipeline including where it begins and ends (the supplier and receiver of the goods);
  - the name, title and contact details of two people responsible for the pipelines operation;
  - whether current procedures for the safe operation and maintenance of the pipeline are in place;
  - whether current procedures for responding to an emergency relating to the pipeline are in place;
  - details of pipeline identification numbers which are used in the workplace;

- details of emergency services points of contact;
- details of each Class of dangerous goods being transferred through the pipeline; and
- the average and maximum quantities of dangerous goods being transferred through the pipeline each calendar year.
- 10.8 If an employer intends to begin operating a pipeline line after 1 May 2006, they are required to notify Comcare with all details specified in 10.7 prior to the operation of that pipeline commencing.
- 10.8 Re-notification is required every two years unless any information contained in paragraph 10.7 changes or if any of the following circumstances apply:
  - before action is taken to modify, relay or renew the pipeline, or to make the pipeline safe.
  - if all or part of the pipeline is removed, decommissioned, closed or abandoned.

## **11. Duties of employees**

11.1 **Regulation 8.67** requires an employee or contractor that is aware of a matter that may affect the ability of the employer to comply with the regulation, to report it to the employer as soon as practicable.

## Appendixes

- 1. Schedule 7 of the Regulations Quantities of dangerous goods
- 2. Schedule 8 of the Regulations Placard requirements
- 3. Standards and Codes applicable to all classes of dangerous goods

#### NOTE

The attached appendixes are for the purpose of reference only and should not be considered a part of this code of practice.

Appendix 1 and 2 are found in the Occupational Health and Safety (Commonwealth Employment) (National Standard) Regulations 1994 and any reference made to them should be in accordance with Schedule 7 and 8.

Appendix 3 contains various references, which are intended to provide employers with additional further reading that may assist them with safe practices in the storage and handling of dangerous goods. Any reference made to this appendix should be in accordance with the appropriate publication, for example; Australian Standard (AS) 1221 Fire hose reels.

Item	Dangerous goods	Packing group	Placarding quantity	Manifest quantity
1.	Class 2.1		500L	5 000L
2.	Class 2.2, Subsidiary risk 5.1		2 000L	10 000L
3.	Class 2.2, other than Subsidiary risk 5.1		5 000L	10 000L
4.	Class 2.3		50 L	500 L
5.	Aerosols		5 000L	10 000L
6.	Cryogenic fluids		1 000L	10 000L
7.	Class 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, or 8	Ι	50 kg or L	500 kg or L
8.	Class 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, or 8	II	250 kg or L	2 500 kg or L
9.	Class 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, or 8	III	1 000 kg or L	10 000 kg or L
10.	Class 3	Mixed	1 000 kg or L	10 000 kg or L
11.	Class 4.1	Mixed	1 000 kg or L	10 000 kg or L
12.	Class 4.2	Mixed	1 000 kg or L	10 000 kg or L
13.	Class 4.3	Mixed	1 000 kg or L	10 000 kg or L
14.	Class 5.1	Mixed	1 000 kg or L	10 000 kg or L
15.	Class 5.2	Mixed	1 000 kg or L	10 000 kg or L
16.	Class 6.1	Mixed	1 000 kg or L	10 000 kg or L
17.	Class 8	Mixed	1 000 kg or L	10 000 kg or L
18.	Class 9	II	1 000 kg or L	10 000 kg or L
19.	Class 9	III	5 000 kg or L	10 000 kg or L
20.	Class 9	Mixed	5 000 kg or L	10 000 kg or L
21.	Mixed Classes of the placarding quantity for each of which is 2 000 kg /l or less		2 000 kg or L	10 000 kg or L
22.	Mixed classes of the placarding quantity for at least one of which is 5 000 kg/l or more		5 000 kg or L	10 000 kg or L
23.	Goods too dangerous to be transported		5 kg or L	50 kg or L
24.	Combustible liquids stored or handled with fire risk dangerous goods		1 000 kg or L	10 000 kg or L
25.	C1 combustible liquids in bulk containers		10 000 L	100 000 L
26.	C1 combustible liquids in packages		50 000 L	100 000 L
27.	C1 combustible liquids in bulk and packages combined		50 000 L	100 000 L

Appendix 1 Schedule 7 of the Regulations

## Appendix 2 Schedule 8 - Placard requirements

## 1 Bulk dangerous goods

- (1) A placard for bulk dangerous goods must:
  - (a) have dimensions not less than the dimensions shown in Figure 1; and
  - (b) show the following details for the goods in the following positions on the placard:
    - (i) in position (a) the proper shipping name;
    - (ii) in position (b) the UN number;
    - (iii) in position (c) the Hazchem code;
    - (iv) in position (d) the class label and the subsidiary risk label (if any).

(2) The numbers and letters used for the proper shipping name, UN number and Hazchem code must be:

- (a) black on a white background; and
- (b) if the proper shipping name takes no more than 1 line at least 100 mm high; and
- (c) if the proper shipping name takes 2 lines or more at least 50 mm high.
- (3) Despite paragraph (2) (a), a letter of the Hazchem code may be white on a black background.
- (4) The class label must:
  - (a) comply with the form and colouring specified in Chapter 7 of the ADG Code; and
  - (b) if there is also a subsidiary risk label have sides of at least 200 mm; and
  - (c) if there is no subsidiary risk label have sides of at least 250 mm.
- (5) A subsidiary risk label must:
  - (a) comply with the form and colouring specified in Chapter 7 of the ADG Code; and
  - (b) have sides of at least 150 mm.

#### Figure 1 Template for a placard for bulk dangerous goods



Figure 2 Example of a placard for bulk dangerous goods



## 2 C1 COMBUSTIBLE liquids

A placard for C1 COMBUSTIBLE liquids must display the words 'COMBUSTIBLE LIQUID' as shown in Figure 3:

- (a) in black capital letters at least 100 mm high; and
- (b) in lettering of the kind shown in Figure 3; and
- (c) on a white or silver background.

## Figure 3 C1 COMBUSTIBLE liquids placard



#### **3** Packaged dangerous goods

- (1) A placard for packaged dangerous goods must:
  - (a) display the class label for each of the dangerous goods to which the placard relates; and
  - (b) comply with the form and colouring specified in Chapter 7 of the ADG Code.
- (2) Each class label must have sides of at least 100 mm.

Figure 4 Example of a placard for packaged dangerous goods



## 4 HAZCHEM outer warning placard

(b)

- (1) A HAZCHEM outer warning placard for dangerous goods must:
  - (a) be at least 120 mm high; and
    - display the word 'HAZCHEM' as shown in Figure 5:
      - (i) in red capital letters at least 100 mm high; and
      - (ii) in lettering of the kind shown in Figure 5; and
      - (iii) on a white or silver background.

## Figure 5 Outer warning placard



#### **5** Goods too dangerous to be transported

- (1) A placard for goods too dangerous to be transported must:
- (a) be in the form shown in Figure 6; and
- (b) display the words 'UNSTABLE', 'GOODS', 'TOO DANGEROUS' and 'TO TRANSPORT' on separate lines as shown in Figure 6:
  - (i) in black upper-case text; and
  - (ii) in lettering of the kind shown in Figure 6; and
- (c) when used in a placard for packaged dangerous goods have sides of at least 100 mm; and
- (d) when used in a placard for dangerous goods in bulk have sides of at least 250 mm.
- (2) The background colour for the top half of the placard must be the colour described as Canary 2 in paragraph Y11 of AS 2700-1996.
- (3) The background colour for the bottom half of the placard must be the colour described as Signal Red 2 in paragraph R13 of AS 2700-1996.



## **Appendix 3 Standards and Codes**

#### STANDARDS AND CODES APPLICABLE TO ALL CLASSES OF DANGEROUS GOODS

National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011], Australian Government Publishing Service, Canberra

National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012], Australian Government Publishing Service, Canberra

Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code), Federal Office of Road Safety, Canberra (Version 6)

Safety in laboratories
Classification of hazardous areas
The storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers
Dangerous Goods Initial Emergency Response Guide
Risk management
The control of undesirable static electricity
Safety signs for the occupational environment

## STANDARDS AND CODES SPECIFIC TO ONE PARTICULAR CLASS OF DANGEROUS GOODS OR TO SPECIFIC TYPES OF DANGEROUS GOODS WITHIN A CLASS

Class 2 Gases	
AG 501	Australian Gas Association Industrial and Commercial Gas Fired Appliances Code of Practice AG 501
AG 504	Australian Gas Association Code of Practice for Natural Gas
AG 601	Australian Gas Association Gas Installation Code of Practice AG 601
AS 1596	The Storage and Handling of LP Gas
AS 1894	Code of practice for the safe handling of cryogenic fluids
AS 2022	SAA anhydrous ammonia code
AS 2030	Cylinders for compressed gases
AS 2090	Uninsulated road tank vehicles for compressed liquefiable gases
AS 2337	Gas cylinder test stations
AS 2927	The storage and handling of liquefied chlorine gas
AS 3961	Liquefied natural gas - storage and handling
AS 4332	Storage and handling of gases in cylinders
AS 4289	Oxygen and acetylene reticulation systems

## **Class 3** Flammable and combustible liquids

Class 5	Flammable and compusible liquids
AS 1692	Tanks for flammable and combustible liquids
AS 1940	The storage and handling of flammable and combustible liquids
AS 2106	Methods for the determination of the flashpoint of flammable liquids (closed cup)

AIP CP4	Design, installation and operation of underground petroleum
	storage systems (UPSS)
AIP CP22	The removal and disposal of underground petroleum storage tanks

## <u>Class 4</u> Flammable solids; substances liable to spontaneous combustion; substances that in contact with water emit flammable gases

AS 1678.4	Emergency Procedure Guide - Transport - Group text EPG for
	Class 4.1 substances - Flammable solids; substances liable to
	spontaneous combustion; and substances that in contact with water
	emit flammable gases

#### Class 5 Oxidising agents and organic peroxides

AS 2714	The storage and handling of hazardous chemical materials - Class
	5.2 substances (organic peroxides)
AS 4326	The storage and handling of oxidising agents

#### **Class 6** Toxic substances

AS/NZS 4452The storage and handling of toxic substancesAS 4081The storage, handling and transport of liquid and liquefied<br/>polyfunctional isocyanates

#### Class 8 Corrosive substances

AS 3780 The storage and handling of corrosive substances

## Class 9 Miscellaneous dangerous goods

AS/NZS 4681 The storage and handling of Class 9 (miscellaneous) dangerous goods and articles

## STANDARDS AND CODES APPLICABLE TO AN INDUSTRY OR

## PARTICULAR SITUATION

AS 2507	The storage and handling of pesticides
AS 3846	The handling and transport of dangerous cargoes in port areas

## STANDARDS AND CODES APPLICABLE TO PARTICULAR DESIGN

## REQUIREMENTS

AS CB 18	SAA pressure piping code
AS 2809	Road tank vehicles for dangerous goods
AS 2865	Safe working in a confined space
AS 3000	SAA wiring rules
AS 3873	Pressure equipment –operation and maintenance
	'BCA' Building Code of Australia

## STANDARDS AND CODES APPLICABLE TO PIPELINES

AS 1345	Identification of contents of piping, conduits and ducts
AIP CP5	Pipeline and underground tank identification

## FIRE PROTECTION STANDARDS AND CODES

Fire hose reels
Manual alarm call points
Automatic fire alarm installations
Automatic sprinkler installations
Fire hydrant installations
Fire hose reel installations
Pumpsets
Low expansion foam
Medium and high expansion foam
Mobile foam apparatus
Dry chemical extinguishing systems
Carbon dioxide extinguishing systems

## **Fire Extinguishers**

rife Exunguishers	
AS 1841.1	General requirements
AS 1841.2	Water type
AS 1841.3	Wet chemical extinguishers
AS 1841.4	Foam type
AS 1841.5	Powder type
AS 1841.6	Carbon dioxide type
AS 1841.7	Vaporising liquids
AS 4265	Wheeled fire extinguishers
AS 2444	Selection and location
AS 1850	Classification of extinguisher
AS 1851.1	Maintenance

## **Personal Protective Equipment (PPE)**

AS 2919	Industrial clothing
AS 3765.2	Clothing for protection against hazardous chemicals - Limited
	protection against specific chemicals
AS/NZ 1337	Eye protectors for industrial applications
AS/NZ 2161	Occupational protective gloves - General requirements
AS/NZ 1800	Occupational protective helmets - Selection, care and use
AS/NZ 2210	Occupational protective footwear - Guide to selection, care and use