AEBN Workshop:
AEBN Dangerous Goods and Hazardous Substances (Storage and Handling)
for
CSL Ltd

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Presented by

Australian Environment Business Network (AEBN)

www.aebn.com.au

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Ross' specialty is in risk management, in particular, in occupational health and safety, environmental and quality management (OHSEQ). His experience covers such industries as chemical and petrochemical, mining and metals, automotive, manufacturing, timber, pulp and paper, construction, aviation, local government, roads, and the health sectors.

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Agenda

- Hazardous substances and dangerous goods
  - Legal compliance framework
- Safety Data Sheets
- Hazardous Substances
  - Globally Harmonised System
  - GHS Labelling
- Dangerous Goods
  - Terminology
  - Classes
- Packaging
- Storage and segregation
- Placarding

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Why it matters?

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Australia has separate legislation covering

- Dangerous Goods
- Hazardous Substances
- Hazardous Chemicals

Today's focus

- Scheduled Poisons
- Security Sensitive Chemicals
- Pharmaceuticals
- Agricultural Chemicals

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Dangerous Goods vs. Hazardous Substances

- The term “Dangerous Goods” applies to chemicals which present immediate hazards during transport, storage and handling.
- “Hazardous Substances” are classified under GHS based on a wider range of hazards, including harm to people during short and long-term exposure, and harm to the environment.

- Under Commonwealth WHS legislation, what we will refer to as Dangerous Goods are technically “Schedule 11 Hazardous Chemicals”

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Hazardous Substances that are Dangerous Goods

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Hazardous Substances that are not Dangerous Goods

What are Dangerous Goods?

- Substances which constitute a **physical hazard** such as **explosion, fire, toxicity, corrosivity or radioactivity**

and

Which are identified by **Class Labels**

and

Have a **UN Number**

- In most cases they pose a short-term risk

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What are Hazardous Substances?

Can pose both short and long-term risks:

Physical hazards

- Explosion
- Fire
- Poisoning
- Radioactivity
- Corrosion

Health hazards

- Very toxic
- Toxic
- Harmful
- Corrosive
- Irritant

Environmental hazards

- To aquatic life
- To terrestrial vertebrates
- Ozone depleting

- Carcinogenic – cause cancer
- Mutagenic – cell mutation
- Sensitising – allergic reactions
- Teratogenic – birth defects

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White King bleach

- Dilute sodium hypochlorite (“pool chlorine”)
  - Is not a Dangerous Good
- Can cause eye damage and skin irritation
  - Is a Hazardous Substance

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Diesel fuel

- Has a high flashpoint – will not ignite easily
  - Is not a Dangerous Good
- Can cause dermatitis and will irritate the eyes
  - Is a Hazardous Substance

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Rexona deodorant

- Flammable Gas of Class 2.1, UN 1950 (Aerosol)
  - Is a Dangerous Good
  - Is a Hazardous Substance (Physical hazard only)

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Benzene

- Flammable Liquid of Class 3
  - Is a Dangerous Good
- Proven Carcinogenic Material
  - Is a Hazardous Substance (physical and health hazard)

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Regulatory Framework

- CSL is a Comcare self-insurer and hence comes under Commonwealth Work Health & Safety (WHS) laws
  - WHS law is harmonised in all states except Victoria and WA where there are minor differences
- Dangerous Goods storage and handling is covered under “Schedule 11 Hazardous Chemicals” in WHS Regulations
  - Duty holder is “person conducting a business or undertaking” (PCBU)
- In VIC Dangerous Goods is covered in separate legislation
  - Dangerous Goods Act 1985
  - Dangerous Goods (Storage and Handling) Regulations 2012

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Regulation – Commonwealth

- Dangerous Goods
- Road and Rail Transport is state-based
- Storage & handling EXCLUDED

- Hazardous Chemicals
- Work Health and Safety Act 2011 (CTH)
  - Work Health and Safety Regulation 2011 Part 7.1 Hazardous chemicals
  - Division 3 Subdivision 2 Manifest of Schedule 11 hazardous chemicals (equivalent to Dangerous Goods storage & handling)

- National Codes of Practice
  - Managing Risks of Hazardous Chemicals in the Workplace
  - Labelling of Workplace Hazardous Chemicals
  - Preparation of Safety Data Sheets for Hazardous Chemicals

National Legislation Cross-Reference

Location	Hazardous Substances / GHS	Dangerous Goods Storage & Handling	Dangerous Goods Transport
Common-wealth	Work Health and Safety Regulation 2011	Work Health and Safety Regulation 2011	National Transport Commission (Road Transport Legislation – Dangerous Goods Act) Regulations 2006
ACT	Work Health and Safety Regulation 2011	Work Health and Safety Regulation 2011	Dangerous Goods (Road Transport) Regulation 2010
NSW	Work Health and Safety Regulation 2017	Work Health and Safety Regulation 2017	Dangerous Goods (Road and Rail Transport) Regulation 2009
NT	Work Health and Safety (National Uniform Legislation) Regulations 2011	Work Health and Safety (National Uniform Legislation) Regulations 2011	Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Regulations
QLD	Work Health and Safety Regulation 2011	Work Health and Safety Regulation 2011	Transport Operations (Road Use Management—Dangerous Goods) Regulation 2008
SA	Work Health and Safety Regulation 2012	Work Health and Safety Regulation 2012 Dangerous Substances (General) Regulations 2017	Dangerous Substances (Dangerous Goods Transport) Regulations 2008
TAS	Work Health and Safety Regulation 2012	Work Health and Safety Regulation 2012	Dangerous Goods (Road and Rail Transport) Regulations 2010
VIC	Occupational Health and Safety Regulations 2017	Dangerous Goods (Storage and Handling) Regulations 2012	Dangerous Goods (Transport by Road or Rail) Regulations 2018
WA	Occupational Safety and Health Regulations 1996	Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007	Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007
New Zealand	Health and Safety at Work (Hazardous Substances) Regulations 2017	Health and Safety at Work (Hazardous Substances) Regulations 2017	Land Transport Rule: Dangerous Goods 2005

Hazardous Substances

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Globally Harmonised System of classification and labelling of chemicals (GHS)

- A substance is deemed to be hazardous if it meets criteria specified in the GHS
- The GHS is an international system developed by United Nations Economic Commission for Europe (UNECE)
  - Australia adopted GHS 3rd Edition (2009) from 2012
  - 7th Edition mandatory from 1 January 2023

GHS classifies chemicals according to:

- Physical hazards
  - 9 classes, aligned to the dangerous goods classes
- Environmental hazards
  - Acute aquatic toxicity
  - Chronic aquatic toxicity
- Health hazards
  - Acute toxicity
  - Skin corrosion
  - Skin irritation
- Health hazards (cont.)
  - Serious eye damage
  - Eye irritation
  - Respiratory sensitizer
  - Skin sensitizer
  - Germ cell mutagenicity
  - Carcinogenicity
  - Reproductive toxicity
  - Specific target organ toxicity (STOT)
  - Aspiration hazard

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Identifying hazards of chemicals

- Section 2 of the SDS
- Identifies hazardous substance chemical by:
  - Pictograms (similar to DG diamonds)
  - Signal Word – “WARNING” or “DANGER”
  - Hazard and Precaution statements
    - (Replace Risk and Safety Phrases)

GHS Pictograms

- The GHS uses 9 pictograms to convey the hazards of chemicals

Exploding bomb
Explosives

Flame
Flammables

Flame over circle
Oxidisers

Gas cylinder
Gases under pressure

Corrosion
Corrosives

Skull and crossbones
Acute toxicity

Environment
Environmental hazard

Exclamation mark
Harmful/irritant
Harmful to ozone layer

Health hazard
Severe health hazards

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Safety Data Sheets (SDS)

- A **Safety Data Sheet** (SDS) is a technical bulletin containing detailed information about a hazardous substance.
  - Formerly known as a **Material** Safety Data Sheet (MSDS)
- Must be in the 16-section approved format
- The hazard identification for the substance must be determined in accordance with the GHS.

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16 Header SDS – Sections

- Section 1 Identification of the material and supplier
- Section 2 Hazards identification
- Section 3 Composition / information on ingredients
- Section 4 First aid measures
- Section 5 Fire fighting measures

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16 Header SDS – Sections *(Cont.)*

- Section 6 Accidental release measures
- Section 7 Handling and Storage
- Section 8 Exposure Control / Personal Protection
- Section 9 Physical and chemical properties
- Section 10 Stability and reactivity

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16 Header SDS – Sections *(Cont.)*

- Section 11 Toxicological information
- Section 12 Ecological information
- Section 13 Disposal considerations
- Section 14 Transport information
- Section 15 Regulatory information
- Section 16 Other information

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SAFETY DATA SHEET

SECTION 1 IDENTIFICATION: PRODUCT IDENTIFIER AND CHEMICAL IDENTITY

Product Identifier	**METHYLATED SPIRITS**
Other Names	Ethanol, Ethyl Alcohol, IMS
Manufacturer's Product Code	15000
Recommended Use	Solvent, Fuel, Cleaning Solvent

Details of Supplier/Manufacturer

Company:	Recochem Inc. ABN: 69 010 485 999
Address:	1809 Lytton Road, Lytton, Queensland 4178
Phone:	(07) 3308 5200 Fax: (07) 3308 5201
Website:	www.recochem.com.au

Emergency Telephone Numbers

Business Hours:	(07) 3308 5200
After Hours:	1300 131 001
Poisons Information:	Australia: 13 11 26 New Zealand: 0800 764 766

SECTION 2 HAZARDS IDENTIFICATION

Hazardous chemical	*according to classification by Safe Work Australia*
Dangerous goods	*according to the Australian Code for the Transport of Dangerous Goods by Road and Rail*

Signal Word	**DANGER**

GHS Classification	Pictogram	Hazard statement
Flammable Liquids, Category 2	 FLAME	H225 Highly flammable liquid and vapour
Serious Eye Damage/Irritation, Category 2A	 EXCLAMATION MARK	H319 Causes serious eye irritation

Precautionary statements:

GENERAL	
P101	If medical advice is needed, have product container or label at hand
P102	Keep out of reach of children
P103	Read label before use
PREVENTATIVE	
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P233	Keep container tightly closed
P240	Ground/bond container and receiving equipment
P241	Use explosion-proof electrical/ventilation/lighting equipment
P242	Use only non-sparking tools
P243	Take precautionary measures against static discharge
P264	Wash thoroughly after handling
P280	Wear protective gloves/eye protection/face protection
RESPONSE	
P303 + P361 + P353	IF ON SKIN (or hair): Take off contaminated clothing and wash before reuse. Rinse skin with water/shower
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313	If eye irritation persists: Get medical advice/attention
P370 + P378	In case of fire: Use foam/water spray/fog for extinction
STORAGE	
P403 + P235	Store in a well-ventilated place. Keep cool
DISPOSAL	
P501	Dispose of contents/container in accordance with local regulations

SECTION 3 COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredients Names and Proportions

Chemical Entity	CAS Number	Proportion (%)
Ethanol	64-17-5	>= 95
Demin. Water	7732-18-5	<= 5
The following materials make up the denaturant of the fluid. They are not present in high enough concentrations to trigger any additional hazards.		
Denatonium Benzoate	3734-33-6	< 0.001
Methyl Isobutyl Ketone	108-10-1	0.25
Fluorescein	-	< 0.001

SECTION 4 FIRST AID MEASURES

Description of necessary first aid measures

Inhalation:	Remove victim from exposure if safe to do so. If rapid recovery does not occur, transport to nearest medical facility for additional treatment. Remove contaminated clothing.
Skin Contact:	If skin contact occurs, remove contaminated clothing and wash skin thoroughly with water and follow by washing with soap if available.
Eye Contact:	If in eyes, hold eyes open, flood with water for at least 15 minutes. If symptoms persist transport to nearest medical facility for additional treatment.
Ingestion:	If swallowed, do NOT induce vomiting. Transport to nearest medical facility for additional treatment.

Safety Data Sheet Exercise

1. What is the issue date of the SDS?
2. What is the Product Name and name of the supplier?
   - Section 1
3. Is the material Hazardous? If yes, write down one (1) Hazard Statement.
   - Section 2
4. Is it a Dangerous Good? If so, what is the UN Number and Proper Shipping Name?
   - Section 14
5. Which section describes physical and chemical properties of the material? Write down two (2) of its physical or chemical properties.

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Dangerous Goods

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ADG Code

- Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)
- Mainly intended for transport, but applies to manufacture and storage in relation to classification, labelling and packaging.
- Maintained by the National Transport Commission (NTC).
  - Updated 2-yearly based on UN Recommendations for the Transport of Dangerous Goods.
  - Currently ADG7.7 (based on UN 21st Edition, UN21) or ADG7.8 (based on UN22) can be used.
  - ADG7.8 will be mandatory from 1 April 2023.

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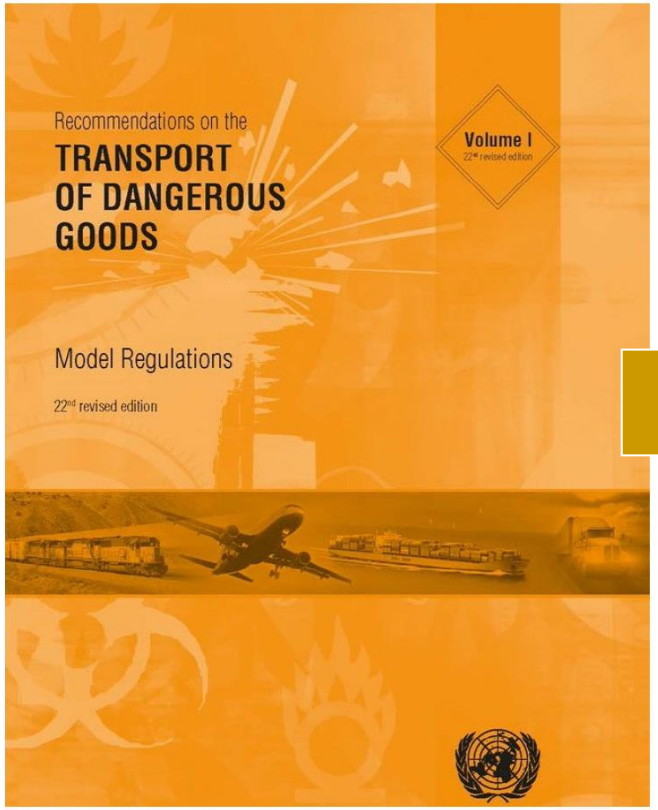

Australian Code for the Transport of Dangerous Goods by Road & Rail

Edition 7.8, 2022

Electronic version www.ntc.gov.au

National Transport Commission

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Classification of Dangerous Goods

- CLASS
  - DIVISION
- SUBSIDIARY HAZARD
- PACKING GROUP
- UN NUMBER
- PROPER SHIPPING NAME

DG Class, Division & Subsidiary Hazard

- CLASS means the Class of Dangerous Goods as shown in the ADG Code
- Within the Classes, there are DIVISIONS
- Substances can be classified within 2 or more Classes, with secondary Class(es) referred to as SUBSIDIARY HAZARDS

Class 1: Explosives

Some Explosive Articles

Ammunition	Flash Powder	Smokeless Powder	Sounding Devices
Black Powder	Fuse	Primer	Torpedoes
Bombs	Fuse (Ammo)	Projectiles	Warheads
Charges	Igniters	Propellants	
Fireworks	Mines	Rocket Motors	
Flares	Powder cake	Signals	

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Division 2.1 Flammable Gases

- Gases which ignite on contact with a source of ignition, however:
- They only ignite in a certain range of concentrations with air
- Above the upper limit – too rich to burn
- Below the lower limit – too lean to burn
- Heavier-than-air gas leaks may flow and accumulate in low points
  - e.g. propane, butane (LPG)

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Division 2.2 Non-Flammable Non-Toxic Gases

- Not Flammable when exposed to a source of ignition
- Not Toxic, but can cause death by asphyxiation
- Most are heavier than air, many 6 or 7 times heavier
- Some are stored in cryogenic form, i.e. below minus 150^{O}C
- Oxygen has sub-hazard 5.1

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Oxidising Gas

- Division 2.5
- This class diamond can be used for road and rail transport in Australia in place of class 2.2 and sub-hazard 5.1
- It is not used internationally and cannot be used for sea freight (IMDG)

- Examples:
  - Oxygen gas
  - Nitrous oxide

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Division 2.3 – Toxic Gas

Most toxic gases are heavier than air and many have a subsidiary hazard

- Ammonia, Anhydrous Sub-Hazard 8
- Arsine SH 2.1
- Bromine Chloride SH 5.1 & 8
- Chlorine SH 5.1 & 8

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Class 3: Flammable Liquids

- The UN defines a flammable liquid as:
  - Any liquid having a flash point not more than 60^{o} C
- A C1 combustible liquid has a flash point above 60^{o} C and below 93^{o} C

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Class 4: Flammable Solids

Class 4 includes 3 Divisions with different diamonds:

- 4.1 Flammable solids
- 4.2 Spontaneously combustible
- 4.3 Dangerous when wet

Division 4.1 Flammable Solids

- Can be easily ignited by flames, sparks etc and are readily combustible
- Danger may also come from toxic combustion products

Examples:
sulphur
red phosphorus
magnesium
matches
firelighters

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Division 4.2 - Spontaneously Combustible

Can burst into flames without an external source of ignition being applied

Two types:

1. Pyrophoric materials
2. Self-heating materials

Examples:

- White phosphorous (kept under water)
- Activated carbon
- Iron swarf

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Division 4.3 - Substances which in contact with water emit flammable gases

When they react with water, these substances are liable to become spontaneously flammable due to the heat liberated by the reaction.

Examples:

- sodium (gives off hydrogen)
- calcium carbide (gives off acetylene)

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Division 5.1 – Oxidizing Agents

Not necessarily combustible but can liberate oxygen and therefore increase ferocity of a fire

Examples:

- Sodium Nitrate
- Hydrogen Peroxide

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Division 5.2 – Organic Peroxides

Can react with organic materials to cause fire

Example:

– Epoxy adhesive hardener, MEKP (Methyl Ethyl Ketone Peroxide)

This DG Class Diamond is no longer used (discontinued as of 2011)

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Division 6.1 - Toxic Substances

Liable to cause death or serious injury or be harmful to health if swallowed, inhaled or by skin contact

Examples:

- Sodium cyanide
- N,N-dimethylaniline
- Alkaloids, solid, N.O.S.
- Trichlorethylene
- Methylene chloride

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Division 6.2 Infectious Substances

An infectious substance is a viable microorganism or its toxin that causes or can cause disease in humans or animals.

Potentially infectious substances include:

- Blood and blood products
- Skin, tissue, cell cultures
- Pathogens
  –(viruses, bacteria, parasites, etc.)

This placard is used for transport but is not required for storage areas.

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Class 7: Radioactive Materials

Radioactive White-I, Yellow-II, and Yellow-III alerts emergency response workers to increasing radioactivity.

White-I is the least radioactive and Yellow-III is the most radioactive.

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Class 8 - Corrosives

A corrosive material is either of the following:

1. Liquid or solid that causes visible destruction or irreversible alterations in skin tissue at the site of contact.

2. Liquid that has a severe corrosion rate on steel or aluminum, as measured in accordance with certain prescribed UN testing procedures.

Examples:

- Solids sodium hydroxide pellets
- Liquids hydrochloric acid

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Class 8 - Corrosives

Most corrosives are either Acidic or Alkaline

- Acids – pH LESS THAN 7
  - Hydrochloric
  - Sulphuric
- Alkalis – pH GREATER THAN 7
  - Sodium hydroxide
  - Potassium hydroxide

- Class 8 Acids and Alkalis must be segregated
  - Check pH in the SDS: SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

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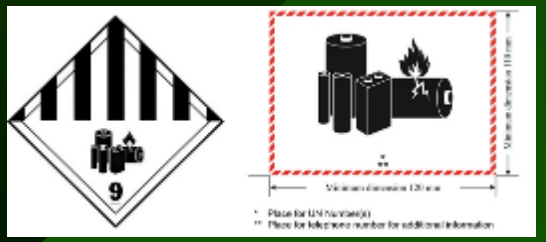
Class 9: Miscellaneous Hazardous Materials

- The UN defines a miscellaneous hazardous material as a material that presents a hazard during transportation but is not included in any other hazard class.
- It includes materials having anaesthetic or noxious properties, elevated-temperature substances, hazardous wastes and marine pollutants, dry ice, magnetized materials, and lithium batteries.
- Examples
  - Hot bitumen (elevated temperature liquid)
  - Lithium batteries (risk of fire if damaged)



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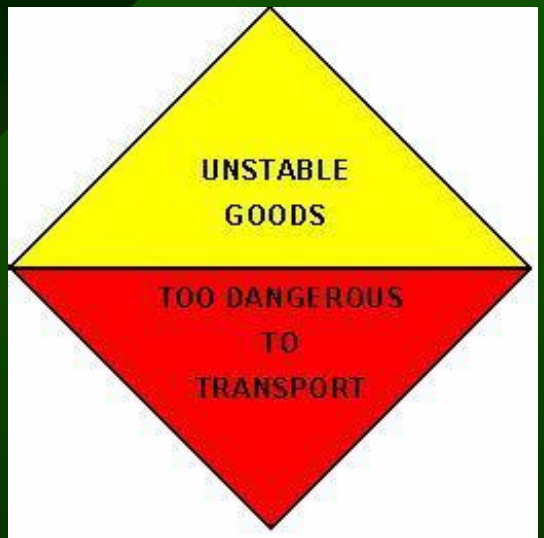
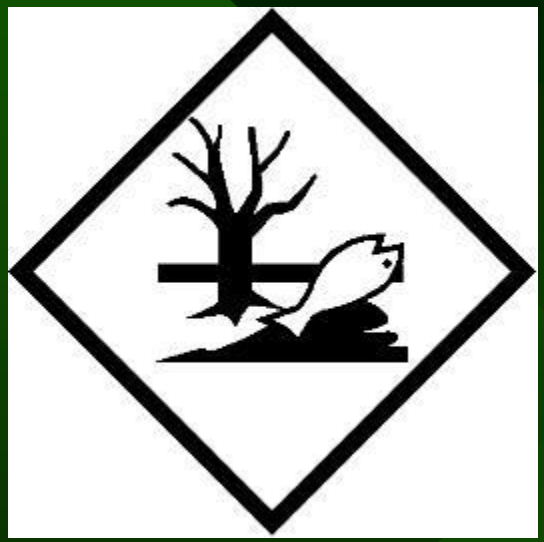
Other Dangerous Goods Diamonds

Multi Class diamond – used for transport



Goods too dangerous to be transported



Environmentally Hazardous mark

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Subsidiary Hazard

- A secondary hazard (or risk) that meets the UN criteria
- e.g. Hydrogen peroxide
  - Class 5.1
  - Subsidiary hazard 8

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Packing Group

- Packing Group I
  - Great Danger
- Packing Group II
  - Medium Danger
- Packing Group III
  - Minor Danger

- Used for packing purposes, to classify common DGs
- Not used for explosives, gases, radioactives, organic peroxides, infectious substances and some class 4 substances

DG Packing Group vs. GHS Category

- GHS refers to “Categories” which are aligned to DG Packing Groups
  - e.g. DG Class 3 Flammable Liquids

DG PG	GHS Category	Criteria	Hazard Statement
I	1	Flash point < 23°C and initial boiling point ≤ 35°C	H224 Extremely flammable liquid and vapour
II	2	Flash point < 23°C and initial boiling point >35°C	H225 Highly flammable liquid and vapour
III	3	Flash point ≥ 23°C and ≤ 60°C	H226 Flammable liquid and vapour
	4	Flash point > 60°C and ≤ 93°C	H227 Combustible liquid

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SUSMP (Poisons Schedule)

Standard for the Uniform Scheduling of Medicines and Poisons

Schedule	Description
Schedule 2.	Pharmacy Medicine
Schedule 3.	Pharmacist Only Medicine
Schedule 4.	Prescription Only Medicine, or Prescription Animal Remedy
Schedule 5.	**Caution**
Schedule 6.	**Poison**
Schedule 7.	**Dangerous Poison**
Schedule 8.	Controlled Drug
Schedule 9.	Prohibited Substance
Schedule 10	Substances of such danger to health as to warrant prohibition of sale, supply and use

A Health Department Poisons License may be required to manufacture, store, supply or use certain Schedule 7 poisons

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UN Number

- Internationally recognized 4-digit number – mainly used in transport.
- Maybe specific to a chemical, or generic to a class – e.g.
  - UN 1114 BENZENE
  - UN 1950 AEROSOLS
  - UN 2921 CORROSIVE SOLID, FLAMMABLE, N.O.S. (*Not Otherwise Specified*)
  - UN 3480 LITHIUM ION BATTERIES (including lithium ion polymer batteries)

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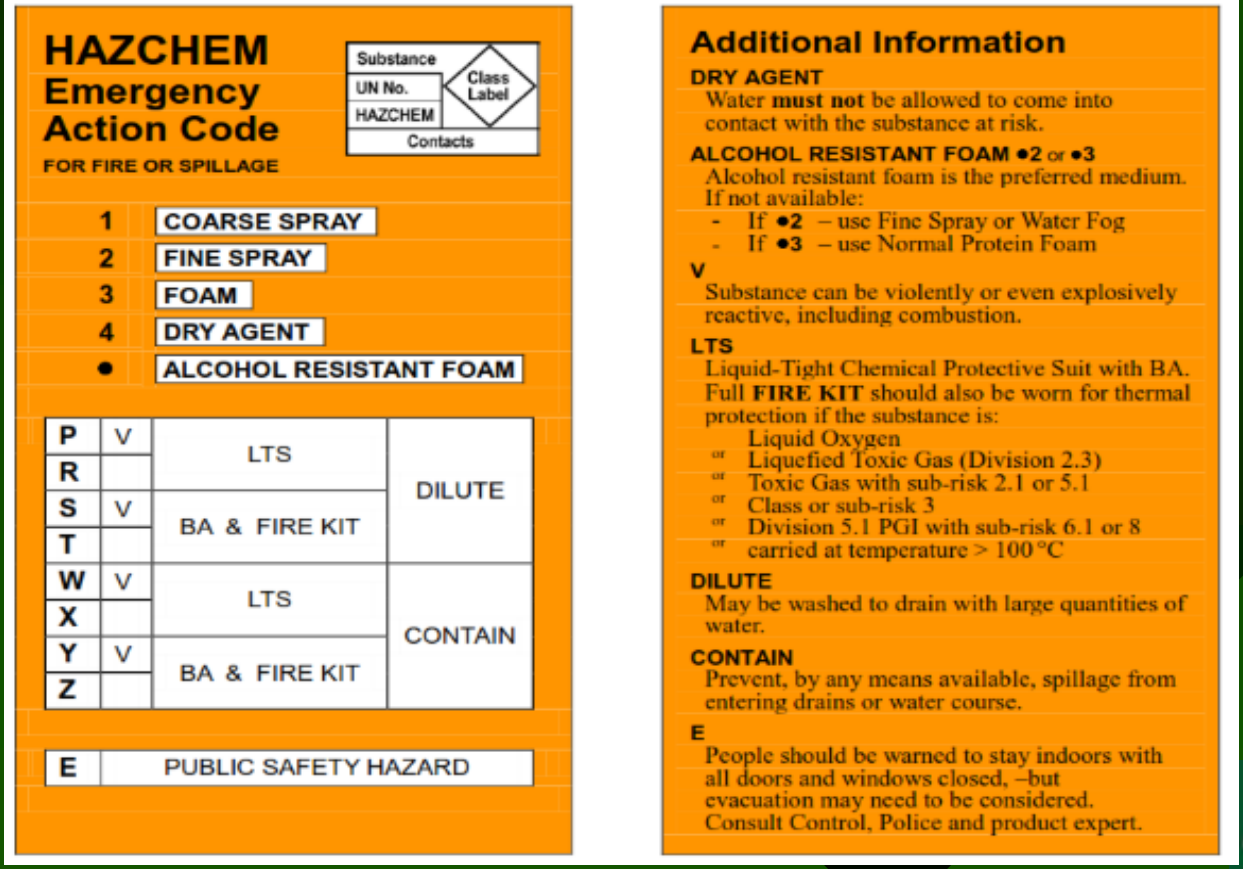
Fire Risk Dangerous Goods

- Goods which burn readily or support combustion
- Classes 2.1, 3, 4 or 5, or products with a 2.1, 3, 4 or 5 sub-hazard

HAZCHEM Code

- Hazchem Emergency Action Code (EAC) is a 2- or 3-character code which gives fire fighters information in an emergency.
  - See Appendix C of the ADG



HAZCHEM
Emergency Action Code
FOR FIRE OR SPILLAGE

Substance
UN No.
HAZCHEM
Class Label
Contacts

1	COARSE SPRAY
2	FINE SPRAY
3	FOAM
4	DRY AGENT
•	ALCOHOL RESISTANT FOAM

P	V	LTS	DILUTE
R			
S	V	BA & FIRE KIT	
T			
W	V	LTS	CONTAIN
X			
Y	V	BA & FIRE KIT	
Z			

E	PUBLIC SAFETY HAZARD

Additional Information

DRY AGENT
Water **must not** be allowed to come into contact with the substance at risk.

ALCOHOL RESISTANT FOAM •2 or **•3**
Alcohol resistant foam is the preferred medium. If not available:
- If **•2** – use Fine Spray or Water Fog
- If **•3** – use Normal Protein Foam

V
Substance can be violently or even explosively reactive, including combustion.

LTS
Liquid-Tight Chemical Protective Suit with BA. Full **FIRE KIT** should also be worn for thermal protection if the substance is:
- Liquid Oxygen
- or Liquefied Toxic Gas (Division 2.3)
- or Toxic Gas with sub-risk 2.1 or 5.1
- or Class or sub-risk 3
- or Division 5.1 PGI with sub-risk 6.1 or 8
- or carried at temperature > 100 °C

DILUTE
May be washed to drain with large quantities of water.

CONTAIN
Prevent, by any means available, spillage from entering drains or water course.

E
People should be warned to stay indoors with all doors and windows closed, –but evacuation may need to be considered. Consult Control, Police and product expert.

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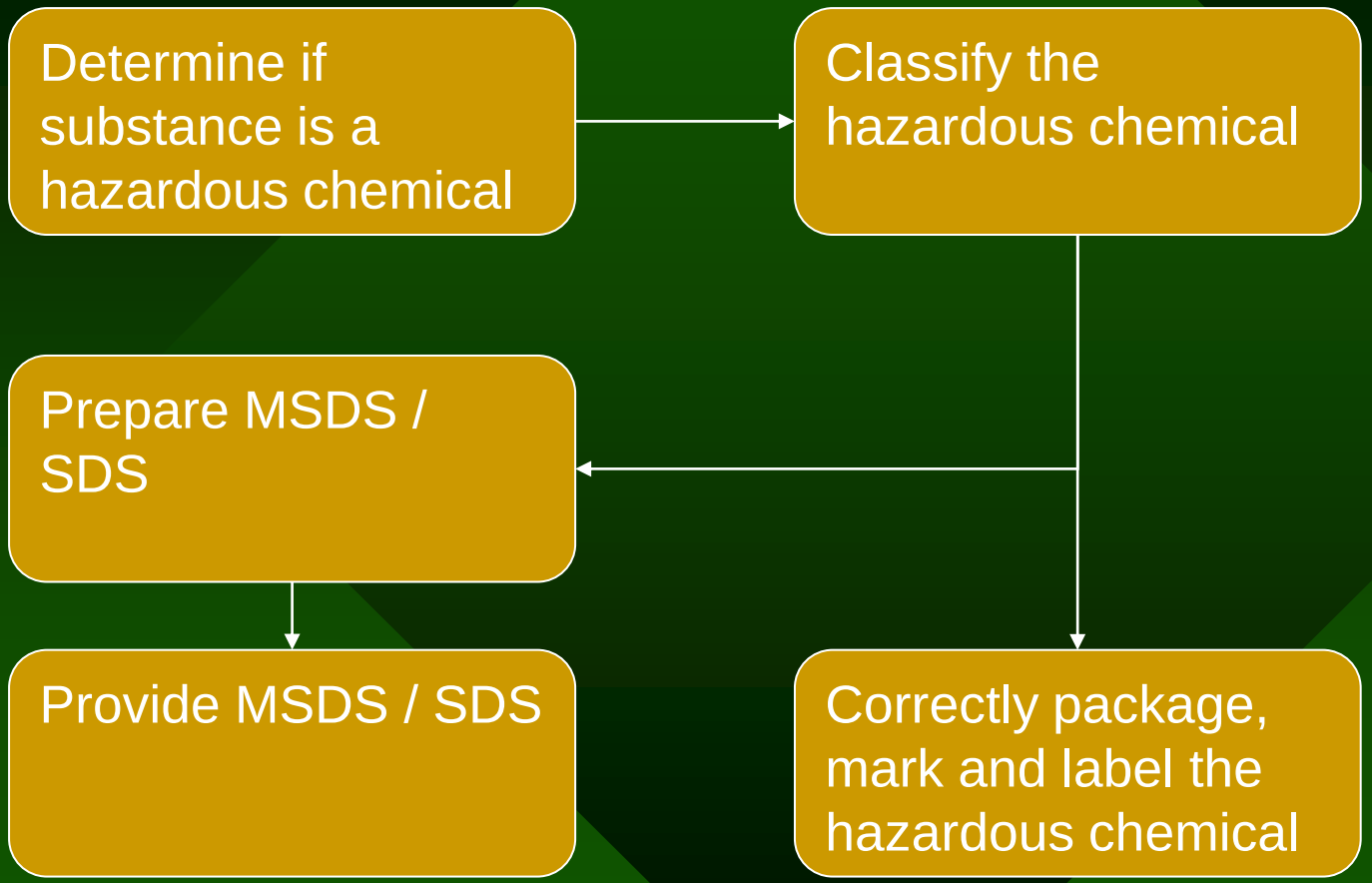
Schedule 11 Hazardous Chemicals (Dangerous Goods) in the Workplace

- Under CTH WHS Regulations 2011

- Similar obligations apply under VIC DG (Storage & Handling) Regs 2022 – ref. Code of practice for the storage and handling of dangerous goods 2013

Duties of manufacturer or importer of a substance



Duties of PCBU at a workplace

- Consultation
- Induction & training
- Obtain SDSs
- Hazardous Chemical Register
- Safety signage / placarding
- Packaging & marking
- Hazard identification & risk control
- Stability
- Isolation / Segregation
- Bunding
- Transfer
- Ignition sources
- Security
- Emergency planning / Incident response
- Fire protection

Hazardous Chemicals Register

- A Hazardous Chemicals Register is simply a list of the product names of all Hazardous Chemicals in the workplace, accompanied by the current SDS
  - CSL uses Chem-Alert for this

Hazardous Chemicals Register – example

Supplier	Product	Issue Date	Expiry Date	Eye Hazard	Skin Hazard	Inhalation	Ingestion	DG Class
BOC Gases	Argoshield Light	19/08/2021	19/08/2026	No	No	No	No	**2.2 Non-Flammable Non-Toxic Gas**
BOC Gases	Oxygen, Compressed	19/08/2021	19/08/2026	No	No	No	No	**2.2 Non-Flammable Non-Toxic Gas**
bp	Automotive Diesel Fuel	8/06/2019	7/06/2024	**Yes**	**Yes**	**Yes**	**Yes**	**Combustible Liquid**
bp	Regular Unleaded Petrol	26/05/2021	26/05/2026	**Yes**	**Yes**	**Yes**	**Yes**	**3 Flammable Liquid**
Castrol	Activ 2T	15/12/2022	15/12/2027	No	No	No	No	**Combustible Liquid**
Castrol	GTX 20W-5	10/03/2023	9/03/2028	No	No	No	No	No
Castrol	Hyspin AWS 68	3/03/2023	2/03/2028	No	No	No	No	No
Castrol	Spheerol EPL 2 Grease	21/01/2021	21/01/2026	No	No	No	No	No

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Threshold Quantities

- Two thresholds are defined in Schedule 11 of the WHS Regulations
  - Placarding Quantity
  - Manifest Quantity

WHS Regs Schedule 11 (extract)

Schedule 11—Placard and manifest quantities

(regulations 347 to 350, 361, 390 and 391)

10		Category 4	10 000 L	10 0000 L
11	Self-reactive substances	Type A	5 kg or 5 L	50 kg or 50 L
12		Type B	50 kg or 50 L	500 kg or 500 L
13		Type C to F	250 kg or 250 L	2 500 kg or 2 500 L
14	Flammable solids	Category 1	250 kg	2 500 kg
15		Category 2	1 000 kg	10 000 kg
16		Any combination of chemicals from Items 12 to 15 where none of the items exceeds the quantities in columns 4 or 5 on their own	1 000 kg or 1 000 L	10 000 kg or 10 000 L
17	Pyrophoric liquids and pyrophoric solids	Category 1	50 kg or 50 L	500 kg or 500 L
18	Self-heating substances and mixtures	Category 1	250 kg or 250 L	2 500 kg or 2 500 L

Source: Commonwealth Work Health and Safety Regulations 2011, Schedule 11

Threshold Quantities (Victoria)

- VIC DG (Storage and Handling) Regulations define 3 thresholds
  - Placarding Quantity
  - Manifest Quantity
  - Fire Protection Quantity
- The quantities are in Schedule 2 and differ slightly from WHS Regulations

Schedule 2 (extract)

Dangerous Goods (Storage and Handling) Regulations 2022
S.R. No. 115/2022

Schedule 2—Quantities of dangerous goods

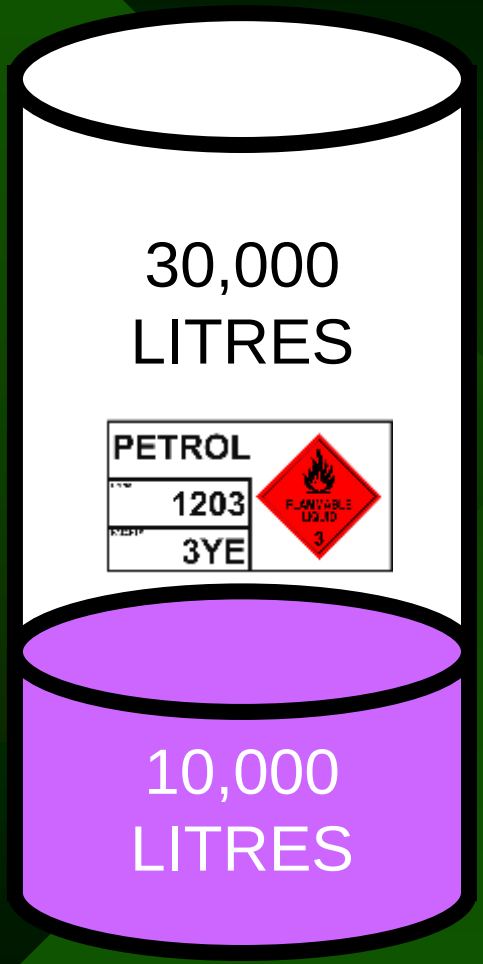
Column 1	*Column 2*	*Column 3*	*Column 4*	*Column 5*	*Column 6*
Item	*Description of Dangerous Goods*	*Packing Group*	*Placarding Quantity*	*Manifest Quantity*	*Fire Protection Quantity*
		II	250 kg or L	2500 kg or L	10 000 kg or L
		III	1000 kg or L	10 000 kg or L	20 000 kg or L
		Mixed Packing Groups in a single UN Class with the quantity of each Packing Group below the specified quantity for the Packing Group.	1000 kg or L	10 000 kg or L	20 000 kg or L

Source: Victorian Dangerous Goods (Storage and Handling) Regulations 2022, Schedule 2

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Quantity Measurement Bulk

- Non liquid – the mass (kgs) the container is designed to hold
- Liquid – the design capacity of the container in litres
  - In example: 30,000 litres
- Gas – total capacity of the container
- Solids not in container – undivided mass in kgs
  - e.g. a stockpile



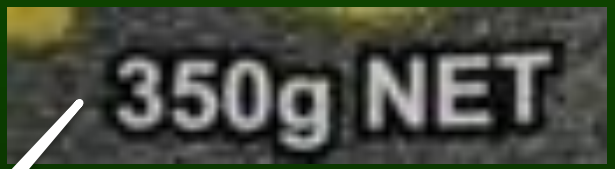
AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Quantity Measurement Packaged

- Non-liquid – net mass (kgs) in container
- Liquid – net capacity of the container in litres
- Gas – Total capacity (volume) of the container in litres

Quantity Measurement - Articles

- The net quantity of that part of the article that is Dangerous Goods



12 x 350 g
= 4,200 g
= 4.2 Kg

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Minor Quantities

Quantities less than the placarding quantity

- Note: There may be several minor quantity stores on a site.
- The total quantity in all stores should be added together to determine the threshold quantity for the site.

Minor Storage

- Ensure containers are properly labeled
- Maintain a Register and SDSs
- Provide suitable PPE
- Ensure adequate segregation
- Ensure suitable spill management
- Provide training
- Provide security
- Manage waste disposal

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Placard Quantities

- Placard site and storage facilities
- Identify hazards
- Perform risk assessment
- Take risk control measures
  - Storage and handling
  - Transfer
  - Segregation
  - Ignition sources
  - Spill control
  - Ventilation

Placarding for Storage

- There are four ‘types’ of placard under the Dangerous Good Regulations – these are:
  - Outer warning placards
  - Information placards for stated Dangerous Goods in tanks
  - Information placards for stated Dangerous Goods in Packages; and
  - Information placards for stated combustible liquids in tanks or packages

Outer Warning Placard

120 mm

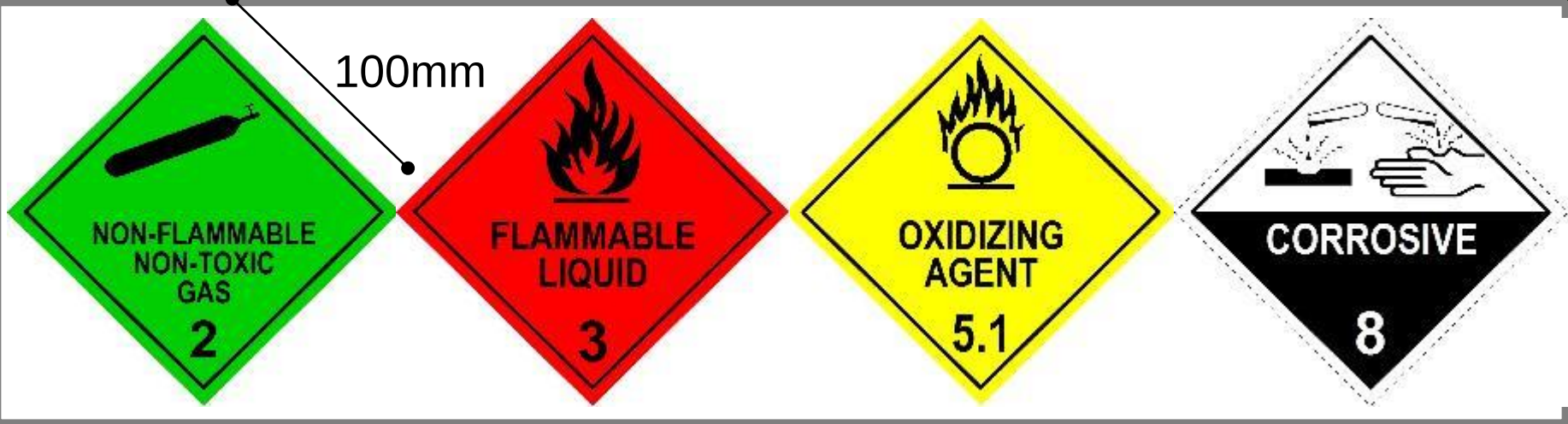
HAZCHEM

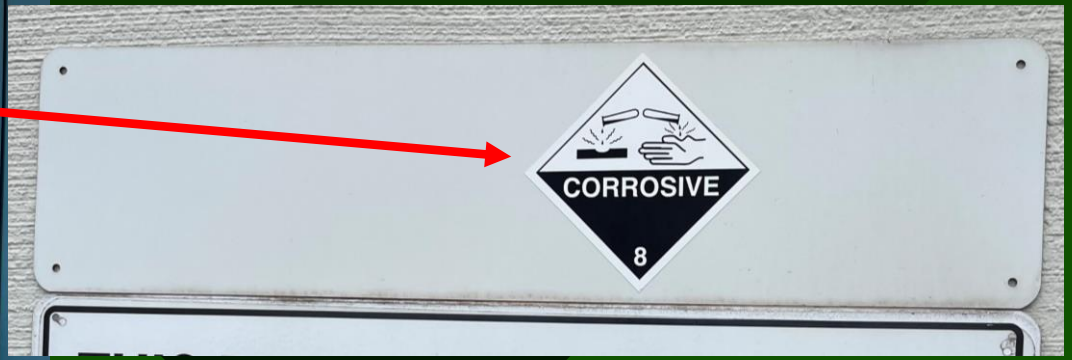
100 mm Lettering

600 mm

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

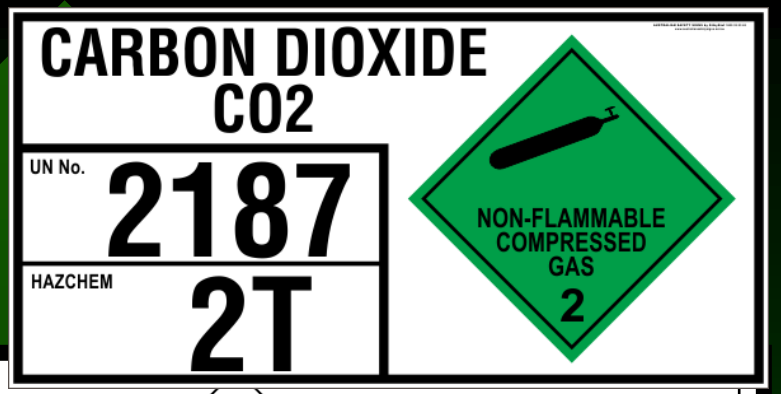
Package Store Placard





AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Bulk Tank Placard



AMMONIA, 50 mm

ANHYDROUS 50 mm

UN No.

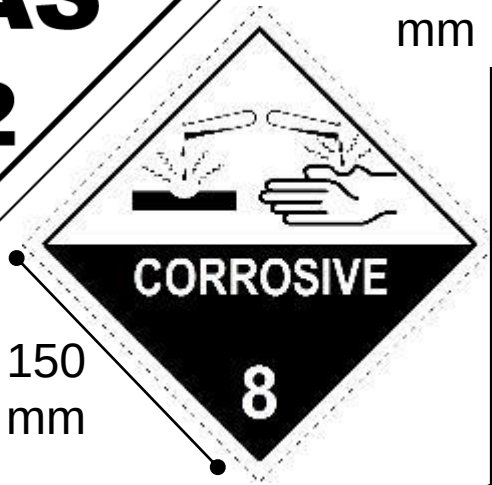
100 mm **1005**

HAZCHEM

100 mm **2RE**

200 mm

400 mm



150 mm

800 mm

Combustible Liquid Placard

(GHS: Flammable Liquid Category 4)

COMBUSTIBLE LIQUID

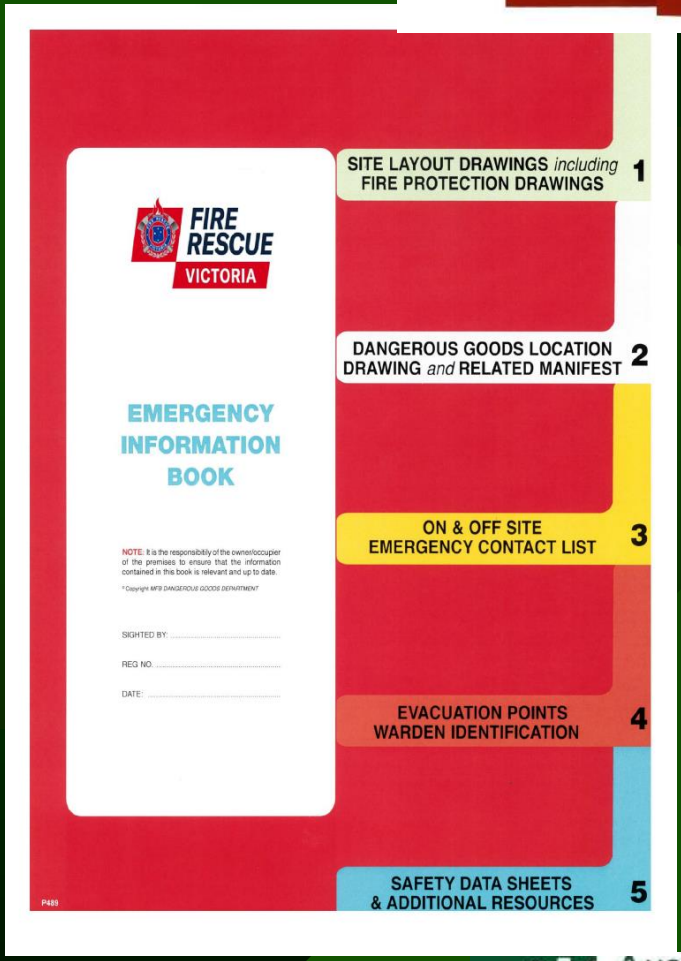
100 mm Lettering

- Placard quantity is 10,000 litres
- Applies to diesel fuel storage (above-ground only)

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

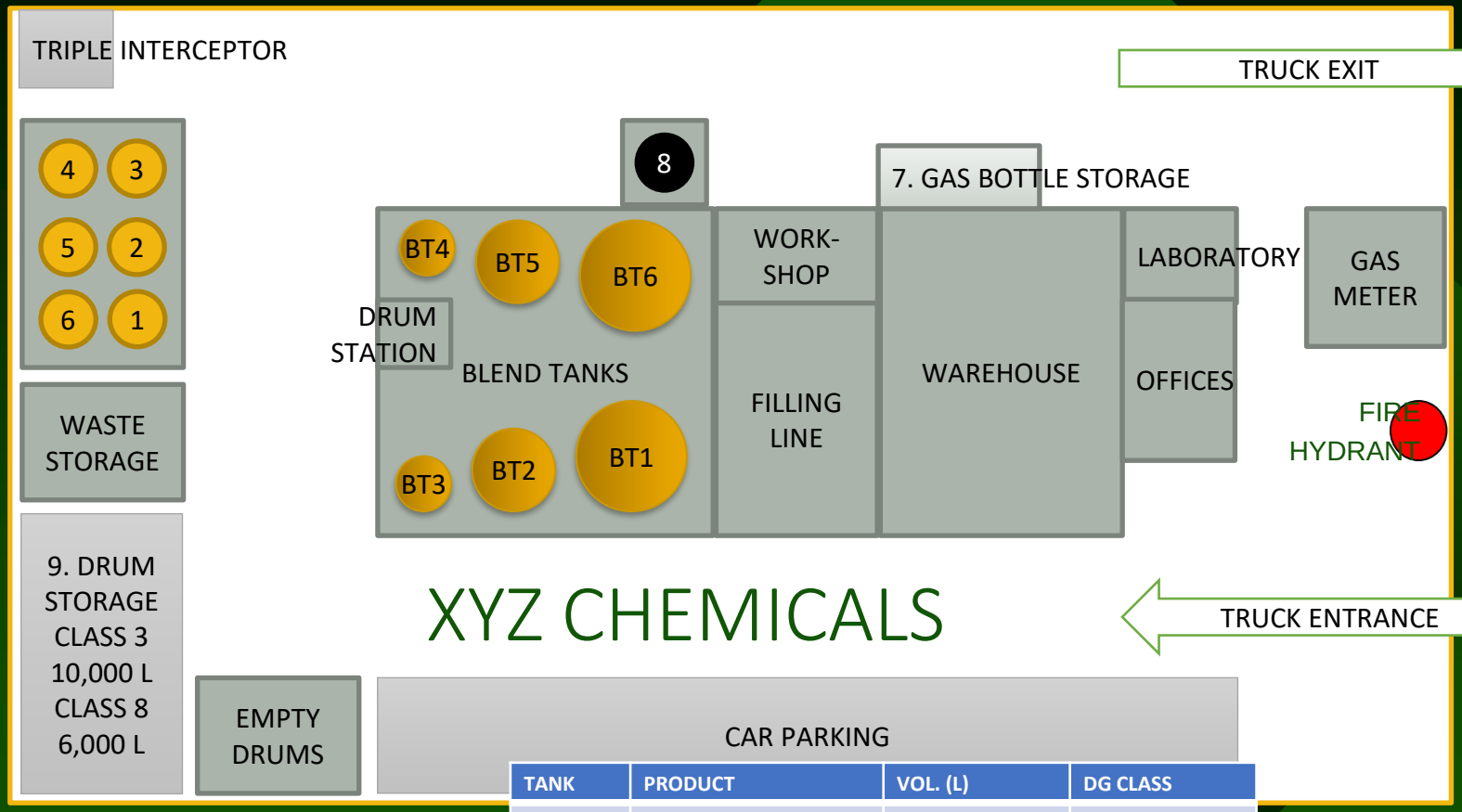
Manifest Quantity

- Notify Comcare
  - Update if significant changes
- Prepare Manifest
  - Shows location of storage facilities and quantities in each store
- Keep the manifest in a readily accessible place
  - Determined in agreement with the primary emergency service organsation



AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Dangerous Goods Manifest



TANK	PRODUCT	VOL. (L)	DG CLASS
1	MEK	10,000	3, PG II
2	WHITE SPIRIT	20,000	3, PG III
3	WASTE OIL	20,000	C2
4	HEATING OIL	30,000	C1
5	BASE OIL 150	55,000	C2
6	BASE OIL 460	55,000	C2`
8	CAUSTIC SODA	5,000	8, PG II

Fire Protection Quantity (Victoria Only)

- Obtain written report from Fire Brigade re adequacy of fire protection services

Segregation

- Segregation of chemicals in a warehouse, is of critical importance to the manager and the operator.
  - Principally achieved by Class
- Sub-hazards must also be considered when determining segregation

- **Some interactions can be violent.**
  Nitric Acid (Class 8 - Corrosive/Class 5.1 Oxidising Agent) + Ethanol (Class 3 - Flammable Liquid)
  will lead to an *explosion* with the liberation of fumes of nitrous oxide, acetaldehyde and formaldehyde.

- **Some interactions can liberate very poisonous gases.**
  Hydrochloric Acid (Class 8 - Corrosive) +
  Sodium Cyanide (Class 6.1 - Poison)
  will liberate extremely poisonous Hydrogen Cyanide.

- **Some interactions can liberate heat and acid fumes.**
  Sulphuric Acid (Class 8 - Corrosive) +
  Sodium Hydroxide (Class 8 - Corrosive)
  will liberate much heat and fumes.

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Segregation

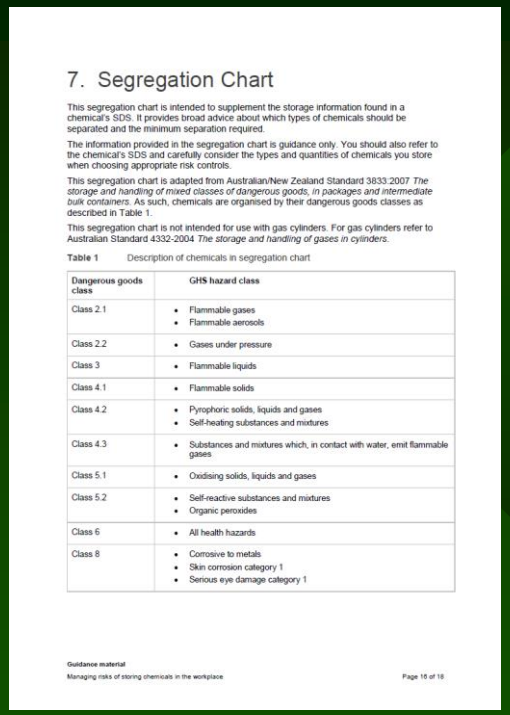
- Flammables
- Oxidisers

- Corrosives – Acids
- Corrosives – Alkalis

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Segregation

- See Safe Work Australia Guide: Managing risks of storing chemicals in the workplace, Part 7. Segregation Chart



7. Segregation Chart

This segregation chart is intended to supplement the storage information found in a chemical's SDS. It provides broad advice about which types of chemicals should be separated and the minimum separation required.

The information provided in the segregation chart is guidance only. You should also refer to the chemical's SDS and carefully consider the types and quantities of chemicals you store when choosing appropriate risk controls.

This segregation chart is adapted from Australian/New Zealand Standard 3833:2007 *The storage and handling of mixed classes of dangerous goods, in packages and intermediate bulk containers*. As such, chemicals are organised by their dangerous goods classes as described in Table 1.

This segregation chart is not intended for use with gas cylinders. For gas cylinders refer to Australian Standard 4332-2004 *The storage and handling of gases in cylinders*.

Table 1 Description of chemicals in segregation chart

Dangerous goods class	GHS hazard class
Class 2.1	• Flammable gases • Flammable aerosols
Class 2.2	• Gases under pressure
Class 3	• Flammable liquids
Class 4.1	• Flammable solids
Class 4.2	• Pyrophoric solids, liquids and gases • Self-heating substances and mixtures
Class 4.3	• Substances and mixtures which, in contact with water, emit flammable gases
Class 5.1	• Oxidising solids, liquids and gases
Class 5.2	• Self-reactive substances and mixtures • Organic peroxides
Class 6	• All health hazards
Class 8	• Corrosive to metals • Skin corrosion category 1 • Serious eye damage category 1

Guidance material
Managing risks of storing chemicals in the workplace Page 16 of 18

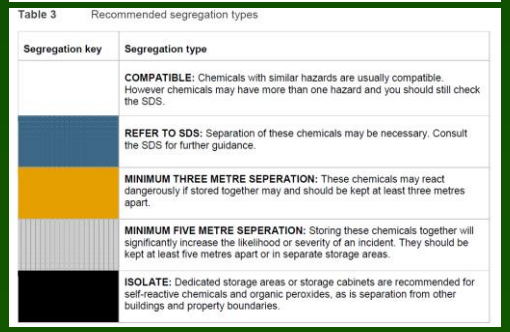


Table 3 Recommended segregation types

Segregation key	Segregation type
	COMPATIBLE: Chemicals with similar hazards are usually compatible. However chemicals may have more than one hazard and you should still check the SDS.
	REFER TO SDS: Separation of these chemicals may be necessary. Consult the SDS for further guidance.
	MINIMUM THREE METRE SEPERATION: These chemicals may react dangerously if stored together may and should be kept at least three metres apart.
	MINIMUM FIVE METRE SEPERATION: Storing these chemicals together will significantly increase the likelihood or severity of an incident. They should be kept at least five metres apart or in separate storage areas.
	ISOLATE: Dedicated storage areas or storage cabinets are recommended for self-reactive chemicals and organic peroxides, as is separation from other buildings and property boundaries.

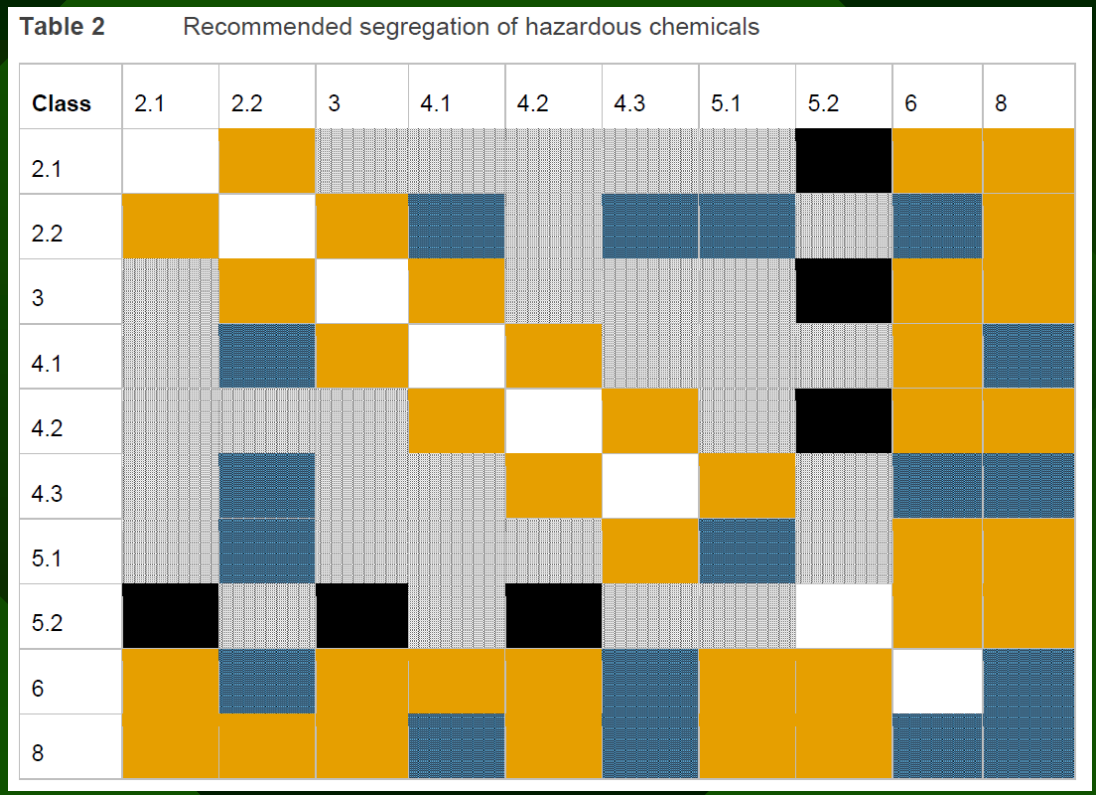


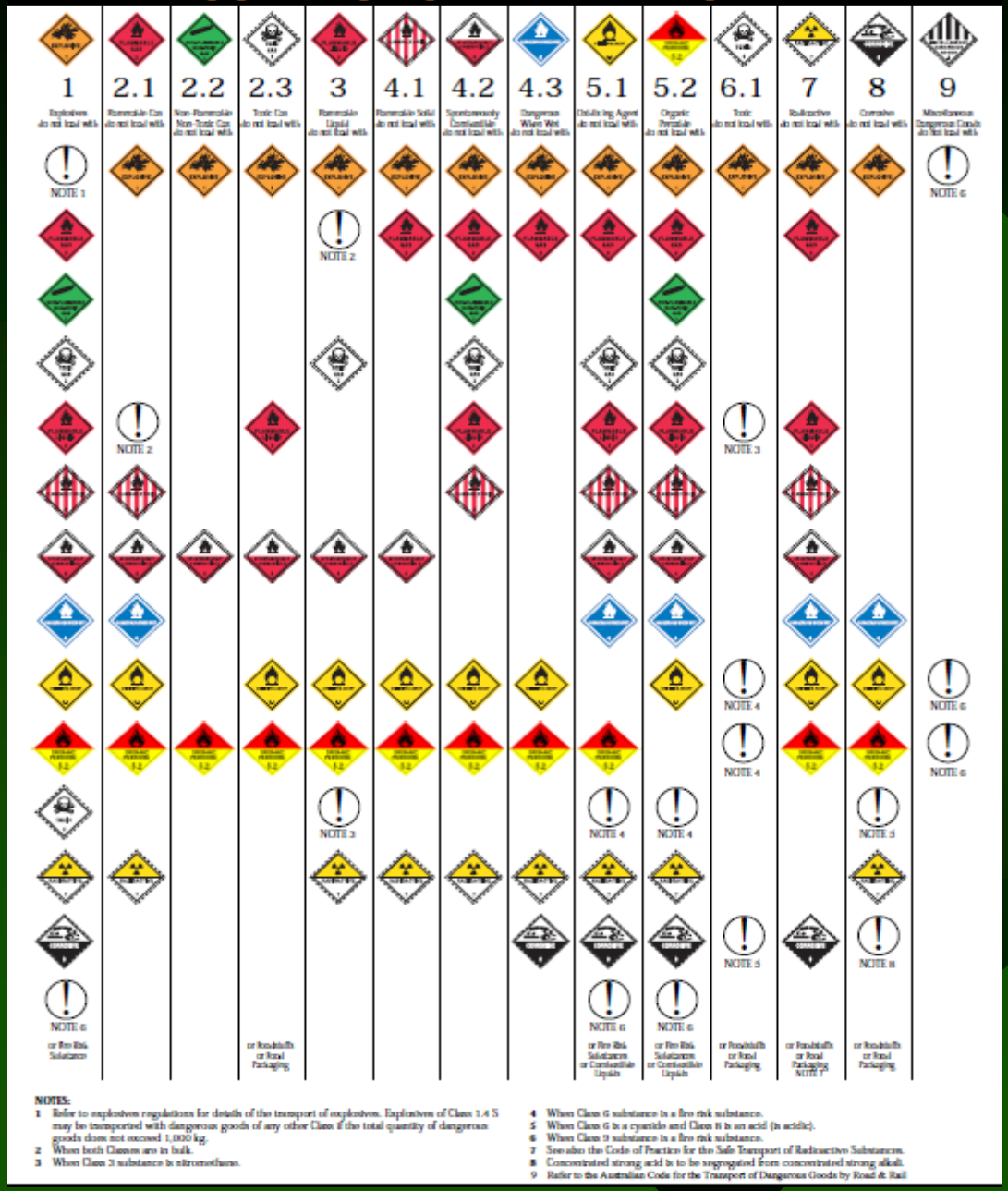
Table 2 Recommended segregation of hazardous chemicals

Class	2.1	2.2	3	4.1	4.2	4.3	5.1	5.2	6	8
2.1										
2.2										
3										
4.1										
4.2										
4.3										
5.1										
5.2										
6										
8										

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Recognising dangerous goods

Segregation of dangerous goods in road vehicles and freight containers



NOTES:

1. Refer to explosives regulations for details of the transport of explosives. Explosives of Class 1.4 S may be transported with dangerous goods of any other Class if the total quantity of dangerous goods does not exceed 1,000 kg.
2. When both Classes are in bulk.
3. When Class 3 substance is nitromethane.
4. When Class 6 substance is a fire risk substance.
5. When Class 6 is a cyanide and Class 8 is an acid (is acidic).
6. When Class 9 substance is a fire risk substance.
7. See also the Code of Practice for the Safe Transport of Radioactive Substances.
8. Concentrated strong acid is to be segregated from concentrated strong alkali.
9. Refer to the Australian Code for the Transport of Dangerous Goods by Road & Rail.

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Segregation Exercise

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

CSL Parkville drum store

Class 8 Corrosive Acids	Class 8 Corrosive Acids	Class 3 Flammable liquids	Class 5.1 Oxidisers
Class 8 Corrosive Bases (alkalis / caustic)	Class 8 Corrosive Bases (alkalis / caustic)	Class 3 Flammable liquids	

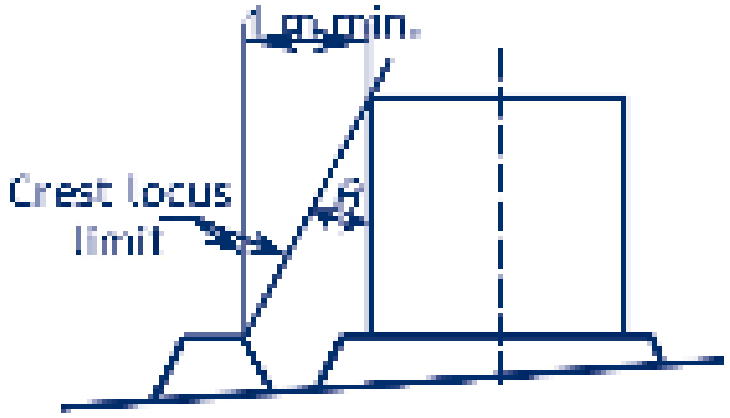
		Alkali	Alkali	Acid

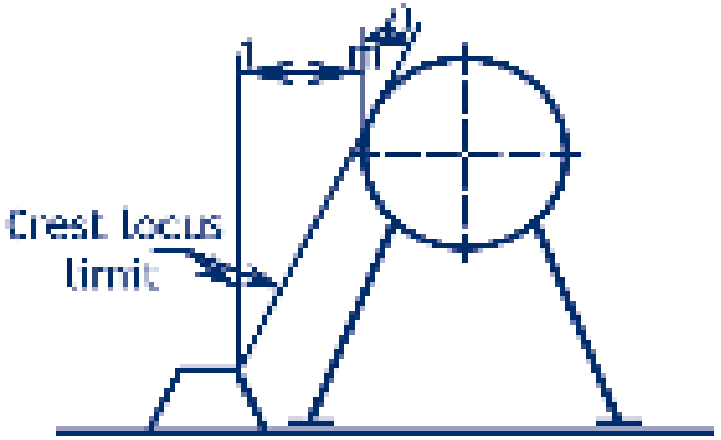
Bunding – Package Storage

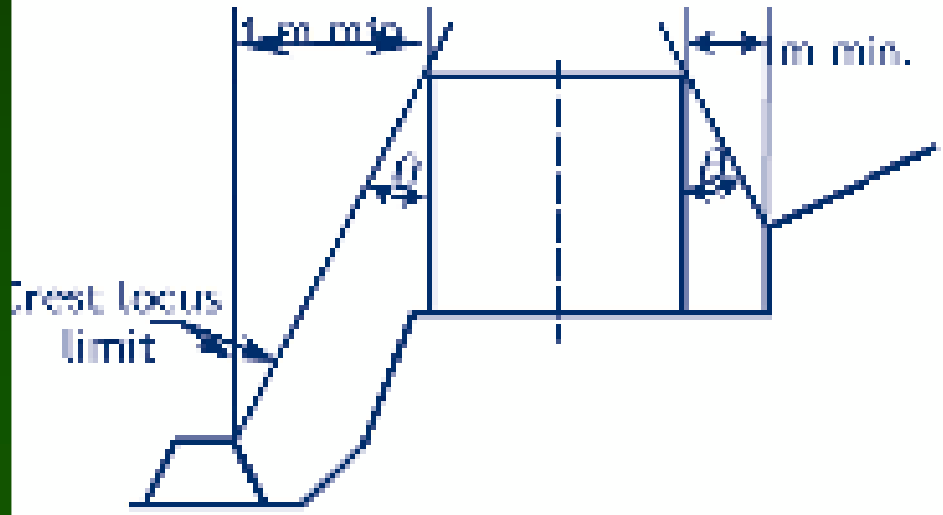
- The capacity of the spillage containment compound shall be at least
  - 100% of the volume of the largest package, plus
  - 25% of the storage capacity up to 10,000 L, together with
  - 10% of the storage capacity between 10,000 L and 100,000 L, and
  - 5% above 100,000 L.

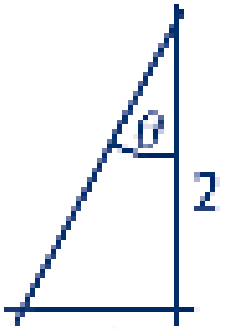
NOTE: Allowance must also be made for fire and storm water if appropriate

Bunding – Bulk Storage









Tan θ = 0.5

Determination of angle θ

Other matters to consider

- Transit storage
- Site plan
- Hazmat box and its location

URL - additional information

- Australian Dangerous Goods Code (ADG)
  - http://www.ntc.gov.au/heavy-vehicles/safety/australian-dangerous-goods-code/
- Safe Work Australia
  - www.safeworkaustralia.gov.au
- National Transport Commission – ADG Code
  - https://www.ntc.gov.au/codes-and-guidelines/australian-dangerous-goods-code
- UN Model Regulations for the Transport of Dangerous Goods
  - https://unece.org/info/publications/pub/364867
- Global Harmonisation System (GHS) – UNECE
  - https://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html
- Labelling of Agricultural and Veterinary chemicals
  - https://apvma.gov.au/registrations-and-permits/labelling-codes
- Poisons Schedule (SUSMP)
  - https://www.tga.gov.au/publication/poisons-standard-susmp

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Australian Standards

- AS 1940–2017 The storage and handling of flammable and combustible liquids
- AS 2243.2:2021 Safety in laboratories, Part 2: Chemical aspects and storage
- AS 3780–2008 The storage and handling of corrosive substances
- AS/NZS 3833:2007 The storage and handling of mixed classes of dangerous goods, in packages and intermediate bulk containers
- AS 4332–2004 (R2016) The storage and handling of gases in cylinders
- AS/NZS 4452:1997 The storage and handling of toxic substances
- AS/NZS 4681:2000 The storage and handling of Class 9 (miscellaneous) dangerous goods and articles
- AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods

Australian Standards

- AS 1940–2017 The storage and handling of flammable and combustible liquids
- AS 2243.2:2021 Safety in laboratories Chemical aspects and storage
- AS 3780–2023 The storage and handling of corrosive substances
- AS/NZS 3833:2007 The storage and handling of mixed classes of dangerous goods, in packages and intermediate bulk containers
- AS 4332–2004 (R2016) The storage and handling of gases in cylinders
- AS/NZS 4452:1997 The storage and handling of toxic substances
- AS/NZS 4681:2000 The storage and handling of Class 9 (miscellaneous) dangerous goods and articles
- AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods

AUSTRALIAN ENVIRONMENT BUSINESS NETWORK

Sources of information

- Physical inspection
- Internal and external audits
- Employee knowledge and expertise
- Trade journals
- WorkCover alerts and publications
- Incident /injury records
- Industry associations

Sources of information

- Product information
- Technical data sheets
- Manufacturers instruction manuals
- Personal contacts
- By asking ‘What if ?’
- Brainstorming

AEBN Workshop:
AEBN Dangerous Goods and Hazardous Substances (Storage and Handling)
for
CSL Ltd

05 & 06 October 2023

Presented by

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