ACT Fire Brigade
Recruit Course

Dangerous Substances One

Version 2
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Contents

Chapter One

Legislation and Agency Roles

Hazardous materials incidents can be complex, involving resources and capabilities beyond those available to any single organisation. To effectively manage a hazmat incident, a comprehensive planning and response has been instituted in the Australian Capital Territory. Due to the integrated nature of this process, it is important that the firefighter has a working outline of the fire service's role and responsibilities under Australian Capital Territory legislation.

This chapter covers:

- **Relevant legislation; and**
- **The roles of support agencies at a hazmat incident**

Legislation

On arriving at the scene, the officer in charge must consider the requirements of any external legislation relevant to hazardous material management when appraising the situation. Any decision as the combating agency of a hazardous materials incident and generally the first service to which is made in the management of the incident will be subject to the following legislation. Advice from specialist advisers will be required in many instances to ensure that legislative requirements are being met. The Fire Brigades powers and responsibilities to attend hazardous materials incidents are derived from the following:

Emergencies Act 2004

The objects of this act are –

a) To protect and preserve life, property and the environment; and
b) To provide for effective emergency management; and
c) To provide for the effective and cohesive management by the emergency services authority of the state emergency service, the ambulance service, the fire brigade and the rural fire service: and
d) To recognise the value to the community of all emergency service members including volunteer members

ACT Hazardous Materials Emergency Sub -Plan (version 2/2000)

The ACT Hazardous Materials Sub-Plan is called up under the ACT Emergency Plan and identifies the roles and responsibilities of the respective lead and support agencies, and the arrangements to deal with hazmat materials incidents within the Territory. The procedures outlined in the plan are activated when the fire services respond to a potential hazmat incident. The plan also outlines the arrangements for obtaining extra resources at an incident.

ACT Chemical, Biological, Radiological and Nuclear (CBRN) Response Plan.

The ACT CBRN Plan outlines responsibilities, authorities and mechanisms to respond and manage CBRN emergencies and their consequences within the Australian Capital Territory. The Plan has been developed under the authority of the statutory requirements of the ACT Emergencies Act 2004 and closely aligns to the National Counter Terrorism Plan (NCTP) to provide strategic, operational and tactical guidance to participating ACT Government agencies.

Cooperative Arrangements with Commonwealth, State or Overseas Agencies

The Minister or the authority may enter into written arrangement with a Commonwealth or State agency, or an agency of a foreign country, (a cooperative arrangement) to facilitate cooperation;

a) In emergency management; or
b) In the day-to-day operations of a territory agency if the operations involve the provision of emergency services outside the ACT or the provision of emergency services in the ACT by a Commonwealth or State agency.

Cooperative Arrangements about Resources

A cooperative arrangement may provide for the authority or the Territory controller to decide the nature and amount of resources needed from outside the ACT to deal with an emergency within the ACT and to ask the other party to the arrangement to provide the resources to the Territory

Dangerous Substances Act 2004

The purpose of this Act is to protect the health and safety of people, and to protect property and the environment from damage, from the hazards associated with dangerous substances.

The purpose of this Act includes the following:

- to eliminate the hazards associated with dangerous substances;
- if it is not reasonably practicable to eliminate the hazards
- to minimise as far as reasonably practicable the risks resulting from the hazards by, for example;
- ensuring that the hazards are identified and the risks are assessed and controlled; and
- requiring information and training about the hazards and the safe handling of the substances to be made available to people handling the substances;
- to allocate responsibilities to people in relation to dangerous substances

- to regulate dangerous substances, including by providing for authorisation, licensing, notification and registration schemes for dangerous substances.

Dangerous Goods (General) Regulations 2004

The Dangerous Goods Regulations 2004, made under the Dangerous Substances Act 2004 are designed to ensure that sites that store and handle dangerous goods have appropriate safety measures in place to protect workers at the site, the community, and the environment from the effects of fire and chemical leaks/discharges.

The Regulations covers such areas as placarding, manifests, emergency plans and installed firefighting equipment ensuring the fire services have adequate information about the dangerous goods kept at the premises, and that appropriate fire control measures are in place to bring accidents quickly under control.

Road Transport Reform (Dangerous Goods) Act 1995 (C'wlth)

The purpose of this Act is to regulate the transport of dangerous goods by road in the Australian Capital Territory and the Jervis Bay Territory in order to promote public safety and protect property and the environment.

Transport, in relation to dangerous goods, includes:

a) the packing, loading and unloading of the goods, and the transfer of the goods to or from a vehicle, for the purpose of their transport; and
b) the marking of packages and unit loads containing dangerous goods, and the placarding of containers and vehicles in which dangerous goods are transported; and
c) other matters incidental to their transport.

Australian Dangerous Goods Code (7th Edition)

The Australian Dangerous Goods Code 7th Edition deals with the transport of dangerous goods by road and rail throughout Australia, and is divided into two volumes. Volume 1 outlines the requirements that must be met by all involved in the transport of dangerous goods. Volume 2 lists all materials classified as dangerous goods. The listing includes the material's name, UN number, dangerous goods class and packing group.

Other legislation in force in the ACT relating to dangerous substances includes the following:

- Environment Protection Act 1997
- Occupational Health and Safety Act 1989
- Poisons Act 1933
- Poisons and Drugs Act 1978
- Health Act 1993
- Land (Planning and Environment) Act 1991
- Clinical Waste Act 1990
- Utilities Act 2000

An awareness of the above legislation, regulations and arrangements will lead to the successful management of hazardous materials incidents. In the event of a major hazardous materials incident the agencies responsible for administering the legislation should be on site.

Roles of Support Agencies at a Hazmat Incident

The fire service along with other agencies, have defined roles at **HAZMAT** incidents. Firefighters should be aware of the assistance and expert advice the numerous support agencies can provide. At most hazmat incidents input from these agencies form a vital component of the decision making process undertaken by the incident controller. The following is a list of agencies we can call upon to attend a hazmat incident, as per the ACT Hazardous Materials Emergency Sub Plan.

ACT Ambulance Service

The ambulance service is responsible for providing emergency medical intervention and casualty transport.

Australian Federal Police

The AFP is responsible for coordinating the incident, which includes traffic control, crowd control and organising evacuation.

State Emergency Service

ACT State Emergency Service can provide logistical support to the control authority.

Environment ACT

Environment ACT provides direction to the control authority on the potential for environmental impact.

Workcover

Workcover determines the industry's compliance with workplace health and safety legislation, and investigates breaches of legislation that may contribute to an accident.

Canberra Regional Oil Industry Emergency Response Group (CROIERG)

Provides the control authority with assistance in product identification, recovery and containment.

ACTEW

Actew are responsible for all utilities in the ACT.

Agility

Agility is responsible for all natural gas in the ACT.

Technical Specialists

Technical Specialists can provide expert advice about chemicals, thereby assisting incident planning and anticipating the likely course of an event.

Chapter One
Self Assessment

1) The Fire Brigades powers to attend hazardous materials incidents are derived from what Act. Name and list the objects of this Act.

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2) Name the legislation, that impacts directly on all lead and support agencies, and when is it activated.

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3) Describe the role of a technical specialist at a hazmat incident.

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4) Name the Act that deals with transport in relation to dangerous goods.

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5) List seven support agencies that could possibly attend a hazmat incident.

Chapter Two

Hazardous Materials

Hazardous Materials is a term that has evolved to encompass Dangerous Goods and Hazardous Substances. These materials are used, transported and distributed throughout the community. Therefore Hazmat incidents can occur anytime and anywhere. Firefighters need to understand what they are dealing with and stated exposure standards (and where to locate them), in order to make informed decisions on handling of hazardous materials, PPE and incident resolution.

This chapter covers:

- **Dangerous Goods**
- **Hazardous Substances; and**
- **Hazardous Materials properties**

Dangerous Goods

Dangerous goods are substances that are considered to present a risk to the health and safety of the public if they are not properly controlled during handling, transportation or storage, Dangerous goods can be deadly, and can seriously damage property and the environment in the short term.

All materials classified as dangerous goods are listed in Volume 2 of the Australian dangerous Goods Code, 7th Edition. Dangerous Goods are classified by their chemical and/or physical properties.

Hazardous Substances

Hazardous Substances are materials that have potentially harmful effects on health. The effects can be acute (short term single exposure) and chronic (long term repeated exposure to small quantities).

Hazardous Substances can be gases, liquid or solids and can be pure chemicals or a mixture of several different chemicals. Hazardous Substances are classified according to their short and long term health effects.

For the purposes of an emergency, the fire services classify both categories of materials as “hazardous materials” or “hazmats”.

Hazardous Materials

The ACT Hazardous Materials Emergency Sub Plan defines Hazardous Materials as : Hazardous Materials, Hazardous Substances or Dangerous Goods. These may be flammable, explosive, toxic, radioactive or infectious substances otherwise hazardous to health and safety, as defined either singly, or in combination, under Occupational Health and Safety, Environmental, Dangerous Goods, Ionising Radiation or Clinical waste legislation.

Locations

Hazardous materials can be found in a variety of locations within the community, such as:

- Transport vehicles carrying materials (ranging from petrol to toxic chemicals);
- Chemical plants;
- Transport depots;
- Manufacturing facilities;
- Potentially hazardous enterprises (such as electroplating works);
- Hospitals;
- Universities; and
- Laboratories.

It is critical that firefighters are aware of the locations and layouts of buildings in their area that contain hazardous materials risks.

The benefits of possessing this information include:

- Knowledge of what materials to expect at a location;
- Knowledge of what equipment to expect at a location;
- Potential minimisation of the risk to firefighters;
- An insight into extra resources that will be required urgently; and
- Increased probability of successful managing the incident.

Hazardous Materials Properties

To enable firefighters to understand and recognise the potential dangers associated with hazardous materials, a basic knowledge of the various properties of these materials is essential.

Hazardous materials will generally display one or more of the following properties:

- Toxicity;
- Flammability;
- Reactivity; and/or
- Corrosiveness.

Toxicity

Toxicity can be defined as “the ability of a substance to cause injury to biological tissue”. In human terms, this generally refers to unwanted effects that are produces when a chemical has reached a sufficient concentration at a location within a body.

Virtually all materials have the potential to be toxic under certain conditions.

Toxic substances can enter the human body and cause serious damage. The four main ways that toxic substance can enter the body are through:

- Inhalation;
- Ingestion;
- Absorption; and
- Injection.

Inhalation

Inhalation is the introduction of toxic substance (chemical vapours or toxic products) into the body through the airway. Some toxic materials can severely irritate the airway and lower air tract. Other toxic substances may not cause this type of irritation, but enter the lungs themselves.

Once a toxic substance is in the lungs, it can be absorbed into the bloodstream and carried to other internal organs.

Note: Inhalation is the most common route of exposure to a chemical toxin, and is often the most damaging

Ingestion

Ingestion is the introduction of a toxic substance into the body through the mouth. The most likely means of a toxic substance entering the body via the mouth occurs when contaminated hands are in contact with food. Personnel who attend a hazmat incident should not eat, drink or smoke except in designated rest areas, after they have been decontaminated.

Absorption

Absorption is the introduction of a toxic substance into the body through the skin. Pain or skin irritation is not always present, and skin absorption can occur with no sensation to the skin itself as a warning sign.

Some poisons are so concentrated that a few drops placed on the skin can result in severe injury or death. Abrasions, cuts, heat and moisture facilitate skin absorption.

Injection

Injection is the introduction of a toxic substance into the skin through a syringe or sharp object. The best protection against injection is to ensure that the correct PPE is worn, and safe working practices are observed.

Toxic exposures and their effects

Many toxic substances are chemical in nature. Chemical exposures and their effects on the body are commonly described as acute or chronic

Acute Effects

Acute effects result from either a single exposure to a highly toxic substance, or a large dose of a less toxic substance. Effects from acute exposures may not be evident for up to 72 hours after the initial exposure.

Note: It is possible for signs and symptoms from acute exposures to be masked by smoke inhalation or illnesses such as colds.

Some of the possible signs and symptoms of acute exposure include:

- Burns;
- Vomiting;
- Dizziness; and
- Central nervous system damage

Chronic Effects

Chronic effects of poisoning are the result of repeated exposure to relatively small amounts or doses of chemicals, over a period of time. Time weighted averages (TWA) are calculated to protect workers from these chronic effects.

Some of the possible effects include:

- Cancer;
- Birth defects;
- Respiratory diseases;
- Dermatitis; and
- Cirrhosis of the liver.

Time Weighted Average

The time weighted average (TWA) concentration is based on an 8-hour working day over a 5-day working week and establishes the concentration that workers may be repeatedly exposed to without adverse effect.

Short-term exposure limit

The short-term exposure limit (STEL) is the concentration that workers can be exposed to for up to 15 minutes at a time, without suffering irritation, irreversible tissue damage or narcosis (sleepiness).

Up to four 15-minute periods are allowed per working day, with at least one hour between exposures. People exposed to a chemical on this basis should not have an increased likelihood of accidental injury or impaired escape ability.

The STEL is not a separate exposure limit from the TWA, rather it is a supplement to the TWA, where there are recognised short-term effects from a substance.

Peak Limitation Values

Peak limitation values are assigned to materials associated with significant short-term health effects. If a material has been assigned a peak limitation value, then the value should not exceed under any circumstances. Generally, materials that have been assigned a peak limitation value will not have a TWA or STEL value.

Note: The lower the quoted exposure standard, the more toxic the chemical

Flammability

Flammability can be defined as the ease with which a substance will ignite, from exposure to either a high temperature environment, or to a spark or open flame. It is important to note that of the three states of matter (solids, liquids and vapours) only vapours will ignite. Therefore, the most dangerous flammable substances are either already gases, or liquids that will readily evaporate.

Flammable Gases

A property of certain hazardous materials is flammability. Gases that will ignite and burn from exposure to high temperatures or on contact with a source of ignition are referred to as flammable gases e.g. liquefied petroleum gas – LPG and Acetylene.

Acetylene is considered so dangerous that the brigade has a specific SOP to deal with these events.

Flammable Range

Flammable gases will only ignite if their concentration in the air lies within a certain range. This range is known as the flammable range. The lower and upper limits of this range are known as the lower and upper flammable or explosive limits. They are often abbreviated as the lel and uel.

Gas	lel	uel	Flammable Range
	% concentration in air		
LPG	1.6	9.5	1.6 to 9.5
Acetylene	2.5	85	2.5 to 85
Methane	5.3	14	5.3 to 14
Hydrogen	4.0	75	4.0 to 75

The wider the range the more hazardous the material. Concentrations less than the lel are too lean to burn while concentrations above the uel are too rich to burn.

Gas density

Most flammable gases are heavier than air. This means that they will go to ground if released into the air, and gather in hollows, pits and drains, which causes an increased risk of fire or explosion.

Flammable Liquids

A flammable liquid is a liquid that produces a flammable vapour (i.e. the vapours that evaporate from these liquids will ignite on contact with an ignition source).

This is an important physical fact, because, as mentioned before, of the three states of matter – solids, liquids and gases – only gases (vapours) will burn.

Flashpoint

The flashpoint of a liquid is the lowest temperature at which there is sufficient vapour given off from which the liquid to form a flammable mixture with air. This mixture will flash momentarily when a flame is applied. Regulations state that a liquid is classified as flammable if it has a flashpoint below 61°C.

The table below list the flashpoints of some common liquids

Liquid	Flashpoint
Petrol	-43°C
Acetone	-18°C
Benzene	-10°C
Ethanol	13°C
Kerosene	38°C
Diesel Fuel	65°C

All the above liquids are classified as flammable, except for diesel fuel, which has a flashpoint above 61°C. The lower the flashpoint the more hazardous the flammable liquid, as is the case with petrol and acetone.

Petrol and acetone are well above their flashpoints at normal air temperatures.

At normal air temperatures, these liquids will produce a lot of flammable vapour, so they will ignite easily. On the other hand, kerosene has to be warmed before it will ignite, so it does not present as high a risk as petrol or acetone.

Flammable Range

Like flammable gases, flammable liquid vapours have a flammable range. The table below lists the flammable ranges of some common flammable liquids.

Flammable Liquids	Flammable Range (% concentration in air)
Petrol	1.4 to 7.6
Acetone	2.5 to 13
Ethanol	4 to 19
Kerosene	0.7 to 5
Ether	2 to 48
Acetaldehyde	4 to 55

As before the wider the range, the greater the danger.

Vapour Density

All flammable liquid vapours are heavier than air. This means that they will go to ground if released, and gather in hollows, pits and drains, which causes an increased risk of a fire or explosion. Flammable liquid vapours will also travel along the ground, which means ignition and flashback to the original source can occur from an ignition point some distance away. A good example of this is a petrol spill and its associated vapour.

Examples of flammable liquids include:

- Petrol;
- Kerosene;
- Paint thinners;
- Turpentine;
- Paints, adhesives and surface coatings;
- Methylated spirits; and
- Solvents used in laboratories.

Boiling Points

The boiling point of a flammable liquid is the temperature at which the liquid boils, or alternatively, gives off large quantities of vapour very quickly. The lower the boiling point of a given material, the more volatile the material; that is, the more readily it will be vaporised and present an increased hazard.

Examples of flammable liquids with low boiling points include:

- Ethanol (79°C);
- Benzene (80°C);
- Acetone (56°C);
- Ether (35°C); and
- Acetaldehyde (21°C)

Reactivity

Reactivity is the ability of a substance to react chemically with another substance and in the process release significant quantities of energy. These reactions may create flammable vapours and or result in spontaneous combustion.

For example:

- Pyrophoric substances such as yellow phosphorus, ignite on contact with air;
- Hypergolic substances such as hydrogen and fluorine ignite if placed in contact with each other; and
- Water reactive substances such as sodium, calcium carbide and magnesium powder react chemically on contact with water releasing flammable gases.

Corrosiveness

Corrosiveness can be defined as the ability of a substance (acid or alkali) to erode or damage other substances, including biological tissue. Corrosive materials can exist as either solids or liquids. In their original state, these materials can severely damage other materials, and most importantly can cause severe chemical burns to human tissue.

Common examples of corrosive substances include acids such as hydrochloric, nitric, sulphuric and phosphoric, and alkalis such as sodium hydroxide (caustic soda) and potassium hydroxide (caustic potash).

Some of the common reactions of corrosive materials are as follows:

- Acids and alkalis can react violently with each other;
- Some concentrated acids will react violently with water, especially sulphuric acid;
- Some powdered or granulated alkalis can also react violently with water;
- Acids and alkalis are capable of causing severe chemical burns to human tissue;
- Some acids and alkalis produce toxic gases or dusts, especially if heated;
- Strong acids will attack and corrode metals, wood, paper and cotton; and
- Concentrated alkali solutions will dissolve silk, wool and animal tissue.

Chapter Two
Self Assessment

1) Define the term ‘hazardous materials’.

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2) List five locations where hazardous materials may be found.

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3) List four main characteristics of hazardous materials.

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4) List the four major ways that hazardous materials can enter the body.

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5) List and define three key exposure standards for atmospheric contaminants.

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6) Define the term corrosiveness and how it can directly affect firefighters.

Chapter Three

Personal Protective Equipment

The ACT Fire Brigade provides a range of protective equipment and clothing for use at hazmat incidents. The purpose of this protective equipment and clothing is to protect the wearer from the hazards of the chemical involved and keep his or her exposure levels below recommended safe levels.

This chapter covers:

- **PPE selection considerations;**
- **Standard turnout gear;**
- **Chemical splash suits;**
- **Encapsulated gas suits; and**
- **Positive pressure breathing apparatus**

Note: see attachment for staff minute regarding levels of Personal Protective Equipment

PPE Selection Considerations

A primary concern for all firefighters at hazmat incidents is the avoidance of coming into contact with the material involved, and the suitability of the protective clothing.

The purpose of chemical protective clothing is to protect the wearer from the hazards of the chemical involved, and keep their exposure levels below recommended safe levels.

To meet this requirement, the fire services have available a range of protective clothing and self contained breathing apparatus.

Standard Turnout Gear

Standard turnout gear is limited in many ways at hazmat incidents, but can still provide a basic measure of protection as long as the wearer is informed about the nature of the hazard and the limitations of the gear.

Turnout gear offers little or no protection against gamma and x ray radiation, explosions and cryogenic materials.

If the level of personal protection cannot be increased, then the best option is to keep any unprotected personnel at a safe distance from the hazardous material.

Standard turnout gear includes:

- Boots
- Over pants and braces
- Structural coat
- Flash hood
- Helmet
- Gloves.

Standard Turnout Gear

Chemical Splash Suits

Chemical splash suits are designed to protect the wearer from specific hazards, namely the splash risk. Splash suits are suitable for a variety of situations, including:

- Exposure to chemicals in a liquid splash environment during a hazmat incident;
- Hazardous dust environments;
- Extremely dirty environments; and
- Alpha radiation incidents.

Splash suits have limitations and potential wearers need to be aware of them. Splash suits are not suitable for use where;

- The chemical presents a gas or vapour hazard; and
- The chemical can cause skin irritation or can be absorbed through the skin.

Where the HAZCHEM code specifies the use of full protective clothing, in most cases, a splash suit and BA will be adequate. The Initial Emergency Response Guide provides a guide to the appropriate level of initial protective clothing required.

Chemical splash suit

Encapsulated Gas Suits

Encapsulated gas suits are designed to provide full body protection when a high level of splash protection is required, or a harmful gas or vapour is present. The encapsulated gas suit must be used with BA and airline trolley.

Encapsulated gas suits are usually constructed of a laminate of several different synthetic materials, usually PVC, Butyl and Viton.

The seams on these suits are double folded, stitched and double taped for the highest level of protection.

The suits are one piece, with an integrated hood, facemask, boots and gloves. Once donned, a gas tight zip seals the suits. These suits provide the highest level of protection for the wearer and the breathing apparatus. It should be noted that there are a few chemicals that can degrade, permeate and/or penetrate these suits.

Full encapsulated Gas Suit

Positive Pressure Breathing Apparatus

Positive pressure breathing apparatus is designed to prevent contaminated air from entering the respiratory system.

Because the most common way for chemicals to enter the human body is via the respiratory system, a firefighters BA is a vital component of protective equipment.

Worn correctly and with positive pressure maintained in the mask at all times, BA provides the best possible protection for the respiratory system.

BA Limitations

In certain circumstances, BA has limitations. These situations include where:

- Substances can penetrate the face piece (substances that are able to penetrate the face piece include; methyl bromide, used as a fumigant in the food industry; and epichlorhydin, used in the surfactant industry);
- Failure to maintain the positive pressure in the mask can result in the entry of a toxic material; and
- Improper use and maintenance will compromise the wearer's safety.

Chapter Three
Self Assessment

1) Standard turnout gear offers little or no protection against concentrated acids or alkalis, gamma and x ray radiation, explosions and cryogenic materials.

True False

2) Splash suits are suitable for use where the chemical presents a gas or vapour hazard, can cause skin irritation, or can be absorbed through the skin.

True False

3) Where the HAZCHEM code specifies the use of full protective clothing, in most cases, a splash suit and a BA will be adequate.

True False

4) Encapsulated gas suits provide full body protection when a high level of splash protection is required, or a harmful gas or vapour is present.

True False

5) What equipment must be used in conjunction with an encapsulated gas suit.

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6) List and describe two instances where BA has limitations

Chapter Four

Hazardous Materials Identification

Hazardous materials identification is critical in ensuring the safety of emergency crews at any incident involving these substances. With the large number of substances in use, it is impossible for firefighters to be aware of the properties of each individual chemical that may be encountered at a hazmat incident.

While some substances may be harmless to personnel or the environment, others may present a high risk to life. There is a range of information sources available to assist in identification.

This chapter covers:

- **Naming and numbering conventions;**
- **Class diamonds;**
- **Container marking and colours;**
- **Placard and labels;**
- **Transport documents;**
- **Dangerous Goods Initial Emergency Response Guide (IERG)**
- **Emergency information book (Manifest)**
- **Materials Safety Data Sheets;**
- **Chemical Data Sheets**
- **HAZCHEM Code (Emergency Action Code);**
- **Mixed Load Chart; and**
- **Hazmat Action Guide**

Naming and Numbering Conventions

There are several naming and numbering conventions used to help identify substances:

- United Nations number;
- Proper shipping names;
- Chemical names; and
- Chemical abstract service numbers.

United Nations Number

The United Nations (UN) number is a numerically based identification system, which was developed by the United Nations Organisation. This number is designed to unambiguously identify chemicals or groups of chemicals that have been classified as dangerous goods.

All dangerous goods and their UN numbers are listed in the Initial Emergency Response Guide carried on all fire appliances and in the Australian Dangerous Goods Code (ADG). Examples include:

- Carbon - UN 1361;
- Ethanol - UN 1170

Proper Shipping Names

The proper shipping name is the name specified by the Australian Dangerous Goods (ADG) Code for use on documentation, labelling, emergency information panels and workplace placards concerning dangerous goods. Examples include:

- UN 1830 - Sulphuric Acid
- UN 1267 - Petroleum Crude Oil.

Chemical Names

All chemicals have a proper chemical name, which is determined by a set of rules formulated by the International Union of Pure and Applied Chemists (IUPAC). In the majority of cases the chemical name for a pure substance is the same as its proper shipping name, as contained in the ADG Code.

Chemical Abstract Service Numbers

Chemical Abstract Service (CAS) numbers are assigned to provide all chemical substances with a unique identifying number. This numbering system is different from, and more comprehensive than, the UN numbering system.

Not all chemicals have a UN number, and sometimes UN numbers are assigned to whole classes of chemicals. For example, UN 1760 Corrosive Liquids NOS (not otherwise specified) covers approximately 2250 different corrosive materials.

CAS numbers are a way of overcoming the inadequacies of the UN number system. CAS numbers are required on Material Safety Data Sheets, for every chemical listed on the data sheet. This applies for both pure substances and the chemical component of a mixture. CAS numbers are very useful for the unambiguous identification of substances.

Class Diamonds

The Australian Dangerous Goods Code states that, “Dangerous Goods are classified according to the predominant type of risk involved”. There are nine classes of Dangerous Goods, as defined in the ADG Code, for the purpose of storage and transport.

A specific sign called a Class Diamond identifies the type of material, the dangerous goods class and main hazard. Each diamond is unique and consists of a coloured background, a pictogram, the class name and the class number.

Where a material presents more than one type of hazard a subsidiary risk is also assigned. Subsidiary risk labels are the same as the equivalent class label except the class number is omitted.

Any vehicle or container carrying an amount of dangerous goods, in packages, more than the minimum specified in the code must display Dangerous Goods Class Diamonds front and rear.

Class Number	Class Name
Class 1	**Explosives**
Class 2	**Gases (Flammable, Non-Flammable Compressed, Toxic)**
Class 3	**Flammable Liquids**
Class 4	**Flammable Solids**
Class 5	**Oxidising Substances and Organic Peroxides**
Class 6	**Toxic and Infectious Substances**
Class 7	**Radioactive Material**
Class 8	**Corrosive Substances**
Class 9	**Miscellaneous Dangerous Substances**

Class 1 - Explosives

Class 2 – Gases (Flammable, Non-Flammable Compressed, Toxic)

Class 3 - Flammable Liquids

Class 4 – Flammable Solids

Class 5 – Oxidising Substances and Organic Peroxides

Class 6 – Toxic and Infectious Substances

Class 7 – Radioactive Material

Class 8 – Corrosive Substances

Class 9 – Miscellaneous Dangerous Substances

Container Markings and Colours

Hazardous materials containers often have specific markings or colours that provide an indication of their hazard. The table below lists the most common containers, their colour, state of the material and the hazard associated, smell and vapour density.

Name	Colour	State	Hazard	Smell	VD
Acetylene	Crimson	Liquefied (in acetone)	Explosive	Ether	Lighter than air
LPG	Aluminium	Pressurised Liquid	Highly Flammable	Stenching agent added	Heavier than air
Chlorine	Golden Yellow	Pressurised Liquid	Toxic	Pungent	Heavier than air (BA required)
Hydrogen	Signal Red	Compressed Gas	Explosive	None	Lighter than air
Oxygen	White Shoulder – Black	Compressed Gas	Increases Burning	None	
Air	Black or black/white shoulder – dark grey	Compressed Gas	Supports Burning	None	
Ethylene	Dark Violet	Compressed Gas	Explosive	Sweet	Lighter than air
Nitrous Oxide	French blue	Compressed Gas		Slightly sweet	Heavier than air

Placards and Labels

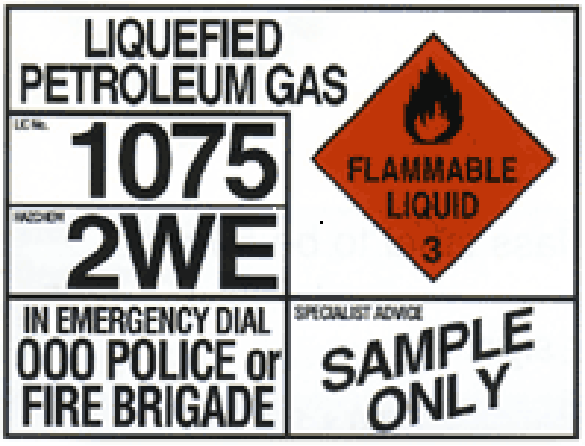
Dangerous Goods Class labels are required to be displayed by site occupiers and road transport vehicle operators, when certain threshold quantities of dangerous goods are exceeded.

Emergency information panel (EIP)

Emergency Information Panels are required where a vehicle is transporting individual containers holding more than 250 litres of liquid dangerous goods, 400kg of solid dangerous goods or 500 litres (water capacity) of gas.

EIP's display:

- Correct shipping name (chemical name)
- UN number
- HAZCHEM code
- Emergency contact phone numbers
- Class label and subsidiary risk label
- Company name and specialist advice



Placarding at a Workplace

Warning placards are required once certain quantity thresholds have been exceeded. Where these thresholds have been exceeded, the quantities involved pose a threat to firefighters.

Placards at a workplace can consist of an outer warning notice, a packaged dangerous goods placard or a bulk dangerous goods placard. A combination

of these placards may exist at the site depending on the quantities of dangerous goods involved.

Outer Warning Notice

The outer warning notice indicates the presence of dangerous goods at a workplace. The outer warning notice is the first indication fire crews will get of the presence of dangerous goods at a site, in quantities that may cause them harm. It is located at every road and rail entrance to the site

The outer notice consists of red lettering on a white background.

HAZCHEM

Packaged Dangerous Goods Placard

A packaged dangerous goods placard indicated the presence of dangerous goods in packages. A package is defined as a container less than 450 litres in volume.

The packaged dangerous goods placard consists of class diamonds for each class of dangerous goods present, placed on a white background. If no other information is available firefighters should consider this information when formulating the incident action plan.

The packaged dangerous goods placard must be located at:

- The main entrance of a building or structure;
- Every entrance to a room or compartment within a building where dangerous goods are stored; and
- Adjacent to an outside area where packaged dangerous goods are stored.

Bulk Dangerous Goods Placards

A bulk dangerous goods placard indicates the presence of dangerous goods stored in containers of greater than 450 litres in volume.

Firefighters should consider the information provided by bulk dangerous goods placards, in conjunction with information provided by the occupier or the Emergency Information Book, to establish if specialist equipment or resources are available at the site to combat the incident.

Bulk dangerous goods placards are located on the container and provide the following information:

- The chemical name;
- UN number;
- HAZCHEM code; and
- Dangerous goods class

Product Labels

Depending on the size of the containers involved in an accident, the product label attached to the container can provide useful identification information, such as:

- Product name;
- UN number;
- HAZCHEM code;
- Packing group;
- Product supplier; and
- Dangerous goods class labels

Packing groups

Dangerous Goods have been divided into three packing groups indicated by the degree of danger presented by the substance. This information is usually shown on documentation and may be on substance labels.

The criteria for allocating Packing Group for a substance are based on its potential hazard. The criteria depend on the class and subsidiary risk of the substance. Packing groups are written as PGI, PGII, PGIII and represent:

- **PGI - Great Danger**
- **PGII - Medium Danger**
- **PGIII - Minor Danger**

PGI - Substances that pose an immediate threat to life, health or property whenever there is a leak, spill or fire, even in small quantities.

PGII - Substances that pose a significant threat in fire or larger spill or leak. Flammable substances of PGII will ignite readily at ambient temperatures.

PGIII - Substances that are similar in hazard to many found in domestic situations. Flammable substances of PGIII will usually be difficult to ignite at

ambient temperatures. Generally PGIII substances pose a significant threat to health or property in open areas only when involved in a large fire or in a major spill or leak.

Packing group designators relate to the Seriousness of the hazard, whereas Dangerous Goods Class numbers relate to the Chemical nature of the hazard.

Transport Documents

The driver of the vehicle will be able to direct you to all the documentation carried on the vehicle if she/he is not holding it. If the driver cannot be found or is injured, the documentation should be located in a prominent, visible location inside the cabin of the vehicle. The nature of the load and any hazards should be ascertained before any attempt is made to retrieve the shipping documents.

Shipping Documents

The ADG Code requires the driver of a Dangerous Goods Vehicle to have the correct shipping documents supplied by the consignor or prime contractor, describing the load being carried. These documents must show in English:

- Name of the product
- Class number
- Subsidiary risk class number if any
- UN number
- Packing Group
- Total net quantity of each product
- Number of packages of each type
- Consignor's name
- Type of outer packaging.

Dangerous Goods Initial Emergency Response Guide

The Dangerous Goods Initial Emergency Response Guide (IERG), sometimes referred to as the "HB76", is carried in the Red Hazmat Bag on every ACTFB appliance in the cabin compartment. It provides the firefighter with an initial guide for identifying the hazards associated with a material, and the preliminary precautions that can be taken to protect the firefighter and the public.

The IERG provides a number of ways to identify the hazardous response procedure required, using the three colour-coded primary sections;

- Green pages;
- Orange pages; and
- Yellow pages.

Green Pages

Green pages list materials in order of their United Nations number, with the appropriate guide number and the proper chemical name.

Orange Pages

Orange pages provide the proper chemical name in alphabetical order, with the appropriate guide number and the UN number.

Note : Certain guide numbers displayed in the green and the orange pages of these sections has the letters E or P attached:

- **E** indicates the substance may behave explosively at high temperatures.

- **P** indicates the substance reacts violently under high temperatures or on contamination with other materials. This may lead to a pressure build up in the container storing the material.

Yellow Pages

Yellow pages are the guide pages, and provide information in a brief and practical format. These guides are divided into four sections.

1. Hazards: Information on possible fire, explosion and health risks.

2. Protective Clothing: Information on the PPE to be worn.

3. Public Safety: General information on public safety and evacuation considerations.

4. Emergency Response: provides information on firefighting precautions and information involving fire, spills, leaks and first aid.

Emergency Information Book (EIB Manifest)

Site occupiers who store and handle dangerous goods beyond manifest quantity are required to prepare and maintain and Emergency Information Book (EIB).

The EIB is usually placed at the main entrance(s) to the site or building, in a position that can be easily seen by responding fire crews, and located in a red weatherproof container.

Note: "The Coles Express/ Shell Company" has recently installed 'Emergency Information Poles' at all their petrol stations.

The Red Poles are situated near the main entrance of each station and look like red metal bollards with 'Emergency Information' in white lettering displayed down the length.

The Emergency Information Pole is actually a capped receptacle for an 'Emergency Information Folder'. The cap of the pole is secured with a padlock, which is '003 – keyed'.

The EIB should contain the following information:

- Name and address of the premises;
- Emergency contacts
- Information about - classes of dangerous goods on site: and
- Dangerous goods in bulk
- A plan of the premises, showing the location of dangerous foods, essential services and installed firefighting equipment

If set up properly and maintained by the site occupier, the information contained in the EIB becomes a valuable resource for the firefighter, and should be accessed by first-on-scene crews as soon as possible.

Material Safety Data Sheet (MSDS)

Material Safety Data Sheets are used internationally to provide the information required to allow the safe handling of substances used at work. These sheets assist employers to discharge their general duty of care to employees by providing them with information on the hazardous substances they are working with and the hazards associated with those substances.

The MSDS is divided into 16 sections that provide information on:

- Chemical Product and Company Name
- Hazards identification

- Composition/Information on ingredients

- First Aid Measures
- Firefighting Measures
- Accidental Release measures
- Handling and Storing
- Exposure Control/Personal Protection
- Physical and Chemical Properties
- Chemical Stability and Reactivity Information
- Toxicological Information
- Ecological Information
- Disposal Considerations
- Transportation Information
- Regulatory Information
- Other Information

Chemical Data Sheet

Chemical data Sheets are information/printouts from a computer data base (Chemdata) and are used to transfer information by the radio to HAG sheets.

The features of a chemical data sheet include:

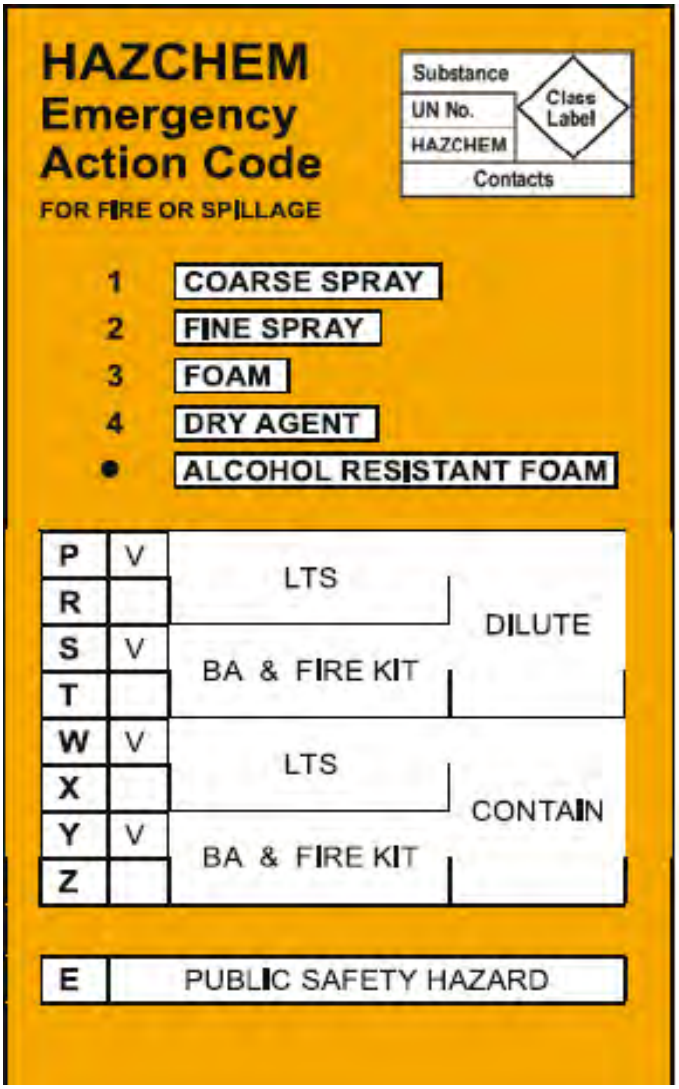
- Product number
- UN number
- APP code
- Hazards
- Precautions
- Firefighting
- Company names
- Decontamination
- First Aid

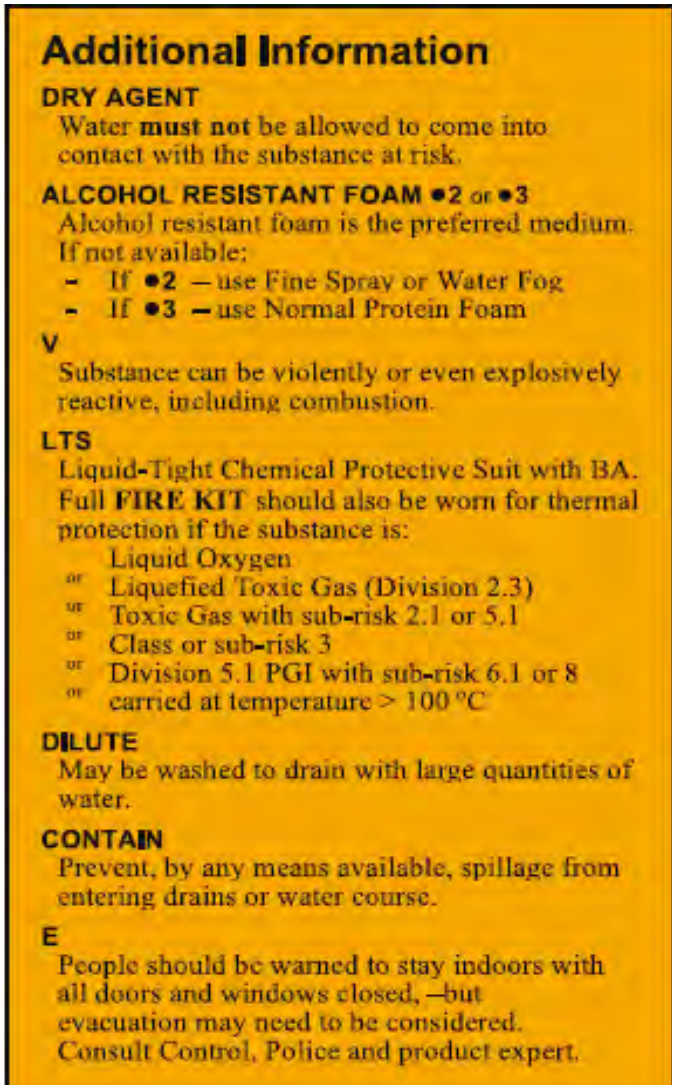
HAZCHEM Code (Emergency Action Code)

The HAZCHEM Code was designed as a generic “first three minutes action code”. It is a two or three character code that gives information about the initial actions to be taken at the scene of a hazmat incident.

The HAZCHEM Code is found on transport emergency information panels, tanks and other large containers found in a range of workplaces where chemicals are stored and handled. The HAZCHEM Code for fire or spillage is outlined in the table below.

HAZCHEM Emergency Action Code for Fire or Spillage





HAZCHEM Code explained

a – extinguishing agents

The first number indicates the appropriate firefighting agent:

1. denotes **Coarse Spray**
2. denotes **Fine Water Spray**
3. denotes **Normal Foam**
4. denotes **Dry agent**: water **MUST NOT** be allowed to come into contact with substance

NOTE: ***Any higher number than the one shown can be used but a lower number must not be used.***

A bullet "●" sometimes precedes the number 2 or 3
●2 and ●3, have the following meanings:

●**2** denotes that **alcohol resistant foam** is the preferred firefighting medium but, if it is not available, fine water spray can be used.

●**3** denotes that **alcohol resistant foam** is the preferred firefighting medium but, if it is not available, normal foam can be used.

For example, the Hazchem Code assigned to UN 1193 Ethyl Methyl Ketone is ●**2YE.** The "●" here indicates to us that alcohol resistant foam is the preferred firefighting medium. However, if such foam is not available, fine water spray, as the next most effective medium, should be used.

b – letter code information

Meaning of Second Character of Hazchem Code

Letter	Risk of Violent Reaction or Explosion	Recommended Personal Protective Equipment	Appropriate Measures
P	Yes	Liquid-tight chemical protective clothing and breathing apparatus	Dilute
R	No		
S	Yes	Full fire kit and breathing apparatus	
T	No		
W	Yes	Liquid-tight chemical protective clothing and breathing apparatus	Contain
X	No		
Y	Yes	Full fire kit and breathing apparatus	
Z	No		

The letter V located next to the letters P, S, W or Y, while not actually appearing on a displayed code, indicates that materials with these letters as part of their HAZCHEM Code are highly reactive and may explode or burn vigorously.

c – PPE information

Where the second character of the EAC is S, T, Y or Z, normal firefighting clothing is appropriate, i.e. self-contained open circuit positive pressure compressed air breathing apparatus, worn in combination with fire kit, firefighters' gloves and boots.

Note 1: *Leather boots may not provide adequate chemical resistance and therefore cation should be exercised in their use.*

Note2: *Letters S, T, Y and Z, which in previous EAC's were shown in reverse printing or square brackets for some dangerous goods, are now always shown in normal print, indicating that breathing apparatus should be used for all significant incidents.*

Note 3: *LP Gas, which in previous Codes was assigned an EAC of 2WE, is now assigned to 2YE in recognition that the most personal protection from this substance is thermal protection that is best provided by full fire kit, including breathing apparatus.*

d – dilute or contain

- **Dilute**: the letters P, R, S or T mean that the runoff and decontamination water may be diluted with larger quantities of water. Generally, however, the EPA prefer that this not happen, and materials should be contained.
- **Contain**: the letters W, X, Y or Z mean that runoff and decontamination must be prevented from entering drains or water courses.

Materials should be recovered where safe to do so.

Note: overzealous dilution should be discouraged, because this increases the volume of material that needs to be managed.

e – evacuation

In some instances the letter E will appear on the HAZCHEM Code, which indicates that consideration should be given to evacuation.

Any decision regarding evacuation, need to be considered carefully. Items that need to be considered include:

- The type of quantity of chemical involved
- The wind direction and weather
- The size of the area affected
- The environment, and
- Whether or not it would be safer to leave in place the persons affected by the incident.

Table C2 Situations where evacuation may be necessary

	EXAMPLES	ASSESSMENT
1.(i)	Smoke from product fire which is allowed to burn out. (Often the safest and least environmentally damaging option.)	*Nuisance effects will last several hours. Smoke or gas concentrations in open air are unpleasant but short-term exposure is not likely to be dangerous.*
(ii)	Small/low concentration long lasting toxic emission.	
2.	A larger long lasting toxic gas emission which will be carried towards an inhabited area after a predicted wind change not due for at least two hours.	*Area considered for evacuation will not be exposed to significant danger for at least an hour, preferably longer.*
3.	Evacuation of people from an isolated house in the country may be feasible, possibly using additional BA sets.	*Downwind area is very sparsely populated and resources are available to protect people during their evacuation.*
4.(i)	Righting a loaded road tanker or rail tank wagon, especially one carrying a liquefied gas.	*Area considered for evacuation could be exposed to danger as a result of actions necessary to restore normality at a time determined by the recovery team.*
(ii)	Recovering or clearing petrol from drains.	

Mixed/Multi Load Chart

Code chart for determination of emergency action codes for multi-loads

	P	R	S	T	W	X	Y	Z
P	P	P	P	P	W	W	W	W
R	P	R	P	R	W	X	W	X
S	P	P	S	S	W	W	Y	Y
T	P	R	S	T	W	X	Y	Z
W	W	W	W	W	W	W	W	W
X	W	X	W	X	W	X	W	X
Y	W	W	Y	Y	W	W	Y	Y
Z	W	X	Y	Z	W	X	Y	Z

The sequence of steps to be taken to determine the HAZCHEM code for a mixed load is detailed below:

a) To determine the first character (1, 2, 3 or 4). Take the first number of the code for each individual substance in the load. The numerically highest number is the first character of the Mixed Load HAZCHEM emergency action code.

b) To determine the second character –

I. If the same letter occurs as the second character in the code for each substance then that letter is the second character of the Mixed Load HAZCHEM emergency action code

II. If there are two different letters, take one of them and, using the code chart, select the appropriate vertical column for that letter. Take the horizontal line appropriate to the second letter and the letter at the intersection is the second character of the Mixed Load HAZCHEM emergency action code.

III. If there are more than two different substances in the load proceed as in (b) above using the letters for any two of the substances action codes. Then use the resultant letter with that for another substance to determine a second resultant. The procedure is repeated until a final resultant letter is found. That

letter is the second character of the Mixed Load HAZCHEM emergency action code.

IV. The letter 'E' is added to the Mixed Load HAZCHEM emergency action code if it appears in any codes relating to any of the substances in the Mixed Load.

Example:

- The HAZCHEM emergency action codes for four substances are as follows:

  2PE; 3S; 1T; 2Z

- The resultant mixed load HAZCHEM emergency action code is then

  3WE

Note: It is important that you develop the skills necessary to quickly and accurately apply the information given in the HAZCHEM Code and the Mixed Load Chart.

Hazmat Action Guide

The ACT Fire Brigade uses Chemdata as its chemical database. The information provided by the database is presented so it can be transferred to the HAZMAT Action Guide (HAG). The Hag is a double sided yellow form that comes in the same form as an A4 notepad. Side 1 of the form is used to gather information about the materials involved at incidents. A self explanatory 3 step procedure is followed to gather information, which is passed on to Comcen via radio and used to access the database.

Step 1 - Obtain the product name and, if possible, chemical name and UN number.

Step 2 - Transmit this information to Comcen using the phonetic alphabet (listed on side 1 of the HAG form) to ensure accuracy of message transmission).

Step 3 - While waiting for a reply, collect as much of the following information as possible and start to fill in **Side 1**:

- Form of substance;
- Number of containers;
- Type of containers;
- Size of containers;
- Total quantity involved;
- Manufacturers name;
- Specialist advice reference; and
- Class label/HAZCHEM emergency action code.

Side 2 of the HAG form is used to record the information retrieved from the database. Code numbers are transmitted to the personnel on site who, by marking boxes corresponding to the numbers being transmitted, will have information relevant to the hazard.

This information includes:

- Personal protection equipment to be worn;
- Physical form of the substance;
- Hazards associated with the substance;
- Effect when substance is mixed with water;
- Emergency action which should be taken;
- Firefighting actions; and
- Personnel decontamination procedures.

Chapter Four
Self Assessment

1) List two naming and numbering conventions used to help identify substances

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2) What does UN stand for and where would we find a complete list.

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3) There are nine classes of dangerous Goods, as defined in the ADG Code, list the nine classes.

---

4) State the colour of a cylinder containing chlorine and its possible hazards

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---

5) List the information located on an Emergency Information Panel.

---

6) A Material Safety Data Sheet is divided into 16 sections. List eight of those sections.

Chapter Five

Responding to a Hazmat Incident

Several issues need to be addressed from the time an appliance leaves the station till the time it arrives, to ensure an incident is handled safely. When responding to a potential hazmat incident firefighters must take into account all possible factors before deciding on the safest course of action. Information gathered at the scene may compliment initial response information. This information, combined with ACTFB SOP's and checklists will guide the incident controller in developing strategies for establishing control at the scene and terminating the incident.

This chapter covers:

- **Response considerations**;
- **Arrival on scene**;
- **Site control**;
- **Containment strategies and tactics**;
- **Recovery**; **and**
- **Incident termination**;
- **Standard operating procedures.**

Response Considerations

As firefighters exit the station, they should already be considering the information provided in the callout. Initial information provided in the callout request may include:

- Type of incident (if known);
- Time;
- Location of the incident;
- Current weather conditions;
- Other units/services that may be responding; and
- Details of any casualties.

Where hazardous materials or dangerous goods are known to be involved, firefighters must also consider:

- Types and quantities of hazmat products present
- Existence and availability of local knowledge; and

- What PPE will be appropriate.

Where further information relating to the identification of hazmat products is made available over the radio, product details must be accurately relayed. Hazmat product names should be spelt out using the phonetic alphabet to ensure no mistakes are made.

Where there is uncertainty about the type(s) or quantity(s) of hazmat product at the scene, firefighters must clarify what they are dealing with before proceeding to take action.

Initial considerations

It is important to remember that hazmat products present unique hazards requiring specialist equipment and response techniques. Firefighters responding to a hazmat incident must never:

- Rush into action; or
- Unnecessarily expose themselves to hazmat products.

Response Sequence

The following acronym may assist hazmat responders in remembering the sequence of events taken into controlling a hazmat incident:

I - identify hazard

P - personal protective equipment required

I - isolate (area of contamination/hazard)

C - contain (contaminate)

D - decontaminate (persons and equipment)

M - monitoring of contamination and personnel

Arrival On-Scene

Once on scene, firefighters will need to take some general precautions and carry out the tasks involved with size up of the incident, identification of the hazardous material and assessment of whether or not rescue and evacuation is required.

General Precautions

There are a number of general precautions that should be observed at any suspected hazmat incident. The following precautions will help firefighters maintain the safety of all personnel involved in a hazmat incident response and ensure the effectiveness of any actions taken.

- Control the movement of people.

- Confirm that the incident involves hazardous materials:

  I. Look for the HAZCHEM sign;
  II. Identify the materials from a distance (use binoculars)
  III. During identification, remember that spelling and product details are crucial; and
  IV. Do not guess – only use the information that is at hand.

- Once the hazardous materials have been identified:

  I. Select the appropriate PPE
  II. Avoid any unnecessary exposure.

Size Up

Size up is the mental evaluation made by the incident controller to determine a suitable course of action fro dealing with an incident. As incidents are dynamic situations, new hazards and risks may occur with little warning. For this reason the situation, and actions taken are to be continually reviewed (dynamic risk assessment process) until the incident has been successfully terminated.

If you have responded to an incident and you see a HAZCHEM sign, you should always consider that there are dangerous goods on the site that could be involved in the incident.

On seeing a **HAZCHEM** sign you should:

- Locate and assess the type of hazmat products;
- Locate the emergency information container or other placarding; and
- Ascertain from the occupier if there are any persons on site.

If you have responded to an incident and you see an **EMERGENCY INFORMATION** panel you should:

- Consider that there are likely to be **large quantities of dangerous goods** on the site;
- Obtain the emergency information book located in the emergency information container;
- Identify the types and quantities of dangerous goods; and
- Determine their locations

In order to maintain a safe working environment, and frame an appropriate sit-rep, the following factors need to be considered:

- Access to the scene of the incident and the local topography.
- Siting of appliances
- Availability of on site chemical, technical and safety information.
- Is there any danger to life, property or the environment? Consider

I. Evacuation of the work site and a roll call;
II. First aid to injured workers and/or members of the public (consider risk of contamination);
III. Contaminated runoff, air pollution and the effect of topography;
IV. Type of construction used in buildings on the site;
V. Utilising installed fire protection;
VI. Red HAZMAT bag carried on all ACTFB appliances;
VII. Protecting exposures;
VIII. Control of potential ignition sources;
IX. Availability of water supplies; and
X. Requirement for extra supplies of neutralisers, absorbents and other chemical agents.

Most of this information is contained in the Emergency Information Book, but it should be noted that sites with limited quantities of dangerous goods would not have an EIB. In such circumstances, firefighters must rely on the more basic forms of information such as UN numbers and product labels.

Product Verification

Product data and verification of product data through the IERG, EIB, MSDS and other relevant sources of information, are essential considerations in framing an appropriate sit-rep and planning strategies to control the incident.

To accurately verify the product involved in the incident, the following details may be required:

- UN number/dangerous goods class;
- HAZCHEM action code;
- Product name;
- Quantity of material;
- Health risks posed by the material;
- Fire or explosion hazards posed by the material;
- The chemical reactivity of the material;
- The physical form of the material – solid, liquid or gas; and
- Any other relevant specialist information.

Site Control

Where firefighters suspect the presence of a hazardous material, the operational priority is to isolate the scene and deny entry. The objectives of site control are to manage the:

- Perimeter around the site entry points: and
- Access inside the perimeter to all entry points (e.g. gates and windows)

Site control is achieved through the implementation of isolation and control zones. There are operational differences between the initial isolation zone and the control zones.

Isolation zones can be set up by first responding firefighters. Control zones generally require additional personnel, the use of protective clothing, decontamination procedures and air monitoring instruments. Control zones are usually established after sufficient specialist resources have arrived on scene.

Initial Isolation Zone

First responders using barrier tape or other suitable materials to create an outer perimeter around the hazmat scene can establish an initial isolation zone. The IERG details suitable distances for the perimeter based on the type of hazardous materials involved.

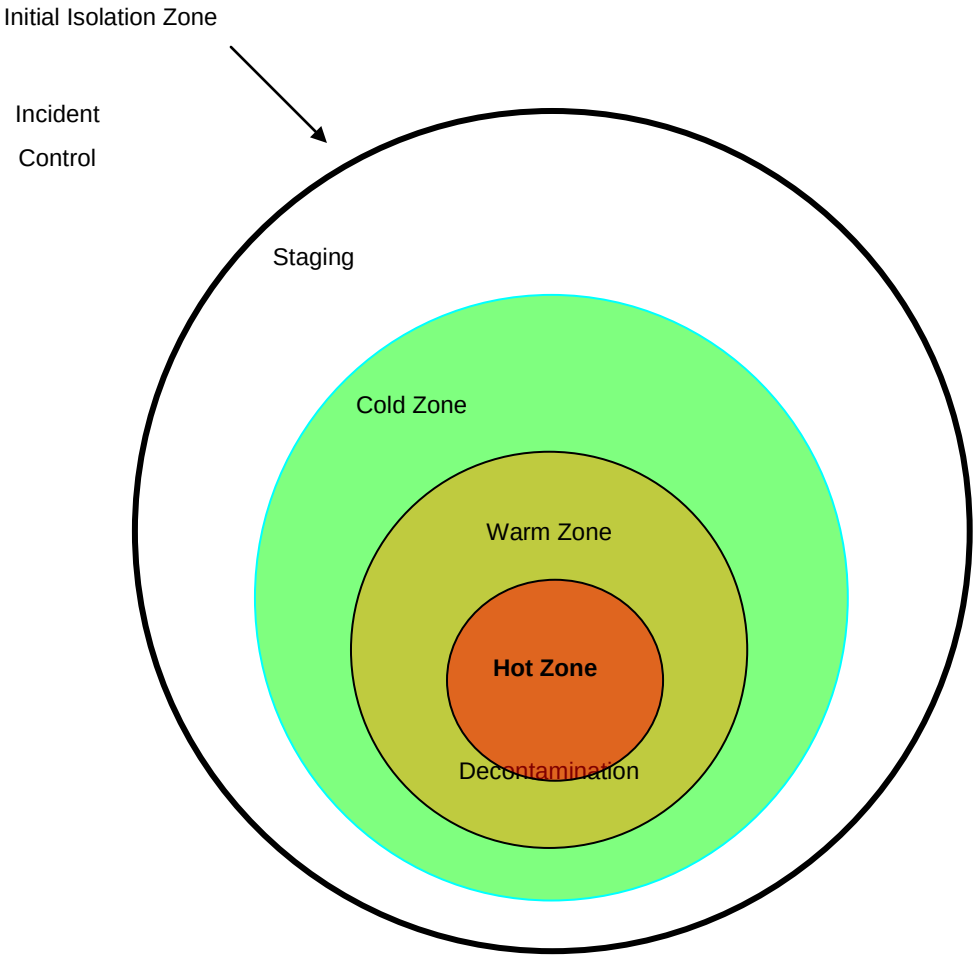
Personnel or members of the public are not permitted to pass through the perimeter and into the initial isolation zone without the approval of the incident controller.

Control Zones

Three control zones are to be established, the:

- Hot zone;
- Warm zone; and
- Cold zone

All three zones are defined and controlled by the incident controller. The size of each zone depends on the extent and severity of the incident, and the physical layout of the area. In some instances, gas detection equipment might be required to determine the actual area of the zone.



Hot Zone

The hot zone is identified as an area of isolation where contaminant levels are considered sufficiently high to threaten life and safety. Only personnel equipped with the appropriate PPE and other equipment may enter.

Warm Zone

The warm zone is identified as an area of immediately surrounding the hot zone and is where decontamination commences. Near the boundary of the hot zone contaminants may still be at a level that can pose an exposure risk to unprotected personnel.

Cold Zone

The cold zone is a support area immediately surrounding the warm zone. Access to the cold zone is restricted to support agencies. Site control, casualty treatment area and marshalling/assembly areas are generally established in the cold zone.

Note: The actual layout of the zones will be determined by wind direction, topography and the physical layout of the site.

Rescue

When responding to an incident there is the potential that a rescue of unaccounted persons might be necessary.

However, it must always be kept in mind that at a hazmat incident, the nature of the material involved may make a rescue impractical. Justifying not performing a rescue is very difficult. However, the safety of firefighters is paramount and must be the first consideration. In some cases it may be appropriate to protect endangered people in-situ until specialist resources become available.

Before performing a rescue, firefighters must carefully weigh up all the factors. If the decision is taken to proceed with a rescue at a hazmat incident, full structural firefighting protective clothing with self contained breathing apparatus (BA) and rubber protective gloves and rubber boots must be worn **as a minimum.**

The following actions must be taken when conducting a rescue:

- Injured people removed from the hot zones should be moved to a safe location as quickly as possible after emergency decontamination;
- It is preferable that the rescuers do not perform any first aid on the victims, because of the possibility of spreading contamination;
- For their own protection, firefighters practicing first aid must wear appropriate protective clothing; and
- After the rescue has been completed, the rescuers should assume they have been contaminated, and must seek decontamination and if necessary preventative medical assistance.

Evacuation

The purpose of evacuation is to move people from a threatened or hazardous area to a safe area. When evacuation is a priority, it should be carried out at the same time as the control zones are being identified and established.

The evacuation should commence in the hot zone and continue outward to the initial isolation zone perimeter, taking into account wind direction and the slope of the land.

Depending on the extent and severity of the incident, it may be necessary to consider evacuating people from the premises surrounding the incident. This decision will be based on the extent of the protection provided by the structures themselves.

In some instances it is better if people are left inside surrounding buildings, with instructions to close all doors and windows, and to shut off ignition sources, heating, ventilation and air conditioning equipment, rather than risk moving people through a gas cloud.

Evacuations can be complex and a number of basic factors need to be considered before deciding whether to evacuate or to begin in-situ protection.

Before commencing an evacuation consider:

- The nature of the materials involved;
- The population at risk;
- Ability to communicate with the public;
- The resources on scene and the capabilities of the firefighters;
- Time factors, such as the time of day and the amount of time required to complete the evacuation; and
- Current weather conditions.

People who have been evacuated should be asked if they know of anyone who has been left behind or who is otherwise unaccounted for.

Containment Strategies and Tactics

Suitable strategies are determined based on initial size up of the incident, which takes into account facts, probabilities, own situation, decisions and the formulation of a plan of action. Strategies may be offensive, defensive, or a combination of the two.

Note: **RECEO** (rescue, exposures, containment, extinguishment and overhaul) supports the size up process and assists the incident controller in establishing the operational priorities for controlling and terminating the incident.

The desired outcome of any strategy that is employed should always be:

- Prevention of death and injuries;
- Minimisation of property and environmental damage; and
- The resolution of the emergency safely and quickly.

Defensive Strategies

Defensive strategies involve no direct intervention by the firefighter. The aim is to let the incident stabilise itself.

For example, under the right circumstances, letting a toxic substance involved in a fire burn and allowing the intense heat developed in the fire to destroy any toxic by products. Under the right conditions, this could lead too less environmental pollution and reduce the risk of toxic exposure to firefighters and the community.

A combination of offensive and defensive strategies could involve withdrawing to a safe position until adequate resources are on hand, then employing some form of offensive attack.

Offensive Strategies

Offensive strategies involve some form of direct intervention. This could include an aggressive hose line attack to perform a rescue or protect an exposure, or an aggressive application of neutraliser to contain a dangerous acid spill.

If an offensive strategy is employed, control operation must be kept uphill and upwind. If large tanks are involved, ensure that tank failure will not threaten anyone in the area.

Containment Tactics

Containment tactics are the remedial actions needed to control a leak or spill at its source. Containment tactics generally involve entering the hot zone. This aggressive approach poses an increased level of risk to firefighters.

Techniques and procedures used will depend on the hazardous material involved and the type of container the material is stored in. Examples of containment tactics include:

- Up-righting and sealing leaking containers;
- Allowing the leak to continue then handling appropriately
- Plugging and patching leaking containers; and
- Closing valves and closing and tightening lids.

Confinement Tactics

Confinement tactics are the remedial actions needed to ensure a hazardous liquid or other hazardous spill does not spread any further into the environment. The confinement tactics selected (and the techniques and procedures supporting them) will depend on the hazardous liquid involved, the availability of resources and the location of the hazardous spill.

Tactical options for confining hazardous spills may involve, diversion, dyking, retention or a combination of one or more of them.

Diverting a spill away from storm water drains

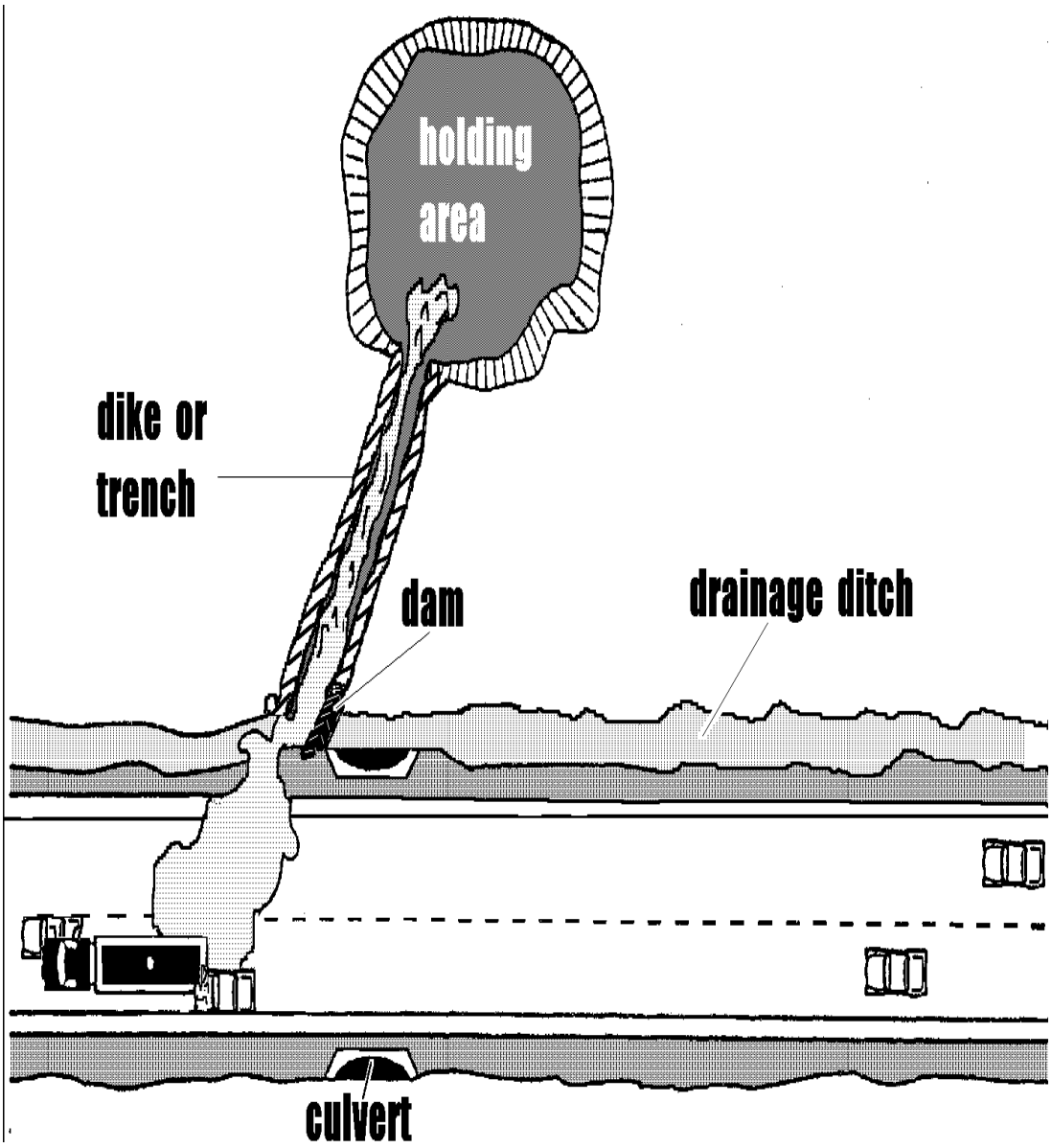
Diversion

Diversion involves redirecting a hazardous spill by constructing a trench or temporary barrier to divert the flow to an area where it can be temporarily retained with minimal risk to personnel or the environment.

Constructing a diversion barrier requires resources, but if done properly a large area can be protected. The barrier is placed ahead of the spill and is usually made of soil, but could be any material that does not react with the hazardous substance involved.

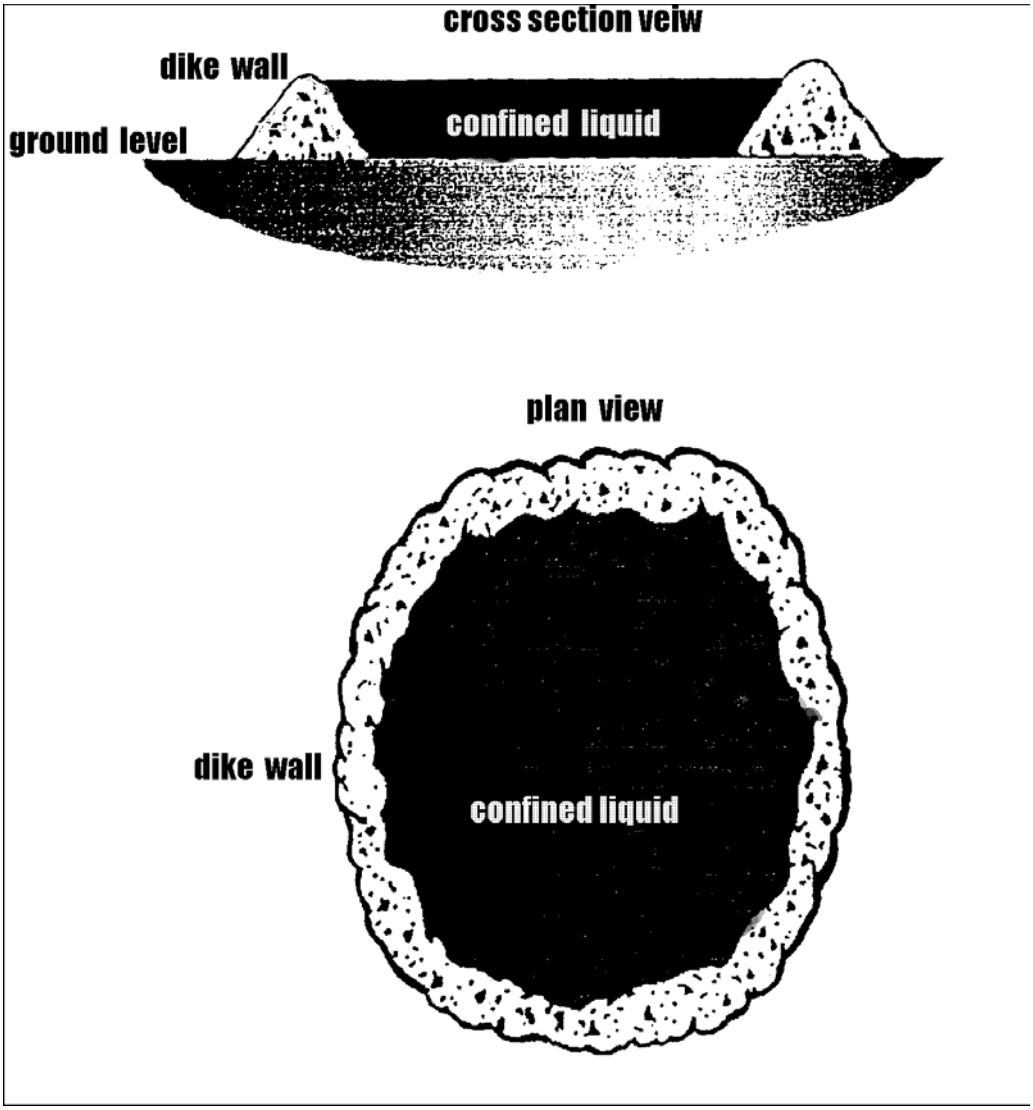
Once the barrier is in place, the liquid can be diverted into a pit, sump, hollow or any other area large enough to contain the spill safely. Sometimes the barrier will need to be built well ahead of the spill.

An example of this technique would be diverting from a roadway, via a trench, into a holding area, see the figure below.



Dyking

Dyking involves containing the spread of a hazardous spill by constructing a barrier around the spill to control its flow. There are several types of dykes that can be constructed. (see figures below.)



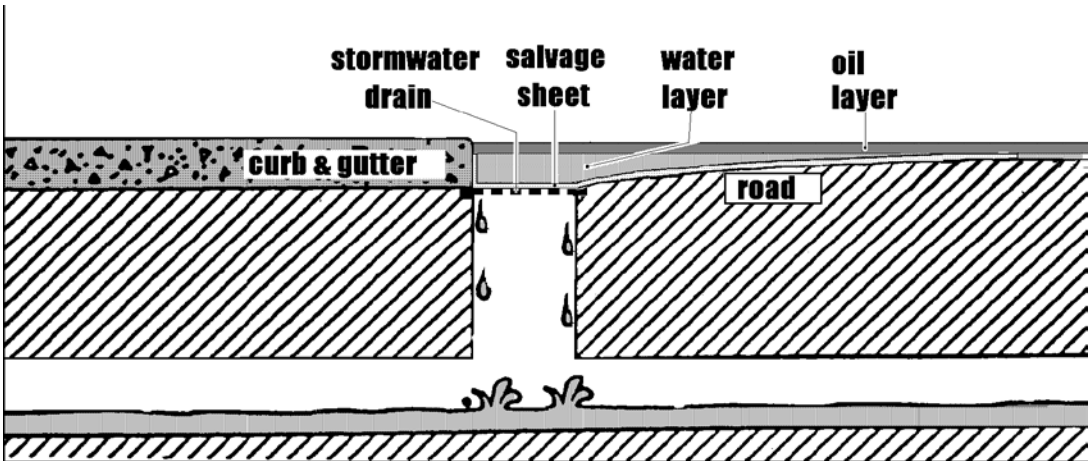
Dykes are most effective when they can be built quickly and are able to contain at least 90% of the spilled material.

As a first responder you will have to use whatever material is available; soil, tarps, boards, sand etc. In fact any material that will not react with the liquid. A common problem is most responders tend to over estimate the amount of spill and underestimate the number of personnel required to construct the dyke. One common factor that limits dyking construction in the metropolitan area is the presence of asphalt and concrete at the spill site, with no available soil. In

this case you will either have to sacrifice some ground or consider requesting COMCEN to obtain the necessary materials.

Retention

Retention generally involves the temporary confinement of the material until other tactics can be employed. Retention techniques can be employed as a backup measure to diversion or dyking. (see figure below)



Retention could involve the covering of storm drains or other outlets with tarps and plastic or blocking the drain with soil. Forming temporary dams using salvage sheets and ropes/ladders. The hazmat van does carry Hazbins that could be used as temporary storage containers for spilt or leaking materials.

If the liquid has a specific gravity less than water and does not react with water, the retention area may be flooded. The material would float on the water and any leakage onto the drain would be water not the hazardous material

Foam

Foam is a very effective vapour suppressing agent and extinguishing agent. There are a number of different types of foam available, each with its own particular characteristics.

When deciding whether or not to use foam on a hazardous material fire, or on a hazardous material spill to limit the spread of vapours, the following guidelines need to be considered:

- Foam solutions conduct electricity and should not be used if there is a danger of electrocution.
- Foam cannot extinguish fuel fires, e.g. leaking valves or flanges
- The liquid being covered must be below its boiling point as foams cannot seal off the vapours of a boiling liquid.
- The foam must be compatible with the liquid otherwise the foam will be destroyed.
- The success of foam application is dependant on the correct application rate; there must be sufficient quantities on hand to cover the liquid and there must also be enough foam delivery equipment on scene to provide an adequate application rate.
- Foam will be destroyed if applied at the same time as some other extinguishing agents. Fore example, water will disperse the foam blanket and dry powder extinguishing agents will break down the foam.
- Foam applied to a burning liquid above 100° Celsius will cause a slop over.
- Foam should be applied gently to provide better aeration and liquid coverage

Recovery

The initial actions of containment and confinement at a hazmat incident are focused on minimising and controlling the impact of an emergency. The phase of the operation following the stabilisation of the scene is the **recovery** of the substance.

The recovery of a spilt or leaking product may be necessary to further reduce or minimise the impact the spill or leak may have on the community or the environment. The Incident Controller in conjunction with other agencies and specialist advice will coordinate the recovery. In most instances Brigade personnel will carry out the work required to recover a substance. There will

however be occasions when specialist will have to enter the hot zone and assist with recovery, e.g. chemists, bobcat operators etc.

There are a number of techniques available for the recovery of hazardous substances spills or leaks. The choice of technique will depend on:

- **The substance involved** – is the substance toxic, corrosive, flammable, carcinogenic.
- **Resources available** – is there enough absorbents, containers, chem suits, staffing available. What other resources are available.
- **Specialist advice** – will offer assistance as to how the clean up/recovery should occur
- **Environmental impact** – will a particular method add to the environmental hazards already taken place, e.g. diluting a chemical and allowing it to enter a drain.
- **Other factors** – time, weather, run off location etc.

Techniques available include:

Sorbents

- Adsorbents – The collection by surface wetting, e.g. heavy oil attaching itself to straw or plastic strips. This method is more likely to be used under specialist advice using the suppliers adsorbents
- Absorbents – Collection by capillary action, e.g. light oil penetrates the surface of vermiculite. This method will be the most common used in the Brigade.

Turbomat

Is an example of a pump that may be used in some circumstances to remove a substance to a more appropriate site. It can be used for example in a basement or an area where a substance has been contained.

Removal of Contaminated Soil

This will be done in conjunction with specialist assistance and advice. The removal will require earthmoving equipment; advice should be sought on how much soil to remove, how to transport the soil and where the soil will be stockpiled.

On Site Storage

Can the substance be contained in or diverted to:

- Portable tanks
- Drums
- Rail or truck tankers
- Lined pits
- Portable or improvised dams.

Incident Termination

The final decision to declare the scene safe will be made by the Incident Controller, once he or she has consulted with the industry technical specialists and support agencies.

Hazmat response personnel can then begin the safe decontamination of all equipment used in the operation and making up of the area can take place. Part of this process involves bagging and tagging all contaminated equipment for decontamination and the recommissioning of vehicles

Standard Operating Procedures

See attachments.

Chapter Five
Self Assessment

1) List five factors that should be considered in order to maintain a safe working environment and frame an appropriate sit-rep.

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2) List five precautions to be taken on arriving at a workplace incident in order to maintain a safe working environment

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3) Name the three control zones established at a hazmat incident and describe the purpose of each.

---

4) List the four containment techniques that could be employed at a hazmat incident.

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5) Provide a brief example of a defensive strategy when dealing with a HAZCHEM spill.

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6) Provide a brief example of an offensive strategy when dealing with a HAZCHEM spill.

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7) Finish the acronym by filling in the missing words.

I----------

P----------

I----------

C----------

D----------

M----------

Chapter Six

Decontamination

Decontamination is the physical or chemical process of making people and equipment safe by removing contaminants, while preventing the spread of contaminants beyond controlled limits.

This ensures that whenever a firefighter or others become involved in an incident in which chemicals are known to be, or are suspected of being hazardous, the contaminant can be removed from those contaminated

This chapter covers:

- **Methods of decontamination**
- **Levels of decontamination**
- **Siting a decontamination area**

Methods of Decontamination

The chemical and physical properties of hazardous materials present at an incident will determine the level of decontamination response required to render the incident scene safe. The aims of decontamination are to:

- Protect the health and safety of firefighters and other emergency services personnel;
- Assist casualties; and
- Prevent the spread of contaminants.

The hazardous materials involved in the incident will determine the method of decontamination.

Wet Decontamination

Water is used to stop contaminants from aerosolising or evaporating, and for washing contaminants off a casualties body provided the contaminant is not reactive to water.

Dry Decontamination

Dry agents are used to neutralise contaminants when the contaminants are water reactive, or can be readily absorbed by dry agents.

Wet/Dry Decontamination

Dry agents are used to first neutralise any water reactive contaminants. This is then followed by the use of water to rinse off the neutralised contaminants.

Levels of Decontamination

There are four levels of decontamination that may be used in responding to hazmat/CBR incidents.

Level 1 – Emergency decontamination;

Level 2 – Emergency Services Decontamination;

Level 3 – Mass Decontamination; and

Level 4 – Bulk Decontamination Systems

The size of the incident, the numbers of casualties and the types of hazardous materials involved in the incident will determine the required level of decontamination response that is needed.

Level 1 decontamination may be undertaken by first responders at the scene, while waiting for hazmat specialist personnel and equipment to arrive. Levels 2-4 decontamination techniques are undertaken by hazmat specialists.

Technical decontamination solutions may be employed to enhance the effectiveness of whatever level of decontamination is deemed appropriate for the incident. Solutions employed in technical decontamination include:

- Soap and water;
- Sodium hypochlorite (household bleach);
- Calcium hypochlorite (pool chlorine); and
- Other suitable neutralising chemicals.

Level 1 – Emergency Decontamination

In the event of a Hazmat incident, casualties may be sufficiently mobile to exit the hot zone without assistance. In these instances first responder's on-scene may need to perform an emergency decontamination. The decontamination equipment available to do this will generally be limited to whatever is present on the first responders appliance e.g. hose lines and hose reels.

Emergency decontamination principles

Emergency decontamination incorporates the following principles:

1) Strip;

2) Wash; and

3) Cover.

Once a casualty has been decontaminated first aid can be performed and medical attention if required.

Emergency Decontamination Procedure

Firefighters carrying out an emergency decontamination must adhere to the following procedure in order to minimise the spread of contaminants:

- Isolate the risk to prevent further casualties;
- Exit casualties to an emergency decontamination area;
- Disrobe the casualty down to their underwear (bag and tag clothing);
- Wash the casualty by flushing with water;

- Apply emergency first aid if required;
- Cover the casualty with a blanket or other clothing to prevent hypothermia and provide them a degree of dignity;
- Seek medical attention; and
- Record details of any personnel exposed to contaminants.

Note: First aid should not be attempted until the casualty has been decontaminated.

Using available equipment, the firefighter can perform an emergency decontamination as shown below.

Wetting disrobed casualty

Level 2 – Emergency Responders Decontamination

Fire and other emergency responder personnel, along with other specialists groups undertake activities that may require them to enter contaminated areas wearing appropriate protective equipment. Emergency responders decontamination, in the form of a “technical corridor” is designed to cater for these personnel.

Emergency Responders Decontamination

On arrival at the scene, Hazmat crews will set up a “technical corridor” decontamination zone. This zone is made up of six functional areas, as follows:

1) Entry area;
2) Holding area;
3) Cleaning area;
4) Inspecting and disrobing area;
5) Buffer zones (hot/warm/cold); and
6) Exit area.

The picture below illustrates the typical layout of a “technical corridor” decontamination zone set up by fire and emergency services personnel.

Emergency Services Decontamination Procedure

Personnel operating with PPC at a hazmat/CBR incident must adhere to the following procedure in order to minimise the spread of contaminants and to avoid coming into contact with any contaminant:

- Exit the hot zone into the holding area before passing through a (dam and wet) cleaning area designed to remove any contaminants that may be present on the PPC; and
- After cleaning, move to the inspection and disrobing safe area, where your PPC is inspected and then removed prior to personnel exiting the decontamination zone

Note: Fire service personnel wearing appropriate PPC will be positioned within the emergency services decontamination zone to assist you with the cleaning, inspection and removal of PPC/E

See attached diagram of a technical decontamination corridor

Level 3 – Mass Decontamination

While mass decontamination may be required at any hazmat incident, it is more likely to be required at incidents resulting from a terrorist act. These types of incidents are likely to involve the use of CBR agents and will target

large numbers of people, seeking to overwhelm the emergency support systems.

Fire and emergency services personnel responding to any such event would be confronted by a scenario that would require the highest level of incident management skills and teamwork if they were to avoid being overwhelmed by the situation they encounter.

Note: Unless fire and emergency personnel are firm in their instructions and guidance to the public, panic will ensue and the mass decontamination area may be over run.

Mass Decontamination Principles

The overarching principle for performing a mass decontamination is to “deliver the greatest good for the greatest number”.

Mass decontamination incorporates the following principles:

1) Wet;
2) Strip;
3) Wash; and
4) Cover.

These principles are similar to Level 1 emergency decontamination principles, with the additional step of wetting the casualties clothing with a fine misting water spray before they disrobe. This is done to stop the contaminant from aerosolising or evaporating any further.

Wetting clothing to reduce aerosolising or evaporation

Note: Where a contaminant is identified as water reactive an appropriate neutralising agent should be used prior to water application.

Mass Decontamination Procedure

As large numbers of the public may need to be decontaminated the procedures used will differ to those used in Level 1 decontamination. In the first instance, mass decontamination may be carried out by firefighters using hose streams to wet down the casualties.

This will be followed by setting up a series of fixed nozzles, ensuring proper wetting on entry (to the zone), and adequate washing prior to exiting the zone.

Note: While the mass decontamination zone is being established, firefighters may need to hold the public at bay with fog streams.

Firefighters conducting a mass decontamination should adhere to the following general procedures:

- Isolate the risk to prevent further casualties;
- Establish the mass decontamination zone with separate corridors (non ambulatory and male/female ambulant casualties);
- Ensure proper wetting on entry (to the zone) and adequate washing prior to exit of this zone;
- Position personnel (in appropriate PPC) within the corridors to guide and direct casualties throughout the whole process;
- Direct casualties to the mass decontamination area;
- Disrobe casualties (down to their underwear) and bag and tag contaminated clothing an possessions;
- Move the casualties steadily throughout the corridor, allowing water sprays to flush away contaminants;
- Apply emergency first aid if required;
- Cover casualties with blankets or other clothing to prevent hypothermia and to provide them a degree of dignity;
- Seek medical attention; and
- Record details of any personnel exposed to contaminants.

Firefighters must also be prepared to triage casualties and be able to recognise the onset of symptoms from ‘agents’ that have caused the event, as well as the effects of heat, shock and anxiety, which will accompany any such incident.

Level 4 – Bulk Decontamination Systems

Level 4 decontamination involves trailer mounted bulk decontamination systems, developed to cater for casualties at large, complex or lengthy hazmat/CBR incidents.

A bulk decontamination system involves up to three corridors; male and female ambulant casualty corridors and a non ambulant casualty corridor.

It is divided into stages – hot, disrobing, inspection and re-dress – and includes an identification bar code system. Bulk decontamination systems are labour intensive, requiring operators at all stages.

These systems can supply warm water for decontamination, as well as having the capability to deliver technical decontamination solutions via an adjustable dosage. They can supply both detergent and bleach solutions.

Siting a Decontamination Zone

When siting a decontamination zone, the following considerations must be taken into account:

- Type of decontamination to be carried out;
- Weather conditions, particularly the wind direction;
- Location of any drains and water courses (to control run off);
- Topography;
- Comfort and safety of personnel;
- Location of appliances;
- Location of water supplies; and
- Location of appliance to supply hose lines. Lighting etc.;
- Proximity to incident;
- Location of entry control point.


A.C.T. FIRE BRIGADE
IN CASE OF EMERGENCY
DIAL
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Chapter Six
Self Assessment

1) List the four levels of decontamination.

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2) List the principles of emergency decontamination for a casualty.

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3) Describe the steps involved in carrying out an emergency decontamination of a casualty of a hazmat incident.

---

4) Describe three features associated with a bulk decontamination system

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5) List six considerations when siting a decontamination zone.

Chapter Seven

Special Hazards

There are a number of special hazards that firefighters may encounter when responding to a hazardous materials incident. These hazards should be treated using the same procedures as applied to any hazardous materials incident. However, incidents involving materials with special hazards do have some unique characteristics, which are discussed in this chapter.

This chapter covers:

- **Asbestos;**
- **Biological Hazards;**
- **Infectious Materials**
- **Clandestine Laboratory Hazards.**

Asbestos

Asbestos was once extensively used as a building material, but it is now recognised as a hazardous material. There are controls on its use in industry and construction, and the long term goal is to remove or make asbestos safe in all structures and buildings.

Potential Location

Asbestos can be found in the following products or locations:

- Heat resistant textiles;
- Asbestos cement sheet;
- Special filters for industrial equipment;
- Thermal insulation and lagging;
- Clutch plates and brake linings;
- Gaskets
- Floor tiles

- Roofing tiles and linings;
- Packing materials;
- Fire retardant paints;
- Spray on fireproofing and soundproofing
- Acoustic plaster soundproofing
- Water pipes; and
- Insulation of air conditioning ducts, pipes, hot water tanks, reactors and boilers.

Associated Hazards

Asbestos particles are in the size range known as respirable (between one and four microns). Due to their size, they are small enough to penetrate the deepest areas of the lungs and, depending on the particle shape, big enough to become trapped.

Chronic asbestos exposure is known to cause asbestosis, lung cancer and mesothelioma (cancer of the external lining of the lung). The risk of developing asbestos related diseases depends on the fibre shape, the concentration of the dust and the length of exposure.

A major concern with asbestos exposure is that no symptoms occur at the time of exposure. Chronic asbestos exposure is a significant hazard. The hazard associated with a single exposure is less clear, although a single exposure to asbestos in circumstances found in firefighting is unlikely to result in disease.

Safe Handling Procedures

To minimise risks associated with exposure to, or contact with, asbestos (fibres/dust):

- Wear BA in conjunction with approved turnout clothing, in areas where personnel may be exposed to asbestos;
- Minimise the amount of unprotected exposure time in an asbestos environment;
- Wet all suspected asbestos materials with a fog spray to reduce the likelihood of airborne exposure;
- Where possible, avoid disturbing asbestos or materials containing asbestos when conducting salvage work;

- Wear BA and apply a light water stream when cutting roofing and other materials suspected of containing asbestos;
- Decontaminate personnel and equipment before leaving the scene of the incident (apart from protecting personnel and equipment, this also prevents contamination to appliances and members own vehicles);
- Contain water run off to prevent further spread of asbestos to other areas; and
- Double bag (in plastic bags) contaminated protective clothing, tag the bags and dispatch them for safe decontamination.

Biological Hazards

Biological hazards are defined as **Infectious Materials** containing disease producing organisms. The main issue is recognising when a biological hazard exists, for example:

- A fire or spillage in a biological laboratory, medical laboratory or quarantine facility.
- A spillage during the storage or transport of chemical, medical or veterinary wastes;
- A motor vehicle accident involving specimens carried in a medical courier's vehicle;
- Incidents involving pets, livestock or other animals in unhygienic conditions; and
- Infectious materials.

The basic types of organisms that can cause infections are:

- Bacteria, such as tetanus;
- Viruses such as hepatitis and HIV;
- Fungi, such as tinea; and
- Yeasts, such as candida

Infectious materials can cause contamination if the material comes in contact with:

- The mucous membranes found in the airway;
- The blood stream, via cuts, lacerations and abrasions;
- The eyes; and
- Other body fluids such as perspiration

Safe Handling Procedures

When responding to an incident with the potential for exposure to infectious substances, it is important that the following broad guidelines are employed.

For a spill involving biological hazards:

- Identify the source of the material;
- Wear BA splash suit, rubber boots and rubber gloves;
- Contain the spill using an absorbent material;
- Collect waste material and place in bio-hazard waste containers; and
- Seek expert advice with regards to decontamination, sterilisation and disposal of contaminated equipment.

For a fire involving biological materials:

- Wear normal structural firefighting uniform, BA, boots and gloves (this will reduce the risk of inhaling the by products of decomposing materials and contamination via splashing, and preventing infection via cuts and abrasions);
- Consider allowing material to burn and be destroyed by the heat of the fire (this decision should be made in consultation with other bodies, such as the EPA).
- Instigate decontamination procedures (technical advice might be required for the correct decontamination technique).

Clandestine Laboratories

Clandestine laboratories are primarily used to illegally manufacture drugs, such as amphetamines.

Clandestine laboratories have also been used in the illicit manufacturing of chemical/biological warfare agents and explosive materials. Given the nature of the chemicals involved in these processes, the potential risks can be quite severe.

Potential Location

There are ranges of signs that can indicate a clandestine laboratory is present. Laboratories can be located in sheds, caravans, houses and motel and hotel rooms. Warning signs can include some or all of the following:

- Improvised laboratory facilities or equipment, including glassware, burners and filtering apparatus;
- Extra locks on doors, and bars on windows;
- Sealed up or heavily curtained windows;
- Slot-type openings cut into doors;
- Chemical solvent odours
- Discarded waste materials; and
- Electrical switchboard bypassed

Note: where these signs are evident, firefighters must notify the police and approach with extreme caution.

Associated Hazards

Due to the temporary nature of these clandestine laboratories, a number of hazards can exist. These can include unsafe structures, inappropriate storage of chemicals and unsafe waste disposal techniques.

General Hazards

Types of hazards at a clandestine laboratory include:

- Improvised and unsafe electrical work;
- Poor ventilation; and
- A variety of potential ignition sources

Hazardous Chemicals

Hazardous chemicals that could be stored in the laboratory include:

- Flammable liquids such as ether and acetone;
- Flammable solids, such as red phosphorus and powdered nickel;
- Corrosive chemicals, such as caustic soda, acetic acid and hydrochloric acid;
- Chemicals capable of producing toxic or irritant fumes;
- Unlabelled or poorly labelled chemicals; and
- Hazardous wastes.

Fire Hazards

Fire hazards may include:

- Highly flammable chemicals – if ignited these materials will burn rapidly;
- Incompatible materials stored in close proximity to each other;
- Chemical containers capable of exploding if involved in a fire; and
- Possibility of chemicals reigniting even after initial fire extinguishment.

Other Hazards

Other hazards may include:

- Little or no control of chemical waste
- Little or no operator understanding of laboratory safety, or the inherent dangers associated with the chemicals being used;
- Weapons, including explosives, security devices and guard dogs used to protect the clandestine laboratory; and
- Mantraps and other booby trap devices.

Self Assessment
Chapter Seven

1) List five locations where asbestos may be encountered.

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2) List procedures to be followed when handling asbestos.

---

3) List three areas where biological hazards may be encountered.

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4) List five points that would indicate the possible presence of a clandestine laboratory.

Glossary

Absorption
Passage of materials through the body surface into body fluids and tissue. This can also refer to the use of adsorbents and to the passage of substances onto chemical protective clothing.

AFAC
The Australasian Fire Authorities Council is the national body representing all urban, rural and land management agencies within Australia and New Zealand with a responsibility for the protection of life and property from fire and other emergencies.

Absorbent
A material (usually granular), which absorbs liquids, thereby reducing their mobility.

Adsorbent
A process in which one material is attracted to, and clings to the surface of another.

Ambient temperature
The temperature of the surroundings, particularly the atmosphere.

Asbestos
Non-combustible mineral fibre. Often used for fire-resisting materials and heat insulation. Asbestos dust and fibres are hazardous to the respiratory system.

Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code)
The ADG Code covers the classification, placarding, marking and transport of dangerous goods. The Code was prepared by the standing National Advisory Committee on the Transport of Dangerous Goods and is endorsed by the Australian Transport Advisory Council. The ADG Code is based on recommendations prepared by the UN Committee of Experts on the Transport of Dangerous Goods.

Bioactive agent
Any material that has an identifiable effect, visible or otherwise, on living tissue, either at the time of initial contact or some time after the initial exposure.

Carcinogens
Substances that have the potential to induce cancer in living organisms.

Cargo manifest
A shipping paper listing all of the load carried by a vessel.

Class labels
Class labels identify the type of hazardous material being stored or transported. These are grouped under broad classifications according to the predominant type of risk involved.

Control zones
The designation of areas at a hazardous materials incident based upon safety and degree of hazard. These zones may be defined as area of likely contamination (hot zone), area of operations (warm zone) and support zone (cold zone).

Combatant authority
The agency, service, organisation, or authority with the legislative responsibility for control of the incident.

Combustible liquids
A liquid that has a flashpoint above 61°C at ambient temperature.

Consignor
According to the ADG Code, a consignor means a person who engages a contractor to transport goods. In the case of imported dangerous goods, legislation establishes the importer as the consignor for the first journey.

Container
According to the ADG Code, a container means anything in or by which dangerous goods are wholly or partly cased, covered, enclosed, contained or packed, whether such a thing is empty or partially or completely full, but does not include a vehicle, or freight container.

Containment
Those procedures taken to keep a material in a defined area.

Contaminant
A material that forms a residue in, or on a substance and may pose a threat to life, health, or the environment during an uncontrolled release.

Cryogens
Substances used to produce low temperatures.

Cryogenic Liquid
A liquid which has a boiling point below -150°C at normal atmospheric pressure.

Decontamination
The physical and/or chemical process of reducing and preventing the spread of contamination from the people involved and equipment used at a hazardous materials incident. Decontamination methods depend on the

chemical characteristics of the materials involved, therefore assistance should be sought from the chemical manufacturer or an appropriate technical adviser.

Emergency Information Panel
A vehicle placard required by the *Australian Code for the Transport of Dangerous Goods by Road and Rail* for the transportation of dangerous goods in bulk, providing information on the Proper Shipping Name, UN Class, UN Number, HAZCHEM Code, and a contact number for specialist advice.

Emergency Procedure Guide
A document specifying the appropriate actions to be taken in the event of an incident involving a dangerous good, during transportation.

Emergency Response Guide Books
Reference guides that provide detailed information on dangerous goods, their specific characteristics and potential hazards.

Flammable
Capable of being ignited and of burning.

Flammable gases
Gases, which ignite on contact with a source of ignition.

Flammable liquids
Liquids, which ignite on contact with a source of ignition and have a flashpoint range of not greater than 61°C.

Flammable solids
Flammable solids are those that are readily combustible and those that may cause fire through friction. Substances liable to spontaneous combustion and substances, which, in contact with water, emit flammable gases, are akin to flammable solids.

Flashpoint
The flashpoint of a liquid is the lowest temperature at which it gives off sufficient vapour to form a flammable mixture with air, so that on the application of a flame, the vapours will flash but will not continue to burn.

Friable material
This is material which is easily crumbled or reduced to powder.

Gas-tight suit
Clothing that protects the wearer against chemical vapours and gases. Usually a single or multi-piece garment constructed of chemical protective materials designed and configured to protect the wearer's torso, head, arms, legs, hands and feet. It covers the wearer's head, hands and feet with attached and detachable hoods, gloves and boots. It completely encloses the wearer by itself or in combination with the wearer's respiratory equipment, hood, gloves and boots. (Considered as Level 'A' Chemical Clothing protection by some agencies, or, Level 3 by others.)

HAZCHEM Code
The HAZCHEM Code is an emergency action code of numbers and letters which provides information to emergency services.

Hazard/Hazardous
Capable of posing an unreasonable risk to health, or the environment; capable of doing harm.

Hazardous material
Any substance that is assessed by an emergency service as likely to endanger people, property or the environment. The term includes dangerous goods, hazardous substances, scheduled poisons, listed wastes, radioactive substances and environmental pollutants.

HAZMAT Action Guide
A document designed to facilitate the communication by radio of data from a chemical data base to an Incident Controller.

Hazardous materials incident
A hazardous materials incident involves the actual or impending spillage or leakage of a hazardous material, in sufficient quantity to pose a danger to life, property or the environment. A hazardous materials incident may occur during manufacture, use, handling, transport or storage of hazardous materials.

High temperature protective clothing
Protective clothing designed to protect the wearer for short-term high temperature exposures. This type of clothing is usually of limited use in dealing with chemicals.

Ignition source
A source of energy sufficient to initiate combustion.

Ingestion
Ingestion is the entry of a substance into the body through the mouth.

Inhalation
Inhalation is the entry of gases, vapours, fumes, mists or dusts into the body through the respiratory system.

Injection
Injection is the introduction of a substance into the body through the skin via a syringe, sharp object or compressed gas.

Material Safety Data Sheet
A document that describes the properties and uses of a substance, that is, its identity, chemical and physical properties, health hazard information, precautions for use, and safe handling information.

Neurotoxins
Poisons that attack the nervous system.

NOS
Not Otherwise Specified. Used in Correct Shipping Names to cover chemicals having similar properties but which have not been assigned separate UN Numbers.

Oral toxicity
The toxicity of a chemical when taken by mouth.

Personal protective equipment
The equipment provided to shield or isolate a person from the chemical, physical and thermal hazards that may be encountered at a hazardous materials incident. Personal protective equipment includes both personal protective clothing and respiratory protection. Adequate personal protective equipment should protect the respiratory system, skin, eyes, face, hands, feet, head, body and hearing.

Placards and labels
These are notices located at sites where hazardous materials are present. There are three types: outer warning placards, composite warning placards (for mixed package stores) and single-substance placards (for tanks and bulk stores).

Proper Shipping Name
The Proper Shipping Name used to describe a dangerous good as defined in the Australian Dangerous Goods Code, the UN Code and the IMDG Code.

Protective clothing
Clothing designed to protect the wearer from heat and/or dangerous goods contacting the skin or eyes. Protective clothing is divided into four types:

- structural firefighters' protective clothing
- splash suit
- gas-tight suit
- high temperature protective clothing.

Regulations
These include all provisions given force of law by the competent authority or authorities.

Shipping papers
A shipping order, bill of lading manifest, waybill, or other shipping document issued by the carrier.

Soda ash
Anhydrous sodium carbonate.

Splash suit
Clothing that protects the wearer against chemical liquid splashes but not against chemical vapours or gases.

Standard operating procedures
A set of organisational directives that establish a standard course of action on the incident ground to increase the effectiveness of the emergency response team. They are to be written, official, applied to all situations, enforced and integrated into the management model.

Structural firefighters' protective clothing
This category of clothing is the protective clothing normally worn by firefighters during structural firefighting operations. It includes a helmet, coat, pants, boots and gloves. Structural firefighters' protective clothing provides limited protection from heat but may not provide adequate protection from the harmful vapours or liquids that are encountered during dangerous goods incidents.

Structures
These include any industrial plant, erection, edifice, wall, chimney, fence, bridge, dam, reservoir, wharf, jetty, earth works, reclamation, ship, floating structure and tunnelling.

Toxins
Substances that can cause harm to living tissue by chemical activity if inhaled, ingested or absorbed.

UN Number
The substance identification number assigned to a dangerous good by the United Nations Committee of Experts on the Transport of Dangerous Goods.

Wetting agents
Chemical additives used to reduce the surface tension of water or other liquids to make them spread and penetrate more easily. They enable fires to be put out more readily.

ACT FIRE BRIGADE

STANDARD OPERATING PROCEDURE No. 15

HAZARDOUS MATERIALS

LEGISLATION & STANDARDS:

Fire Brigade Act 1957, Sections 4, 7, 9.
Fire Brigade Regulations 5B
Dangerous Goods Act 1984
Hazardous Materials Sub Plan (ACT Emergency Plan)
Memorandum of Understanding – Hazardous Materials Spillage
The Australian Fire Competency Standards
Staff Minute 1995-96 / 1

OBJECTIVES:

To provide guidance regarding:-

1. The safe and effective management of Hazardous Materials Incidents.

2. Command of ACT Fire Brigade resources at Hazardous Materials incidents.

3. Control and co-ordination of the resources of the Emergency Services Bureau and other agencies at Hazardous Materials incidents.

RESPONSE:

FIRST ALARM		SECOND ALARM		THIRD ALARM		FOURTH ALARM	
Response	**Notify**	**Response**	**Notify**	**Response**	**Notify**	**Response**	**Notify**
1 Pumper H, BA	DO, Pol, Amb, DGI, EPA	2 Pumpers DO Decon Trl	Supt BAO	2 Pumpers Supt, BAO	F.C. Recall	2 Pumpers	F.C. Recall

NOTE: See Attachment A for response to CBR incidents`

Additional Response:

Determined by the Combat Area Controller based on assessment.
On receipt of further information the Comcen supervisor may upgrade the alarm level. The Comcen Supervisor shall not downgrade the initial response. The response to an incident can only be downgraded by the Combat Area Controller after performing an assessment on site.

Additional Response Issues:

The Combat Area Controller may modify response after considering:

- The nature of the incident on arrival (leak, fire, damage to container with no leak).
- Information received from on-site plant staff/manifest.
- Extent of spillage/plume (environmental impacts).
- Runoff and containment considerations.
- Number of Casualties/potential casualties.
- Number and type of exposures in close proximity.
- Topography / Weather.
- Water Supply.
- Traffic.
- Safety of Personnel and Public.
- Need for evacuation.

OPERATIONAL PROCEDURES:

The Officer on the first arriving appliance will assume the role of Combat Area Controller and is responsible for operations within the Combat Area, (Hot and Warm Zones).

The incident must be approached with caution, having regard to available information. Any approach should be made from upwind and the appliance should be positioned at least 100 metres from the site. (Appliance Binoculars are to be used to assess situation).

- Upon arrival, transmit arrival message including exact location and situation of appliance.
- Obtain a detailed description of the material involved and the nature of the incident eg. spillage, gas leakage, radioactive material, etc. This may be available through on-site experts or via transport/storage manifest, placarding, class labels, chemical database and D.O.T. manual.
- Complete the Hazmat Action Guide (HAG) sheet.
- Secure the area.
- Establish the Hot, Warm and Cold Zones and instigate BA Staging. (see attachment B).

- Consider the need for rescue / evacuation.
- Assess the situation by considering the following:-
    - is there a fire?
    - is there a spill / leak. What is the extent?
    - is containment / neutralisation necessary?
    - what are the weather conditions?
    - what is the topography?
    - what is at risk - people, property or the environment?
      how significant is the risk - based on the situation and the hazards associated with the material?
    - what resources are required?.
- Transmit a Sitrep and upgrade response as necessary. Obtain expert advice as required eg. EPA, Chemists, Radiation Section, Industry experts.
- Establish liaison with AFP who are in control of overall incident scene, (Field Controller). [At small incidents or in early stages of larger incidents, ACTFB may undertake Field Controller function].
- Establish a Decontamination Zone.
- Combat incident and conduct decontamination as appropriate.
- Arrange for disposal of material, in conjunction with EPA, Waste Management and industry experts.
- Compile a list of all people, including staff, who may have been exposed to the material and complete and attach health identification wrist tags to each person on the list. Exposure records to be filled out.
- DO to notify parties to Hazmat Spillage MOU by FAX proforma
- Combat Area Controller and/or Environment ACT and/or Health Protection Service are responsible for declaring the area safe.
- Consideration shall be given to:
    - Critical Incident Stress management
    - Debrief post incident
    - Recording and Reporting
    - Coroners requirements/reports

ATTACHMENT A

Terrorist related Chemical, Biological & Radiological Incidents

(CBR)

OBJECTIVES:

To provide guidance regarding;

1. The safe and effective management of Chemical, Biological & Radiological terrorist incidents

RESPONSE:

FIRST ALARM		SECOND ALARM		THIRD ALARM		FOURTH ALARM	
Response	**Notify**	**Response**	**Notify**	**Response**	**Notify**	**Response**	**Notify**
2 Pumpers H, BA, DO, BAO	Supt, Pol, Amb, EPA, Health	2 Pumpers Supt Decon Trl	FC	2 Pumpers	Recall	1 Pumper	Recall

ADDITIONAL RESPONSE:

Consideration should be given to responding a pumper to the Canberra & Calvary Hospitals to assist with decontamination of self presenters.

ADDITIONAL CBR RESPONSE ISSUES:

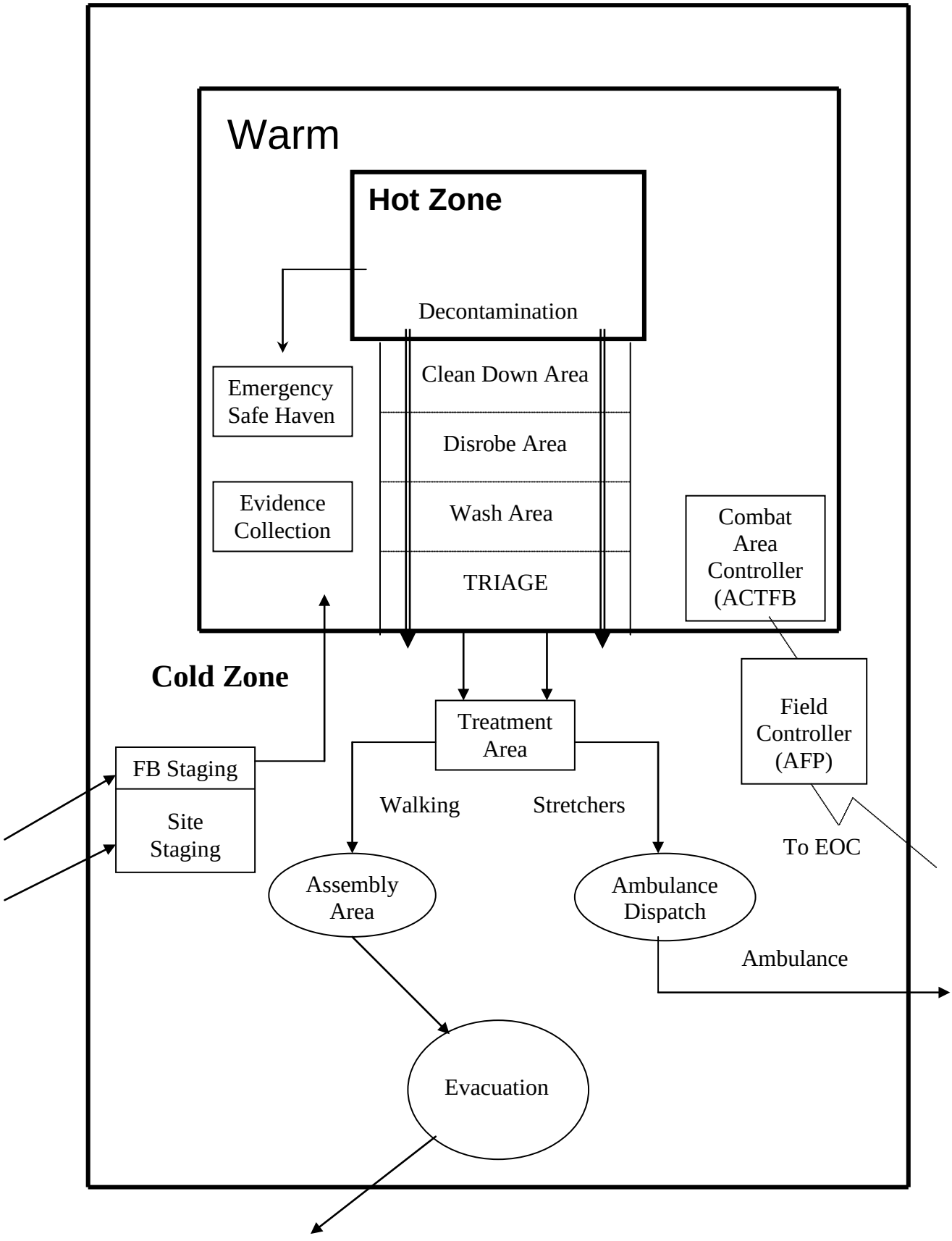
- Detection and identification of agent
- Super-toxic nature of agent involved
- Presence of hostile persons
- Number of casualties/potential casualties
- Mass casualty decontamination
- Political nature of event
- Security of area

ADDITIONAL CBR OPERATIONAL PROCEDURES:

- Establish liaison with Police
- Restrict entry to Hot Zone to personnel wearing Fully Encapsulated Chemical Suits
- Establish a Decontamination Zone for Civilian Casualties
- Establish a Decontamination Zone for Responders
- Preservation of scene

ATTACHMENT B

Stylised Site Layout



Listing of Chemical Protective Suits in the ACTFB (*Feb. 2008)*

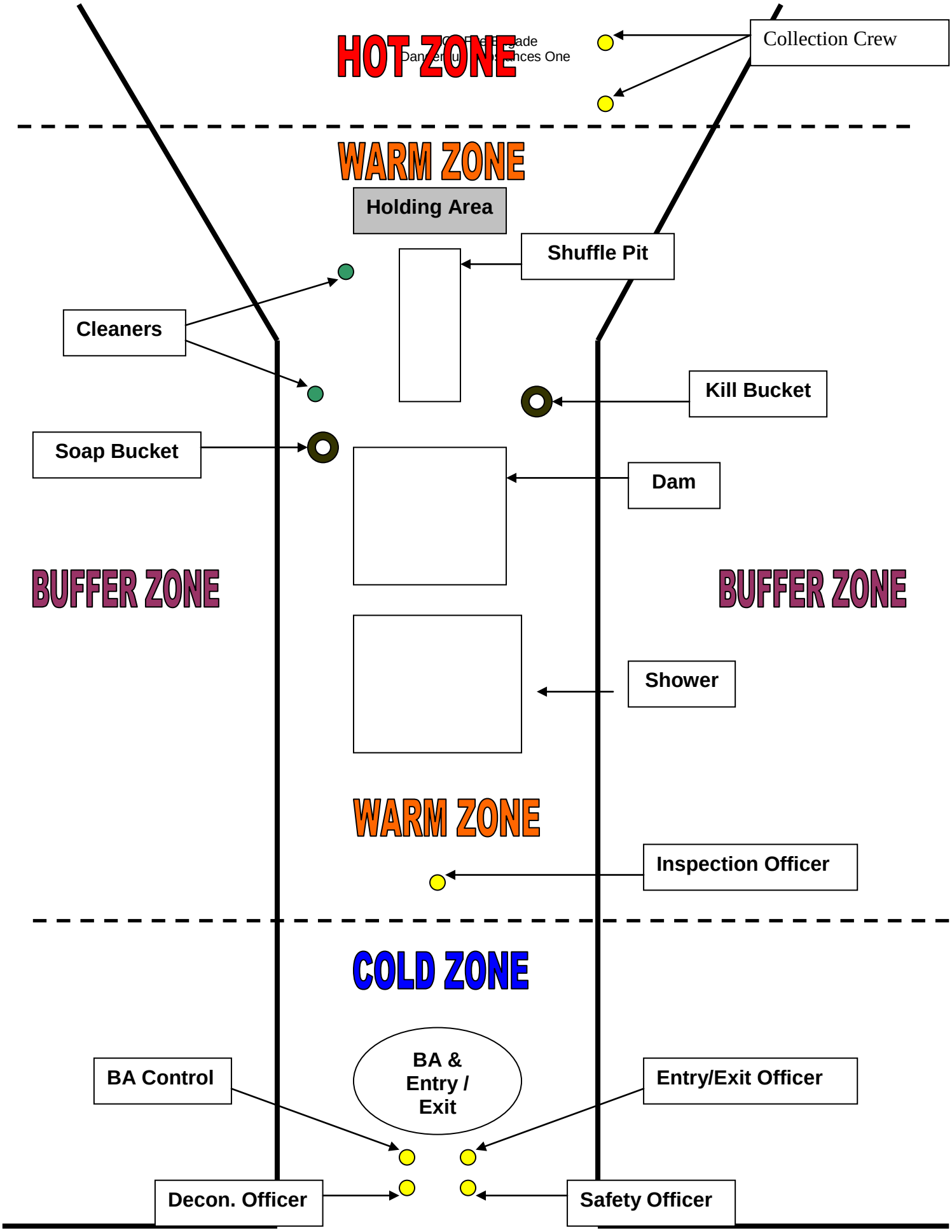
Fully Encapsulating Suits

Type	Colour	Purpose
Respirex	Orange	Operational
Trelleborg	Yellow	Suit No's 34, 35 Operational
Limited Use Tychem	Lime Green	Operational (EMA Cache)
Trelleborg	Yellow	Training

Splash Suits

Type	Colour	Purpose
PVC	Orange	Operational
Tychem TK	Lime Green	Operational
Tychem Type F	Grey	Operational (EMA Cache) 1 time use only
PVC	Green	Training

Note: The reason for different splash suits, is that they have different permeation qualities, for example: PCB's and some chemicals penetrate PVC. You would then use a Tychem splash suit.


HOT ZONE
Collection Crew
WARM ZONE
Holding Area
Shuffle Pit
Cleaners
Kill Bucket
Soap Bucket
Dam
BUFFER ZONE
BUFFER ZONE
Shower
WARM ZONE
Inspection Officer
COLD ZONE
BA &
Entry /
Exit
BA Control
Entry/Exit Officer
Decon. Officer
Safety Officer
Disrobe
area
Robing
Area
Backup Crew

ACT FIRE BRIGADE

Use of Breathing Apparatus & Resuscitation Equipment

Operator/Wearer

Name: **Rank:** **Brigade: No:**

Platoon on Duty: **Stn. No:** **Date of use:** **Incident No:**

Type of Incident

Fire: ☐ **Hazmat:** ☐ **Drill:** ☐ **Other:** ☐

Describe if other:

Address:

Unit History

Type of unit: **Unit No:** **Period of time used:** 00:00

Defects noted:

Operator/Wearer

Platoon: **Station:**

Signature: .....

Station Officer

Platoon: **Station:**

Brigade No: **Name:**

Signature: .....

HAZMAT/CBR INCIDENT ATTENDANCE RECORD

DATE: **INC#:** **LOCATION:**

TYPE: **HAZMAT / CBR** **OIC:**

BRIGADE No.	NAME	DECON. YES / NO	TASK

THIS FORM IS TO BE COMPLETED AT HAZMAT/CBR INCIDENTS AND FORWARDED TO THE BA OFFICER.

DECONTAMINATION ZONE SUMMARY

DATE	TIME	INCIDENT No.	LOCATION	PLTN

Wrist tags completed. **YES / NO**

Type of contaminant/s:

Form of contaminants:

How contaminated (eg inhalation, ingestion, absorption, skin contact)

Brief description of degree of contamination

Number of brigade personnel decontaminated (including decontamination team).

Number of non-brigade personnel decontaminated.

Casualties: Brigade/non-Brigade.

Type/level of decontamination and equipment used in zone (wet decon, dry decon, shower, dam, hose lines).
Cleansing/neutralising agent/s used.

NAME_____ DATE_____

This form is to be filled out and signed by the Decontamination Officer and forwarded to the Incident Commander
CONCLUSION

ACT Fire Brigade

ACT FIRE BRIGADE

STAFF MINUTE

Subject: **UNIFORM DRESS REQUIREMENTS FOR OPERATIONAL PERSONNEL**

Reference: 2004026

Distribution: All Members All Stations

Date: 30 March 2004

This Staff Minute supersedes Staff Minute 2001083.

All members are advised that following recommendations of the uniform committee and the acceptance of a total uniform package submission, a number of new items of uniform and equipment are being introduced into the Brigade.

The following is a list of new items to be issued;

- ACTFB Baseball Cap
- ACTFB Beanie
- ACTFB T-shirt
- ACTFB Polar Fleece
- ACTFB Wet Weather Jacket
- ACTFB Backpack

With the reintroduction of T-shirts, members will be issued 4 x T-shirts per year.

The wearing of non-Brigade issued T-shirts will not be allowed under any circumstance. Brigade issue T-shirts are not to be worn by members when carrying out activities in view of the general public with the exception of operational duties.

Following the initial issue, all other items will be on a one-for-one basis.

It is the responsibility of the Station Officer to ensure that all members are dressed in the appropriate uniform and/or protective clothing, in line with the following guide.

Operational Firefighters are required to wear specific items of uniform whilst performing duties in accordance with the appropriate level of preparedness. The levels of preparedness are described as follows;

Dress Uniform

Official Brigade ceremonies.

Level 0

General station duties, all situations where the Brigade are in public view, not associated with an incident.

Level 1

Motor vehicle accidents, grass fires, medical assists.

Level 2

Alarm calls, structural fires, transport fires and rescues that require fire protection.

Level 3

Hazardous material incidents (splash suits).

Level 4

Hazardous material incidents (fully encapsulated).

Dress Uniform		
Item	**Issue**	**Comments**
Shoes	Baxter elastic sided boots	Unless medical exemption
Socks	Lightweight or Heavyweight	As issued
Trousers	Navy blue woolen	
Belt	25mm leather	
Shirt	Light blue short sleeve or Light blue long sleeve	Worn with tie
Tie	Clip on navy blue	compulsory
Jumper	Lightweight navy blue (Nato)	as required
Galatea		DO & above
Epaulettes		On shirt, jumper or galatea
Head dress	Peak cap or Akubra	DO & above SO and Firefighters

Day Workers		
Item	**Issue**	**Comments**
Shoes	Baxter elastic sided or Taipan GP style boots	Unless medical exemption
Socks	Lightweight or Heavyweight	As issued
Trousers	Navy blue woolen	
Belt	25mm leather	
Shirt Winter (Eastern Standard Time)	Light blue short sleeve or Light blue long sleeve	Worn with tie
Shirt Summer (Eastern Standard Daylight Saving Time)	Dark Blue Short Sleeve or Dark Blue Long Sleeve	Light blue to be worn by DO's and above at all times
Tie	Clip on navy blue	Winter only
Jumper or Fleece Jacket	Lightweight navy blue (Nato)or Fleece Jacket	As required
Vest	Navy blue	Day workers and comm's staff only
Epaulettes	Correctly positioned and according to rank	On shirt, jumper, vest or fleece jacket
Head dress	Navy blue baseball cap or Akubra	District Officers and above will wear a peak cap

Level 0 - Station Level		
Item	**Issue**	**Comments**
Shoes	Baxter elastic sided or Taipan GP style boots	
Socks	Lightweight or Heavyweight	As issued
Trousers	Navy blue woolen	
Belt	25mm leather	
Shirt	Dark blue short sleeve or Dark blue long sleeve or T-Shirt	Station & in public Station & in public Station work or under level one or two jackets only
Jumper or Fleece Jacket	Lightweight navy blue (Nato) or Fleece Jacket	As required Fleece not to be used for Firefighting situations
Vest	Navy blue	Comcen only
Epaulettes		On shirt, jumper, or jacket
Head dress	Navy blue baseball cap, beanie or Navy blue floppy	As issued

Level 1		
Item	**Issue**	**Comments**
Boots	Haix or Warrington Pro or Taipan GP style wildland fire compliant safety boot	Phasing – out
Socks	Lightweight ankle length or Heavy	
Trousers	Navy blue woolen	
Belt	25mm leather	
Shirt	100% cotton T-Shirt	As issued
Jumper	Lightweight navy blue (Nato)	As required for cold, must consider heat stress issues
Overpants	Crossfire or equivalent	As required
Level 1 Jacket		
Flash Hood		As required
Helmet	Lime Green Red White	Firefighters Station Officers DO & above
Gloves	Riggers Shelby structural or replacement	As required As required
Goggles	Safety or Bushfire	As required
Head dress	Baseball cap, floppy hat or beanie	Only to be worn when helmets are not required

Level 2		
Item	**Issue**	**Comments**
Boots	Haix or Warrington Pro	 Phasing – out
Socks	Lightweight ankle length or Heavy	
Trousers	Navy blue woolen	
Belt	25mm leather	
Shirt	100% cotton T-Shirt	
Overpants & Braces	Crossfire or equivalent	Double layer
Structural coat	Crossfire or equivalent	
Flash Hood		
Helmet	Lime Green Red White	Firefighters Station Officers DO & above
Gloves	Shelby or replacement Crossfire	 Phasing out
Self Contained Breathing Apparatus		As required

Level 3		
Item	**Issue**	**Comments**
Boots	Chemical resistant rubber boots	
Socks	Lightweight ankle length or Heavy	
Trousers	Navy blue woolen	
Belt	25mm leather	
Shirt	100% cotton T-Shirt	
Chemical Splash Suit		
Helmet	Light weight or structural helmet	
Gloves	Chemical resistant gloves	
Self Contained Breathing Apparatus		

Level 4		
Item	**Issue**	**Comments**
Boots	Chemical resistant rubber boots	
Socks	Lightweight ankle length or Heavy	
Trousers	Navy blue woolen	Or paper overalls as required
Belt	25mm leather	Not required if wearing paper overalls
Shirt	100% cotton T-Shirt	
Fully Encapsulated Chemical Suit		
Helmet	Light weight	
Gloves	Chemical resistant gloves	
Self Contained Breathing Apparatus		

All Staff		
Item	**Issue**	**Comments**
Kit Bag	Large Red	Storage of all PPE
Back Pack	Small personal	To carry required PPE on the appliance
Wet weather jacket	High Viz Techni Vision	

Note : Various pieces of PPE are required as part of a layered approach for achieving different levels.

The Station Officer or Incident Controller at an incident has the discretion at all times to determine the level of protection appropriate for members and can upgrade at any time.

Operational personnel are only to wear uniform and accoutrements as issued by the Brigade.

G J KENT
Superintendent
Response and Deployment

ACT FIRE BRIGADE

STAFF MINUTE

Subject: **DISPOSAL OF CONTAMINATED WASTE AND CLEANING OF CONTAMINATED PPE**

Reference: 2003108

Distribution: All Members All Stations

Date: 24 September 2003

This Staff Minute replaces:
1994/95-79
2001099

This minute details the procedure to be followed for the disposal of contaminated waste and the cleaning of contaminated personal protective equipment, clothing, blankets etc.

Disposal of contaminated waste

- Contaminated waste (e.g. disposable and riggers gloves, bandages, dressings, etc.) is to be placed in the yellow plastic bags marked **Infectious Waste/ Contaminated** as seen below:

- The bags are to be sealed and tags attached detailing the following information:

    1. When and where used
    2. Who used it (Platoon and contact name)
    3. What the plastic bag contains

- The Station Officer at the incident is to then arrange the Brigade Ute to pick up the bags for delivery and disposal at Total Care Mitchell. If the incident occurs outside business hours the contaminated waste is to be double bagged and then stored in a Hazbin at No 1 Station until it can be disposed of during Total Care's business hours. Entries are to be made in both the Occurrence Book and SO's Diary at No 1 Station, recording the fact that such materials are on location.

Note: The yellow contaminated / infectious waste bags are **not** to be used for any other purpose other than the disposal of contaminated / infectious waste. If, for example, they are used for general rubbish disposal and they are seen at a tip, the tip will be closed down and EPA will be notified.

Cleaning of contaminated PPE etc

- In the event of items such as fire tunics, overpants, trousers, shirts, structural firefighting gloves, flash hoods etc becoming contaminated, they are to be placed in clear plastic bags as seen below: -

- The bags will be sealed and tags attached detailing the following information:

    1. When and where used
    2. Who used it (Platoon and contact name)
    3. What the plastic bag contains

- The bags are then to be delivered to Bel-Air dry-cleaners at the following address;

    Bel-Air
    Paragon Mall
    Gladstone Street
    Fyshwick

    If the incident occurs outside of business hours the bags should be kept at the BA section until it can be delivered to Bel-Air during business hours.

- In relation to structural firefighting boots they are to be bagged in the clear plastic bag as above and returned to your station, then contact the Hazmat section for determination of how best to clean them. In most cases the advice will be to hose the boots off to remove the contamination and clean with a disinfectant such as bleach (5%) solution.

Disposal procedures for items of PPE are the same as outlined above for contaminated waste.

NOTE: These procedures are particularly important in the event of exposure to infectious materials, such as body fluids at MVAs. However, in circumstances such as exposure to certain chemicals it may be necessary to dispose of items of uniform etc rather than have them cleaned. This will need to be determined at the time of the incident in consultation with the District Officer, specialist advice and the Hazmat Section.

Supplies of contaminated / infectious waste bags, clear bags, cable ties and tags are available from the BA Section on request.

Peter Newham
A/g Superintendent
Operations