EMERGENCY PLANNING

GUIDELINES FOR HAZARDOUS INDUSTRY

CHEM Unit
Chemical Hazards and
Emergency Management Unit

DEPARTMENT OF Emergency SERVICES

Australian and New Zealand
Hazardous Industry
Planning Taskforce

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FOREWORD

This is a joint document of the Australia and New Zealand Hazardous Industry Planning Taskforce and the Chemical Hazards and Emergency Management (CHEM) Unit of the Department of Emergency Services, Queensland.

The Taskforce was established in 1989 by the Australia and New Zealand Planning Ministers' Conference to promote a common approach to the planning and assessment of hazardous industry. It provides a forum for the co-ordination of policies, approaches and practices for land use safety planning and industrial risk assessment and management.

The CHEM Unit, which is represented on the Taskforce, was also established in 1989 in order to improve protection of the community from hazardous materials. One way that the Unit aims to achieve this is by improving the prevention of, and preparedness for emergencies through the development and implementation of effective emergency plans.

In an ideal world, the perfect safety management system would eliminate the possibility of emergency situations. However, despite the best intentions, things can, and do, go wrong. To effectively protect people, property and the environment from the consequences of such situations, there is a need for emergency planning. While emergency planning is vital for all industry, it is particularly important for hazardous industry, for which the consequences of emergencies are potentially greater.

These guidelines address the practical issues confronting people who manage hazardous materials. They are also useful for other stakeholders in the emergency planning process, such as local authorities, regulators, planners, the emergency services and the wider community. Emergency planning is an interactive, dynamic process which benefits from consultation with informed stakeholders. Improved understanding of the planning process will contribute to the attainment of best practice in emergency planning.

Chair
Australia and New Zealand Hazardous Industry Planning Taskforce

Director
Chemical Hazards and Emergency Management (CHEM) Unit

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1.1 Background

Emergencies, though undesirable, do not disappear by wishful thinking. In a society dependent on industry for the production of fuels and chemicals, it is essential to minimise the associated risks and to set in place a system to protect people, property and the environment in the event of an emergency. There is a need to prepare for possible emergencies that might occur. This is the role of emergency planning.

The need for effective emergency planning has been reinforced in recent years by major accidents in Australia and overseas. In Australia, these have included the BLEVE in Cairns in 1987, the fire at the Seven Hills chemical plant in Sydney in 1989, the large LP gas fire and BLEVE at St Peters in Sydney in 1990, and the fire in Victoria in 1991 at the Coode Island hazardous chemical facility. Overseas, the names of Bhopal, Mexico City, Sao Paulo, Flixborough, Houston, Seveso and Piper Alpha have become synonymous with major emergencies.

While emergencies can never be totally prevented, their impacts may be mitigated by effective emergency planning. These guidelines are designed to assist operators of hazardous industries in the preparation of emergency plans. They have been developed for the Australia and New Zealand Hazardous Industry Planning Taskforce, by the Chemical Hazards and Emergency Management (CHEM) Unit, Department of Emergency Services, Queensland. The drafting process involved extensive consultation with industry, industry organisations, the emergency services and other government agencies.

1.2 Aim and Focus of these Guidelines

These guidelines aim to provide guidance on how to develop an emergency plan. They adopt a broad generic approach to the issue, rather than referring to specific legislative requirements. This enables their use in a range of jurisdictions throughout Australia and New Zealand.

The document targets the planning and assessment needs of major stakeholders in emergency planning, including the operators of hazardous facilities, local authorities, regulating agencies, strategic planners, the emergency services and the community. It outlines the steps involved in developing plans to deal with emergencies that are industrially-based (e.g. equipment failure resulting in fire or explosion, or bomb threats) or caused by natural hazards.

While the guidelines focus mainly on hazardous materials, they can equally be applied to industries not usually considered hazardous. They are sufficiently broad to apply to any facility, regardless of the nature of the hazardous materials stored or processed, or the type of operation - for example, a port (which has a quick turnaround of materials and which is given short notice when materials will arrive) or a facility with a steady inventory of hazardous materials.

1.3 Scope and Application of these Guidelines

These guidelines are advisory only. The word 'should' is used throughout to indicate that they are not intended as a set of prescriptive requirements that must be rigorously applied; nor are they intended as a template. The diverse nature of industries implies that the system developed by one facility to manage an emergency may not be appropriate for another facility. Even the basic definition of an emergency situation may differ from facility to facility. The level of detail necessary in the emergency plan and the degree of documentation will also vary, depending on the facility.

The key requirement is that the plan is fit for the purpose. It should be sufficiently comprehensive to cover the full range of activities at the facility

(including non-routine activities such as maintenance or construction) that could result in an emergency situation. Fit for the purpose also means relevant, realistic and sufficiently clear to be understood by all users and reviewers of the plan. In other words, an emergency plan should be tailored for the facility to which it will be applied. A small facility may only require a simple emergency plan, while a complex or more hazardous industry may require a more detailed and extensive plan, involving more people and organisations in the development and consultation phases of the plan.

The guidelines provide a basis for facilities to determine the type of emergency plan that is relevant to their needs. They cover only matters of immediate concern to emergency planning. It is envisaged that the facility will have already addressed other matters of importance, such as:

- business continuity following an emergency;
- the design and provision of protective equipment;
- the design of buildings and layout of the facility;
- land use safety planning issues;
- recovery from an emergency;
- safety management systems; and
- environmental management systems.

1.4 The Use of the Term 'Emergency'

Interpretations of the term 'emergency' vary, depending on a person's background and experience. In general, an emergency is a situation which harms (or threatens to harm) people, property or the environment. In these guidelines, the term applies to an incident or circumstance which causes the facility's emergency plan to be activated. Other circumstances, such as a minor spill of hazardous material on site, which is dealt with by standard operating procedures without the need to activate the emergency plan, would not be regarded as an emergency for the purposes of these guidelines.

Therefore, each facility developing an emergency plan will need to define those circumstances that constitute an emergency for its specific operation and activities. This definition should also identify the types of incident or circumstance that do not constitute an emergency and the point at which an emergency ceases to be an emergency.

A facility's definition of an emergency should be distinguished from, and yet complementary with, the use of the term by Police, Fire and other emergency services. The term, as used by the emergency services, will apply not only to events involving hazardous materials in industry but also to a wider range of conceivable incidents. Their sense of the term (and similar expressions such as 'emergency situation') is derived from definitions in relevant legislation and associated policies for determining whether a particular incident or circumstance is to be considered as an emergency.

1.5 The Role of Emergency Planning

Emergency planning aims to prepare for and mitigate the impacts of an emergency. Preparedness requires identifying what to prepare for and how to respond. It therefore involves accumulating knowledge and skills, disseminating information about the management of potential emergencies, and providing and allocating facility resources and personnel to deal with the emergencies identified.

Through emergency planning, facility personnel improve their understanding of the plant, equipment, processes and materials, and their possible impacts in emergency situations. They also develop an understanding of the roles of the emergency services and other external agencies that could be involved in responding to an emergency. This understanding provides a basis for determining the most effective ways of using facility resources, including the development of a management system identifying the functions required to respond automatically to an emergency. It also provides a basis for informed decision-making during the emergency and for effective working relations with external agencies.

1.5.1 Relationship with Other Management Systems

Emergency planning should complement any existing management systems, including: safety management; environmental management; risk management; and emergency management. Common elements of these systems include the identification of hazard and risk, training and education, and consultation.

1.5.1.1 Safety Management

As the title suggests, the safety management system of a hazardous facility is a comprehensive integrated system for managing safety. Under this system, a facility defines its safety objectives and the procedures by which these are to be achieved. It also outlines its safety performance standards and the means of achieving these. The emergency plan is an important element in the safety management system.

1.5.1.2 Environmental Management

The first step in developing an environmental management system is to identify the potential impacts of a facility on the environment. An organisation must then define its objectives and the policy to be adopted in relation to these environmental impacts. An environmental management plan should be developed defining the processes and procedures to be implemented in order to meet these objectives. As a major component of this environmental management plan, potential environmental emergencies would be identified and procedures determined to respond and minimise the impact on the environment.

1.5.1.3 Risk Management

Risk management is recognised as integral to effective management. It is an iterative process which involves systematically identifying, analysing, assessing, treating, monitoring and communicating the risks associated with an organisation's activities or processes. In the case of hazardous industries, risk management is undertaken in an attempt to prevent incidents and to minimise their impact if they do occur. Its major link with emergency planning is in the treatment of risks. After all other risk reduction strategies have been adopted into the design and operation of the facility, the emergency plan addresses the risk that still remains.

1.5.1.4 Emergency Management

The emergency management system is used widely by the emergency services for disaster management planning. This generally covers the planning and co-ordination requirements for large-scale events, such as cyclones, earthquakes, floods, large fires, and also includes large emergencies involving hazardous materials.

Emergency management involves a cyclical process of four phases:

- prevention - regulatory and physical measures to prevent emergencies or mitigate their impact;
- preparedness - arrangements to mobilise and deploy all necessary resources and services;
- response - actions taken during and immediately after an emergency to minimise the impact; and
- recovery - arrangements to restore the facility to normal as quickly and efficiently as possible and to assist the community to recover.

Emergency planning plays a key role in this cycle of emergency management, focussing primarily on the phases of preparedness and response.

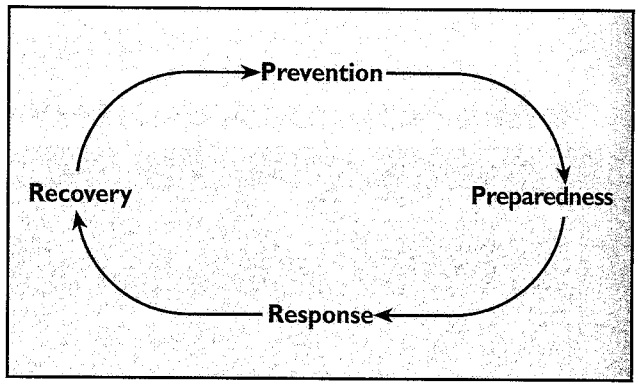


Figure 1-1: Four Phases of Emergency Management

1.6 Structure of these Guidelines

These guidelines are intended to trace the steps involved in emergency planning and to highlight the major points to consider in preparing the emergency plan. Section 2 discusses the numerous considerations involved in a thorough approach to emergency planning. The section suggests that planning should be viewed as a cyclical process from the initial stages of defining the aim and objectives of the plan through the ongoing stages of consultation and monitoring and review. Section 3 provides a general layout for an emergency plan including issues distilled out of the emergency planning process. This layout and the accompanying check list in Appendix A are designed to assist operators to prepare the plan for their facility. The management of the plan, introduced briefly as part of the planning process in Section 2, is discussed in more detail in Section 4.

Terms used throughout the document are explained in the glossary in Section 5. Illustrative and other supplementary information is provided in the appendices.

2.1 Introduction

The main consideration of emergency planning is the protection of people, property and the environment from harm during an emergency situation. This is achieved by developing an emergency plan that implements a system able to respond automatically to any emergency and that leads to the most effective outcome possible under the circumstances. The plan should therefore be comprehensive, yet concise, simple and flexible. It should also be dynamic and interactive, ensuring ongoing relevance to the needs of the facility and all stakeholders by continual monitoring, review and consultation. Emergency planning is therefore a cyclical process, as illustrated in Figure 2-1. All of the stages are inter-related and plan details should be continually evaluated, and revised as appropriate.

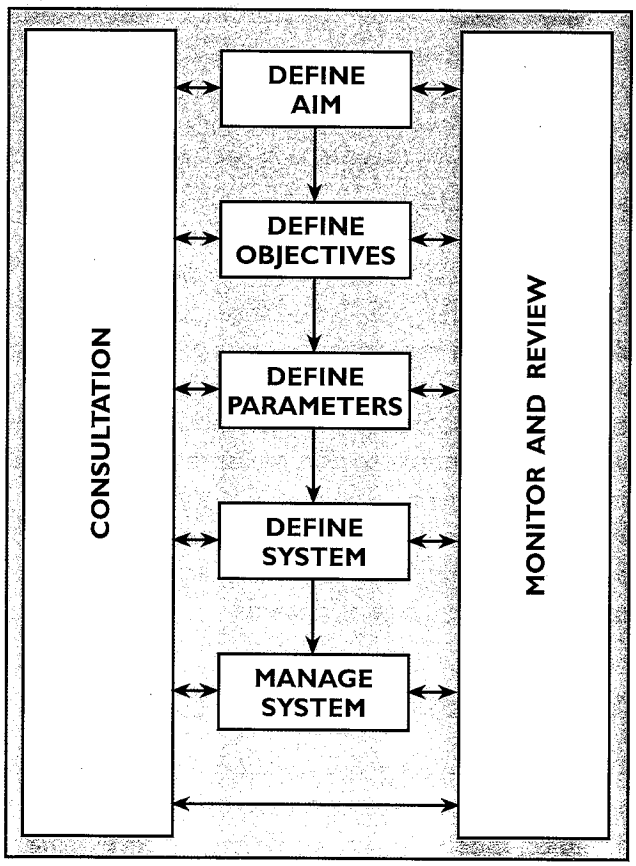


Figure 2-1:The Emergency Planning Process

2.2 Consultation

Consultation is the key to an effective emergency plan and should be conducted in all phases of the planning process. All stakeholders affected by the plan (including facility personnel, the community, and external agencies) should be consulted to ensure that each group knows what to expect of the other.

A coordinated and effective response to any emergency requires an understanding between the different parties involved. Consultation when developing the emergency plan enables the development of this understanding before an incident occurs. It ensures that the roles, responsibilities, functions and needs of all agencies and groups are understood and accurately incorporated into the emergency plan. Once the plan is implemented, consultation during the management of the plan allows all stakeholders to contribute to the testing, monitoring and review, and updating of the plan.

To ensure that consultation is comprehensive, the key stakeholders in the emergency planning process should be identified and on-going relationships with these groups developed. One method of achieving this is by forming an emergency planning working group which includes representatives from all interested parties. While much of the work in developing and managing the emergency plan can be performed by facility personnel, this working group can assist in developing concepts and ideas, and also in verifying that the emergency plan adequately addresses their particular concerns.

The stakeholders and issues identified below are not exhaustive; a specific hazardous facility may need to consider other groups or issues.

2.2.1 Facility Personnel

All employees (including employee representatives) should be consulted extensively during the emergency planning process. Not only does this ensure that their intimate knowledge of the facility and its operations is incorporated into the development of the emergency plan; it also generates a sense of commitment and ownership. Each person within the organisation has a responsibility to ensure that they are capable at all times of fulfilling their role in the event of an emergency.

Ongoing consultation with facility personnel should be actively pursued. For example, staff should be involved in preparing and conducting exercises in order to test the capability of the plan. Debriefings following these exercises can allow participants to indicate the problems encountered and suggest possible solutions.

2.2.2 Neighbouring Facilities and the Community

Consultation with neighbouring facilities and the community should result in a two-way flow of concerns and ideas. Community consultation not only results in a better prepared community; it can often lead to an improved understanding and acceptance of the industry by the wider community.

It is first necessary to identify all neighbours, including those that may have special requirements, such as:

- neighbouring hazardous facilities;
- local mutual aid groups;
- managers of sensitive environmental sites;
- facilities accommodating large numbers of people (e.g. commercial or shopping centres, motels, recreational facilities); and
- facilities provided for members of the community who may be more vulnerable to the consequences of an emergency (e.g. schools, child care centres, hospitals, nursing homes).

With respect to neighbouring hazardous facilities, it is essential that all parties gain an understanding of the potential impacts of an incident on other operations or storage areas. This will enable procedures to be developed to prevent the escalation of an incident. Neighbouring facilities may also be able to provide resources, including personnel, for responding to an emergency. Several industries of related types of operation or locality may be involved in this type of cooperative arrangement, often referred to as a mutual-aid group.

In the event of an emergency, there needs to be an effective warning system for the neighbouring community who could be affected by the emergency. Members of the community need to be aware of the action to be taken when the warning is activated. Consultation should identify the needs of the community and address the difficulties likely to be encountered. Further details of the community consultation process are presented in Appendix D.

2.2.3 External Agencies and Other Groups

Police, Fire and other emergency services, Local Government, and safety, health and environmental agencies (government and non-government) should be consulted throughout the emergency planning process.

The degree of involvement of Government and other agencies in an emergency will depend on the level and potential consequences of the emergency. Consultation can help to define the circumstances when external agencies or other groups need to become involved. This consultation should also result in a clear understanding by all parties of the roles and responsibilities of each group at an emergency. In order to formalise this understanding, the facility operator may need to establish partnership agreements with the relevant agencies. These agreements should outline the interactions between the organisations, including details of the assistance to be provided in each instance.

In many cases, a number of hazardous industries may be located together within an industrial estate or region, for which a regional emergency plan may be developed. The emergency plan for each individual facility should provide the basis for the regional emergency plan.

In addition, Local Government is responsible for identifying all the hazards and threats in its area and developing and implementing plans to address these hazards. This is usually achieved by an inter-agency committee. The facility operator should liaise closely with this committee so that measures developed to respond to a major emergency at the facility are incorporated into the Local Government's regional plan and are complementary with arrangements made for other types of hazards.

2.3 Defining the Aim of the Plan

The aim of an emergency plan should be expressed as a broad statement of planning intent. It should be based on the fundamental reasons for developing a plan. Examples of aims are:

- to provide a system and resources to deal with emergencies to protect people, property and the environment; and
- to minimise adverse impacts on people, property and the environment.

2.4 Defining the Objectives of the Plan

The objectives of the plan translate the broad aim into specific end results to be achieved. They lay the groundwork for defining and implementing the facility's system to manage an emergency. Therefore, the areas addressed by the objectives should be as comprehensive as possible. The establishment of priorities will also help to focus efforts in defining and implementing a system to meet the needs of all stakeholders.

Examples of objectives include:

- to maintain a high level of preparedness;
- to respond quickly and efficiently to limit the impacts of an emergency;
- to manage an emergency until the emergency services arrive and take control;
- to support emergency services with information, knowledge, skills and equipment; and
- to protect emergency responders, personnel and the community from harm.

2.5 Defining the Parameters of the Plan

In preparing an emergency plan, it is necessary to define the parameters that will establish the framework for developing the plan. These parameters should define the scope of the emergency plan and identify any limitations. Some of the parameters that should be considered are addressed in this section. However, there may be others, not covered here, that are specific to a particular facility.

One of the fundamental parameters is identifying the potential for emergencies and their characteristics. First, a definition of an emergency situation is necessary because an emergency plan is only activated in an emergency situation and de-activated when the emergency situation ceases to exist. The identification of the hazards will help to define the parameters of the plan, as will an estimation (for a range of scales of incidents) of the consequences and potential impacts of these hazards on people, property and the environment. In addition, any assumptions that might influence the system to be developed to manage an emergency should be identified and evaluated.

2.5.1 Emergency Situations

A clear simple definition of what constitutes an emergency at the facility (i.e. a situation which activates and de-activates the emergency plan) is required. For example, an emergency for a facility and its operations may be described as:

> *a hazardous situation (or threat of a hazardous situation) which requires action to control, correct and return the site to a safe condition and also requires timely action to protect people, property and the environment from harm.*

The level at which a hazardous situation should be regarded as an emergency needs to be defined. However, if there is any doubt whether a hazardous situation constitutes an emergency, it should be treated as an emergency. For example, all fires should be treated as emergencies. (Section 1.4 and Section 2.5.2 may also assist a facility to define an emergency for its planning purposes.)

2.5.1.1 Types of Emergency

Emergencies are defined according to type on the basis of the materials and activities involved. The type of emergency will determine the potential impact of the incident on people, property and the environment. These issues should be addressed in the process of defining the hazards. (See Section 2.5.2.) Examples of types of emergencies are:

- fire (including the generation of toxic combustion products);
- explosion (including BLEVE);
- spill (of hazardous solids and liquids);
- gas leak (flammable, toxic, asphyxiant, pressurised or refrigerated liquid);
- structural failure;
- natural event (including flood, earthquake, storms, storm tides, etc.);
- impact event (road vehicles, railways, aircraft, ships);
- subversive activities (bomb threat, vandalism, sabotage); and
- transport incident.

These types of emergencies should be considered for:

- an incident within the facility;
- an incident occurring outside the facility where a hazardous material is under the responsibility of the facility (e.g. off-site pipeline, transport); and
- secondary events or knock-on effects arising within or outside the facility (e.g. a flood, a bushfire, or an explosion which causes a nearby vessel to fail).

2.5.1.2 Levels of Emergency

Emergencies can vary in scale. For this reason, it is suggested that different levels of emergency be defined for the facility. Information provided by the hazard analysis (see Section 2.5.2.2) will provide guidance in determining the level of emergency for a particular type of incident.

Figure 2-2 provides guidance for facilities when defining levels of emergency. The three levels described are illustrative and advisory only, and should not limit the way in which a facility chooses to define its own levels of emergency. For example, smaller industries may only require one level of emergency, while medium to larger scale facilities could use one, two, or more levels of emergency.

There is not necessarily a direct correlation between the size of a release and the scale of the emergency. For example, a small release of chlorine gas may affect people outside the boundary of the facility and therefore be classed as an 'external' emergency (using the definitions in Figure 2-2). In comparison, a large release of an alkali that is contained within a bunded area could be classed as a 'local' emergency.

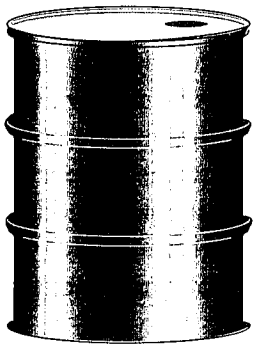
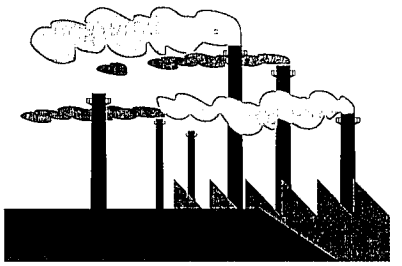
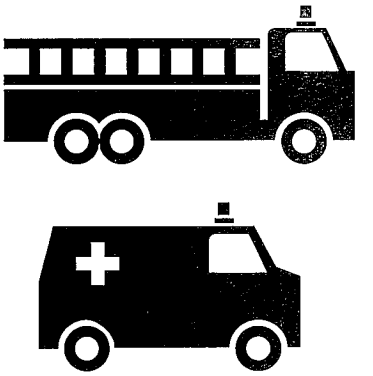
LOCAL	SITE	EXTERNAL
		
An emergency where the impacts on people, property and the environment: • are expected to be confined to a specific location within the facility and no escalation is expected	An emergency where the impacts on people, property and the environment: • are expected to spread or affect all parts of the facility, but not off-site	An emergency where the impacts on people, property and the environment: • are expected to impact both within the facility and beyond the boundary of the facility
Emergency Services MAY BE REQUIRED	**Emergency Services SHOULD BE REQUIRED**	**Emergency Services WILL BE REQUIRED**
Examples: • ruptured drum in warehouse • leaking flange or seal • small fire in a bag store	**Examples:** • tank or bund fire • pipe rupture	**Examples:** • a bomb threat • large tank bund fire • BLEVE of large liquefied gas storage • toxic gas release • transport incident

Figure 2-2: Examples of Levels of Emergency

2.5.2 Defining the Hazards

Information on the potential hazards at a facility will help to provide an understanding of the impacts on people, property and the environment of different types and levels of emergencies.

2.5.2.1 Hazard Identification

The emergency planning process should identify all hazards which can reasonably be expected to initiate, or contribute to, an emergency. This could involve identifying hazards of several different types:

- the hazards arising from the hazardous materials associated with the facility;
- the hazards arising from activities or equipment associated with the facility (e.g. cranes, plant, machinery, transport, electrical); and
- natural hazards (e.g. floods, lightning strike, etc.) that could impact upon the safe operation of the facility.

If a risk assessment or other safety study (such as HAZOP) has been conducted, a list of potential incidents may already be available.

It is not feasible, or appropriate, to develop individual systems to respond to every potential incident identified in the hazard identification exercise. The challenge is to prepare a simple and effective plan that is generic in nature, but provides an effective system for responding to any type or level of emergency. Therefore, a screening technique should be adopted to produce a representative set of incidents.

One method of achieving this is to take the following steps:

- eliminate localised incidents that would not require activation of the emergency plan;
- consolidate incidents that have similar materials, inventories, discharge rates, discharge locations, and types of emergency response actions; and
- select one incident to represent each group identified.

In preparing this representative set of incidents, it should be remembered that emergency planning prepares for events that it is hoped will never happen. Therefore, detailed planning should not only concentrate on the more likely or credible events (such as a small leak from a pipe or failure of a single 200 litre drum), but also extreme events (such as the catastrophic failure of a reaction or storage vessel). These events would have a high impact even though the likelihood of their occurrence is extremely remote. This consideration of a broad range of possibilities will enable the development of a system capable of responding to any level and type of emergency.

2.5.2.2 Hazard Analysis

The hazard identification exercise may reveal a whole spectrum of incidents which can significantly impact on people, property and the environment (including fire, explosion, dispersion of toxic chemicals, violent reaction, polymerisation or decomposition).

In order to define the system to manage an emergency, an understanding of the actual impact of an incident is essential. From information available on the operating conditions, the facility layout and environmental conditions (such as the range of weather conditions possible at the site, and the flow characteristics of nearby waterways), the following can be estimated:

- the rate at which a material is released:
- the dispersion of toxic or flammable vapours in the atmosphere;
- the radiated heat generated by a fire;
- the blast generated by an explosion;
- the concentration of a toxic material in the atmosphere; and
- the dispersion of contaminants in nearby waterways (including subsurface aquifers).

An understanding of the physical and chemical properties of these events enables the potential impacts to be determined. There are many modelling tools available for calculating this information, both qualitative and quantitative, and ranging from simple hand calculation techniques to sophisticated computer models. Further information on assessing the consequences and impacts of incidents is provided in Appendix C.

Some potential impacts of an incident on the environment may not be immediately apparent. Frequent minor incidents may cause long-term degradation of the environment.

2.5.3 Physical Areas to be Covered by the Emergency Plan

The geographic area over which a large scale emergency might impact should be defined. This area can be estimated in the process of defining the hazards (see Section 2.5.2). Features considered should include:

- the exposure of people;
- the exposure of sensitive environmental receptors;
- all equipment and operations located within the boundaries of the facility;
- hazardous materials being transported or removed from the site that are under the responsibility of the facility;
- any other areas or activities under the control or influence of the facility that are not on-site and not covered by a separate emergency plan (e.g. off-site pipelines supplying raw materials to the facility and product from the facility); and
- the area beyond the boundary of the facility which is likely to be affected in the event of an emergency. (This area, often referred to as the community information area, will be determined by a hazard analysis - see Section 2.5.2 and Appendix C.)

Significant community and environmental features surrounding the facility need to be identified. These should include centres where large groups of people gather (e.g. sporting complexes, function centres), sensitive land uses (e.g. schools, hospitals, child care facilities, nursing homes), and sensitive environmental receptors. Sensitive environmental receptors may include:

- surface waterways (e.g. creeks, rivers, stormwater drainage systems, access to sewerage system);
- subsurface aquifers;
- soil (considering characteristics such as soil permeability which controls the rate at which leachate from contaminated land will reach ground water reservoirs); and
- natural buffers, wildlife corridors, State forests / national parks.

2.5.4 People to be Covered by the Emergency Plan

The people likely to be affected by an emergency will be located in the physical area to be covered by the plan, as identified in Section 2.5.3 above. The total number of people possibly affected should be estimated. The significance of their exposures can be estimated in the hazard definition process (see Section 2.5.2). Groups of people to be identified may include:

- facility personnel (on-site and off-site);
- visitors on-site;
- contractors on-site;
- emergency responders;
- people occupying sensitive land use sites, who may be more vulnerable to the consequences of an emergency; and
- people within the community information area (including commercial, industrial, and residential neighbours).

Large groups of people, or those more vulnerable to the consequences of emergencies, need to be given special consideration when determining procedures for protecting people from the impacts of an incident.

2.5.5 Assumptions Affecting the Emergency Plan

The emergency plan will usually be based upon assumptions about matters such as the availability of resources and services and the execution of responses within estimated time frames. These assumptions should be evaluated and contingency planning developed to accommodate an emergency where these assumptions fail. Examples include:

- increased response times of the emergency organisation and emergency services;
- unavailability of staff;
- failure of services (gas, electricity, water, telecommunications);
- overlap between the facility emergency control centre and an inappropriate hazard zone (see Section 3.11.1 and Appendix C, Section C4);
- adverse weather conditions; and
- inaccessible or inoperable emergency equipment.

2.6 Defining the System

The next stage is to define a system to manage an emergency which is flexible, simple to implement and general in application. It should be tailored to meet the needs of the facility, within constraints such as the resources available. The phases involved are design, construction, and commissioning.

2.6.1 Designing and Constructing the System

The design process involves establishing the criteria necessary to satisfy the aims and objectives of the emergency plan. The construction process involves providing the resources to support the design, including the response resources; personnel to carry out emergency functions; information, skills, and knowledge to enable these personnel to manage an emergency; and written emergency procedures.

The system should reflect expectations relating to the facility's role in the management of an emergency. The system should be able to spontaneously respond when the alarm is raised as early detection and intervention are vital to ensuring that a small incident does not become a major disaster. The system should also be able to operate within a specified short time frame, i.e. the critical initial period before the emergency services assume control. Thereafter, the system should support and liaise with the emergency services and other external agencies. The system should also be able to manage smaller emergencies or environmental emergencies which the emergency services might not be required to attend.

The capabilities of the system should be based on the parameters of the emergency plan, such as:

- the potential nature and size of an emergency, derived from the hazard analysis;
- the hazardous materials of greatest concern with respect to their impact on people, property and the environment in emergency situations; and
- the potential for further problems arising from the properties of the hazardous materials, e.g. ignition sources for flammable gases and vapours.

The system should also take into account the limits of the facility's physical response capabilities. Obviously, the scale of the system developed will depend on the hazards associated with the facility, and its resources. An over-commitment or under-dedication of resources will result in an ineffective system.

The system will share similarities with other systems of management. It should include an organisational structure with a chain of command and specified emergency functions to be carried out by facility personnel. The system should have established and approved procedures and resources designated for the purpose, and personnel should be provided with the necessary information, knowledge and skills to carry out the responsibilities assigned.

2.6.2 Emergency Functions

The system should include defined emergency functions which, like emergency planning in general, aim to protect people, property and the environment. The functions nominated should cover all areas of responsibility necessary to manage the types of emergencies identified. These functions should be defined, taking into account the facility's response requirements and capabilities (i.e. the nature of the operation, the types of emergencies identified, and the number of personnel available). Broad areas to be addressed by emergency functions should include:

- responding to control the emergency;
- limiting the spread and impacts of an emergency on adjoining processes, materials, property, and the environment;
- protecting the safety and health of all personnel on site;
- protecting the environment;
- alerting people to the emergency and communicating adequately with all stakeholders during the emergency;
- accessing the right information; and
- controlling the entire emergency scene and the whole facility.

These areas may be addressed by several functions. For example, the protection of the safety and health of all personnel on site may be addressed by functions relating to search and rescue, roll-call, and safeguarding measures such as evacuation. (See Section 3.9 and Appendix E for a further explanation of emergency functions).

Positions should be established, and personnel assigned to these positions, to fulfil the functions identified. The expectations, information and resources associated with each function should be established, as well as the inputs that can be expected from other facility personnel, the Police, Fire Service and the other emergency services. Overall responsibility for these functions is to be assumed by the facility emergency controller who is supported by the personnel allocated to carry out the various functions.

2.6.3 Emergency Procedures

Emergency procedures are a series of steps that need to be followed when responding to an emergency. When defining these procedures, it is important to recognise the limitations of personnel in performing tasks, particularly while under extreme stress.

Emergency procedures are generally of two types: those that relate to the system of management (i.e. general procedures to be adopted regardless of the nature, type and scale or emergency) or those specific to the types of incidents identified.

Areas relating to the system that might be addressed by emergency procedures include:

- raising the alarm;
- activating the emergency plan;
- activating the emergency services;
- terminating the emergency; and
- health and safety functions, such as roll call and search and rescue.

Procedures should be developed for all positions within the emergency organisational structure, in particular outlining the roles, responsibilities, and duties involved. Procedures should also be developed for other facility personnel not involved in the emergency organisational structure.

2.6.4 Facility Emergency Resources

The emergency resources necessary to manage an emergency situation should be identified and provided. Such resources include the facility emergency control centre, the emergency communications system, public warning systems, the emergency alarm system, and emergency equipment (such as personal protective clothing and first aid equipment).

The design and provision of emergency resources should consider such matters as:

- their safe and accessible location;
- their ability to be moved to areas as intended (e.g. neutralising agents);
- their suitability for all tasks for which they are provided;
- their readiness for use and their ease of use;
- the adequacy of estimations of quantities; and
- the provision of adequate quantities.

The hazard analysis can help to identify the safety equipment required to respond to the incident and appropriate locations for this equipment to be stored, by identifying 'clean' areas, that is, areas outside potential hazard zones. (See Appendix C for further details on hazard zones.) The functioning capabilities of resources should be considered for all places (e.g. the alarm's ability to reach the people to be alerted), all times (e.g. at night and out of hours) and all circumstances (e.g. adverse weather conditions).

(Further information on facility emergency resources can be found in Section 3.11.)

2.6.5 Information, Knowledge and Skills

2.6.5.1 Provision of Information

The system should provide access to user-friendly information to assist in managing the emergency. This information should include:

- safety, health and environmental information on hazardous materials;
- estimates of the consequences and impacts from hazard analysis;
- maps and plans;
- community information;
- information on safety systems and equipment; and
- emergency contacts.

(Refer to Section 3.16 for further details.)

The system should provide for the communication of information about the plan to stakeholders, including people within the community information area and contractors and other on-site visitors. (Appendix D provides an example of the types of information to be communicated to people within the community information area.)

2.6.5.2 Developing Knowledge and Skills

The system should identify and develop the appropriate levels of knowledge and skills to be acquired by facility personnel assuming specified responsibilities. Training and education should be provided to enable personnel to achieve these levels.

In addition, all personnel, whether or not they hold a position in the emergency organisational structure,

should be trained in their roles, responsibilities and duties during an emergency (e.g. all personnel should be trained in evacuation procedures). They should be trained to such a level that, when the emergency plan is activated, they can automatically follow their procedures without necessarily referring to the emergency plan and can competently operate the emergency resources. They may be assisted by supporting information, provided outside the emergency plan, such as palm cards or signs. Training will achieve a greater significance if all personnel have a sense of ownership of the emergency plan.

It is important that key people at the facility understand the potential impacts of the hazardous materials associated with the facility. This understanding will provide the basis for informed decisions to be made in the early stages of an emergency and for advice to be provided to the emergency services.

This understanding can also be used to set priorities in responding to an incident. For example, when considering actions to control or mitigate the impacts of an incident, it may be considered appropriate to allow the incident to proceed with minimal or no direct response. Such a mode of response may result in a lower overall impact (when considering people, property and the environment) than if significant effort were expended in protecting property to the detriment of the surrounding community and the environment. This knowledge of hazardous materials and their impacts may also indicate where to concentrate response efforts, for example, by deciding when it may be more appropriate to focus on protecting adjacent operations rather than expending efforts and resources on an incident that cannot be controlled or that poses an unacceptable threat to the safety of the emergency responders.

2.6.6 Commissioning the System

The commissioning of the system is the process of ensuring that the system functions effectively, according to the intentions of design and construction. Effective commissioning of the system depends on a commitment to providing sufficient time and resources to ensure that the system is workable, simple and flexible, and meets its aims and objectives.

During commissioning, the system should be evaluated to detect problems (such as lack of direction, over-simplifications, poor understanding of the issues, inappropriate assumptions, etc.) which may affect the effectiveness of the emergency plan, and to identify methods for improving the efficiency of the plan. A practical exercise, or mock incident, involving external agencies is an effective way of testing all, or part of, the emergency plan. In addition, the checklist in Appendix A provides a reference for ensuring the general requirements of the system are suitable.

Commissioning of the system might include ensuring that:

- all procedures are validated as safe and personnel are not exposed to an unacceptable risk while undertaking defined tasks and other activities;
- emergency resources and safety equipment are rated for the task;
- emergency resources and safety equipment are clearly identified, accessible, available, serviceable and ready for use;
- communications methods and equipment are satisfactory;
- response times for the facility and the emergency services are tested, known, and found to be realistic;
- suitable supporting information is provided and accessible;
- emergency service vehicles have access to the appropriate parts of the facility;
- the facility emergency controller, emergency organisation personnel and facility emergency responders are suitably identified;
- the plan satisfies the expectations of stakeholders;
- the plan can be updated easily and the information communicated as appropriate; and
- the information of the quantities, locations, properties of hazardous materials is accessible and the potential impacts of these materials are known and understood by key personnel.

Once this process has been completed, the system should be managed as described in Section 4.

2.7 Monitor and Review

The facility should establish and maintain policies and procedures to monitor and review the suitability and effectiveness of all phases of the planning process at specified intervals or after circumstances defined by the facility operator. This ensures that the plan remains relevant to the facility and that it is updated to reflect changes in plant operation and personnel.

Monitoring, which is covered further in Section 4.9, is critical to managing the plan. Important activities in managing the plan include rehearsals, exercises and on-going consultation and communication with facility personnel, the emergency services and the community. These activities can help to identify deficiencies in the emergency plan, which can then be remedied.

WRITING THE EMERGENCY PLAN

3.1 Introduction

A summary of the outputs of the emergency planning process should be documented in the facility's emergency plan. The plan should define areas such as the facility's emergency functions and organisational structure, emergency procedures, equipment, reporting and communication channels, and the type of reporting required by the Police, Fire Service, etc.

This section outlines a general layout of an emergency plan and matters to be considered when writing the emergency plan. Since the plan is to be tailored to suit the facility, the format may vary. Suggested sections in the plan are outlined below. Points raised for consideration are not exhaustive.

Smaller facilities for which an emergency would have minimal impact beyond their boundaries would require a less detailed plan than more complex facilities. Appendix B provides a proforma emergency plan to assist the operators of small facilities in writing their plan.

3.2 Plan Title and Authority

The plan should clearly identify:

- the name of the facility and the operator;
- the identity, scope, and status of the emergency plan;
- the location of the facility;
- preparation details (the date of preparation and other terms of reference);
- authorisation details (person(s) responsible);
- contact details; and
- document control information.

3.3 Table of Contents

A table of contents should be included for quick reference to selected topics.

3.4 Introduction and Definition of an Emergency

The introductory section of the plan should contain a definition of the situation that constitutes an emergency for the facility (see Section 2.5.1) and an outline of the levels of emergencies identified (see Section 2.5.1.2). Other assumptions underpinning the plan should also be stated (see Section 2.5.5).

3.5 Aim and Objectives of the Plan

A statement of the aim and a list of the objectives of the plan should be included. (See Sections 2.3 and 2.4.)

3.6 Roles of Agencies, Groups, Industry and the Community

The roles, responsibilities, functions and needs of all key stakeholders (industry, the community, and external agencies such as the Police and Fire Service) should be clearly defined. These definitions will be derived through extensive consultation. (See also Section 2.2.) The plan should identify the phases when consultation is necessary, such as when the plan is being updated.

3.7 Hazards

Details should be provided of the hazards identified as having a significant impact. (See Section 2.5.2.) This should apply to hazardous materials and other hazards.

3.7.1 Details of Hazardous Materials

Details of all hazardous materials in significant quantities under the control of the facility, including hazardous intermediates, should be provided in the plan. This will include materials in quantities sufficient to initiate an emergency or to contribute to an initial incident. The relevant quantities will depend upon the form and properties of these materials. The significance of the problem posed by these materials should be discussed and the way in which the plan addresses any problems identified.

Hazardous materials include:

- dangerous goods;
- goods too dangerous to be transported; and
- other hazardous materials (such as poisons, workplace hazardous substances, combustible liquids, carcinogens, environmentally hazardous materials, etc.).

Details of hazardous materials should include the following:

- description of the hazardous material (including the name of the chemical ingredients for materials listed under trade names);
- classification (UN No, CAS No, dangerous goods classification and HAZCHEM Code where applicable);
- quantity (including average and maximum inventory in storage and/or in the process, accounting for seasonal factors);
- location of tanks or package stores, (keyed to the site layout plan - refer to Section 3.16.3); and
- location of additional safety, health and environmental information as described in Section 3.16.1.

3.7.2 Details of Other Hazards

Information should be provided on the nature of other hazards identified for inclusion in the plan (i.e. natural hazards or hazards arising from activities not involving hazardous materials). A brief explanation of how the plan will address these hazards should be presented.

3.8 Types and Levels of Emergency

The types and levels of possible emergencies identified for the facility should be described. (Refer to Section 2.5.1.1 and Section 2.5.1.2 respectively.)

3.9 Emergency Functions and Organisational Structure

The emergency organisational structure will embody all emergency functions identified, i.e. the allocated areas of responsibility involved in managing an emergency at the facility. The functions nominated for the facility should be listed in the plan, together with the associated roles, responsibilities and duties of personnel assigned to these functions, and arrangements for appropriate backup.

The functions should address the areas of responsibility required to manage the emergency as outlined in Section 2.6.2. The specific manner of translating areas of responsibilities into functions will depend on the size and the resources of a facility. (See Appendix E for a detailed explanation of suggested functions.) An example of the organisational structure for a small facility is shown in Figure 3-1.

3.9.1 Facility Emergency Control

The person fulfilling the function of facility emergency control is in charge of managing an emergency for the facility and has overall responsibility for all functions performed by the facility during an emergency. This role requires a sound knowledge of:

- the site;
- the materials used;
- the processes;
- the potential impacts of emergencies on people, property and the environment;
- waste control and;
- the application of the emergency plan.

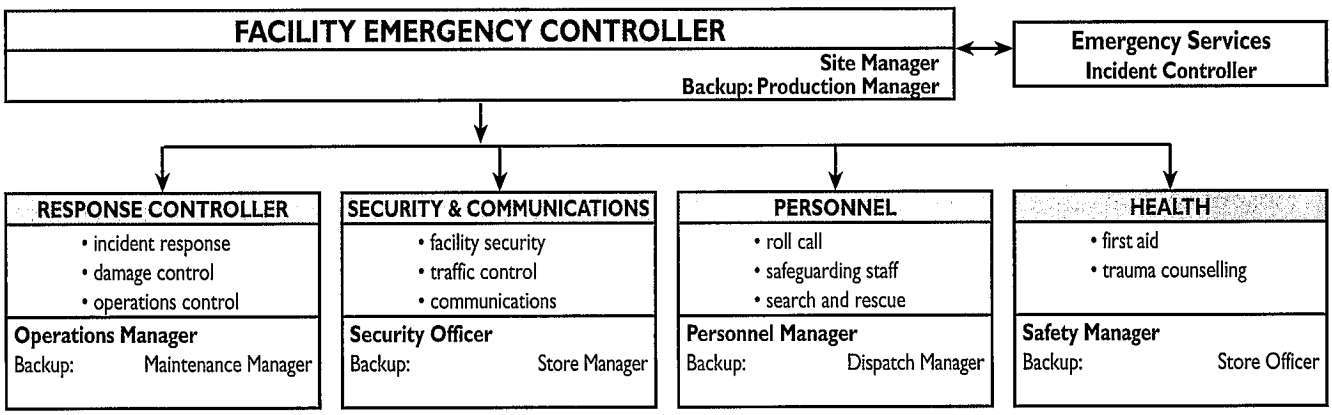


Figure 3-1: Example of an Emergency Organisational Structure for a Small Facility

While some of these duties may be assigned or delegated to other positions or personnel in the emergency organisational structure before or during the emergency, ultimate responsibility remains with the facility emergency controller. The plan should define the role, responsibilities and duties associated with the position, including arrangements for delegation.

3.9.2 Identification

The people acting in a position within the organisational structure, or conducting certain emergency functions, will require clear methods of identification. For example, helmet colours (as outlined in Australian Standard AS 3745) and distinctive tabards identifying the facility and the emergency position or function, may be used.

3.10 Emergency Procedures

Emergency procedures are an important part of the system to manage an emergency. (See also Section 2.6.3.) They should be clear, simple, practical and achievable. The detail contained in the procedure will depend upon the characteristics of the facility. The procedures should describe the steps to be undertaken, the precautions, the protective clothing and equipment to be used, any special conditions, and the responsibilities and duties of people undertaking these procedures.

The emergency response flowchart in Figure 3-2 describes some of the decision-making steps, and their interactions, in the overall management of an emergency. Flowcharts of this type can be used to assist in the development of procedures for the management of emergencies.

Emergency procedures relating to incidents should take into account the properties of the hazardous materials and the impacts on people, property and the environment, as estimated in the hazard analysis process (see Section 2.5.2 and Appendix C). As an example, the following actions might be considered in developing the steps for an emergency procedure relating to a spill of corrosive liquid:

- raise the alarm;
- contain the spill;
- isolate/evacuate the immediate area;
- use of appropriate protective equipment;
- use of absorbents; and
- waste control and disposal.

3.11 Emergency Resources

The resources (equipment and amenities) provided to respond to emergencies should be identified and details provided. (See Section 2.6.4.)

3.11.1 Facility Emergency Control Centre

The location of the facility emergency control centre (FECC) and any alternative should be nominated. The FECC should be readily accessible and should be appropriately resourced with communications equipment and essential documents, including the emergency plan, emergency procedures, MSDS and other relevant safety information. Location maps and site layout plans (see Section 3.16) should be available in the FECC and should be distributed to the emergency services. A dedicated FECC may not be necessary for smaller facilities which could use existing office amenities.

Ideally, the FECC should be located outside a potential hazard zone. If the hazard zone envelops the centre during an emergency, control operations should proceed to an alternative control centre identified in the plan.

3.11.2 Emergency Equipment

The availability and location of specialised emergency equipment to support the functions identified in the plan should be indicated on the site layout plan. Details of, and procedures for, access to additional equipment from other sources such as mutual aid facilities, should be provided. Emergency equipment may consist of the following:

- emergency vehicle(s);
- self-contained breathing apparatus;
- fire fighting equipment;
- fire fighting media (i.e. foams, additional water supplies, etc.);
- neutralising agents;
- personnel identification (e.g. helmets and tabards);
- protective clothing (e.g. overalls, chemical splash suits, gloves etc.);
- specialist equipment (e.g. wind monitoring equipment, gas detectors, emergency power and lighting, etc.); and
- first-aid equipment.

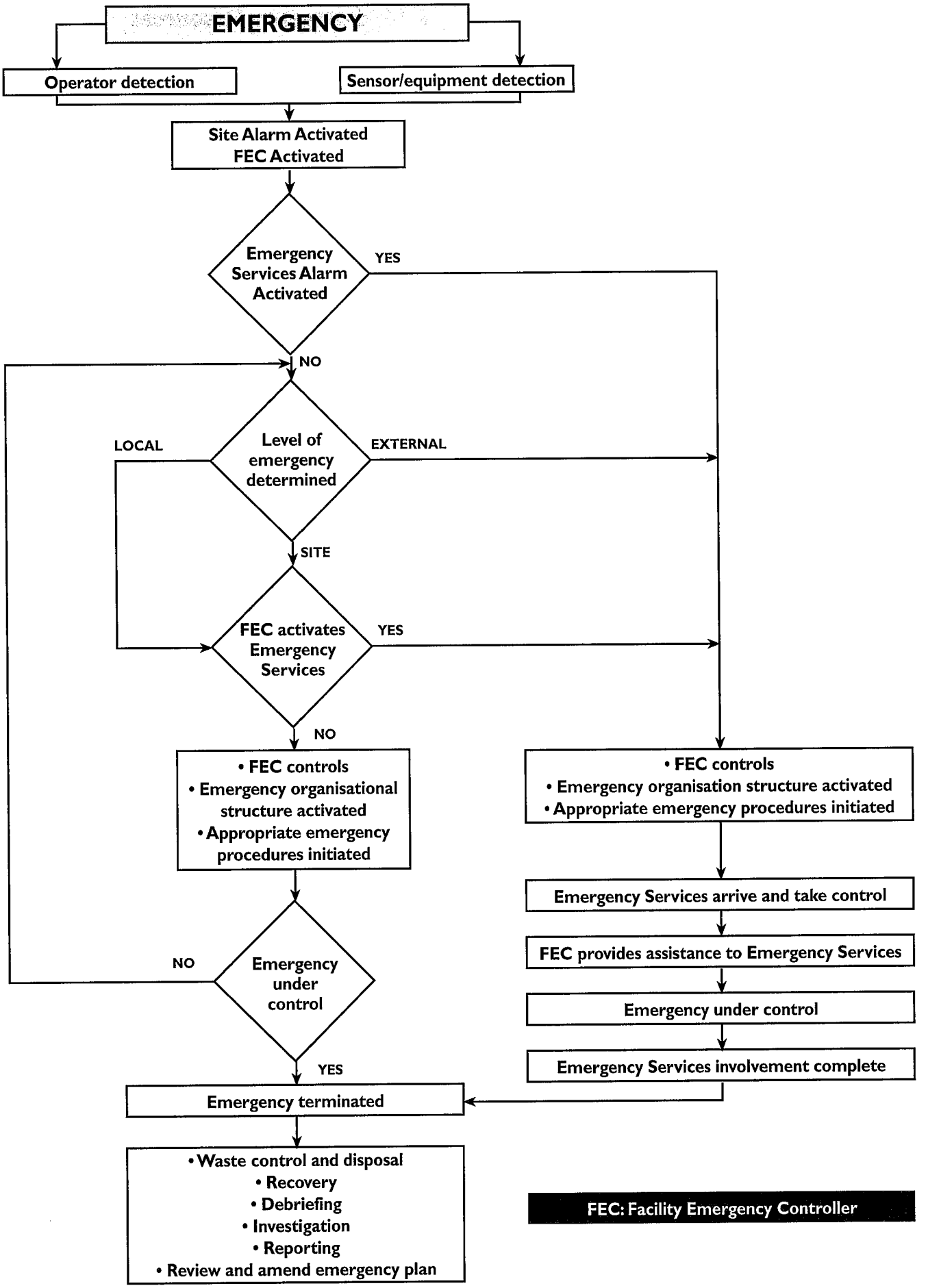


Figure 3-2: Emergency Response Flowchart

3.11.3 Emergency Alarm System

The facility should have an effective alarm and warning system for all levels of emergency. Issues to be considered for inclusion in the plan are:

- type of warning device(s) (flashing light, siren, distinctive tones, etc.);
- location of initiation points, warning devices, etc.;
- circumstances of activation;
- confirmation of initiation of alarm;
- method of establishing that there is an emergency and confirming its level;
- persons authorised to activate the emergency plan after alarm initiation;
- alarm indicators for ALERT, EVACUATE and ALL CLEAR (safe to re-enter);
- ability of the external alert alarm to be effective throughout the community information area;
- method, frequency and recording of testing;
- need for back-up systems for the alarm; and
- alarm operations if the facility is not staffed.

The alarm system should be tested regularly to confirm its intended function, for example, its ability to warn all relevant people under all operating conditions.

3.12 Activation of the Emergency Plan

The roles, responsibilities and duties of all personnel involved in activating the emergency plan when the initial alarm is raised should be defined. The plan should also indicate:

- the circumstances under which it is to be activated;
- the method of activation (including all designated methods for raising the initial warning and sounding the alarm);
- the means of alerting all relevant stakeholders;
- the arrangements for activation when the facility is not staffed (such as lodging a regularly updated list of emergency contact numbers with the Police and Fire Service); and
- the means of addressing communication issues with the relevant emergency services and other stakeholders.

3.12.1 Initial Advice to the Emergency Services

The role, responsibilities and duties of the person nominated to report the emergency to the emergency services should be identified. The nature of the initial report and the information required should be determined following consultation with the Police, Fire Service, and other emergency services. The initial report would usually be made by dialling the emergency number, currently 000 in Australia or 111 in New Zealand and asking for the Fire Service.

The information provided in this report should include the following details where available:

- name and location of the facility (suburb, street, nearest cross street to relevant site entry);
- number of injured persons or casualties and the nature of injuries;
- the type and scale of emergency including a brief description;
- hazards involved (including details of substances, namely UN Numbers, names of substances, quantities involved);
- telephone contact number (for any return messages);
- name of person making the call; and
- any other useful information (e.g. wind speed and wind direction, etc.).

3.12.2 Environmental Emergencies

The role, responsibilities and duties of the person nominated to report an environmental emergency to appropriate agencies should be identified. The nature of the initial report and the type of information required should be determined following consultation with these agencies.

3.12.3 Special Cases

Bomb threats represent a special case. The initial report of a bomb threat should be made by dialling the emergency number, currently 000 in Australia or 111 in New Zealand and asking for the Police. Bomb threat procedure guidelines and a sample bomb threat checklist are provided in Australian Standards AS 3745 and AS 4083 (see Appendix F for references).

3.13 Reporting of an Emergency

This refers to reporting to corporate personnel and government agencies or groups other than the Police, Fire and emergency services. The procedures for reporting emergencies and the role, responsibilities and duties of personnel reporting should be defined.

3.14 Termination of an Emergency

The plan should outline the procedures and responsibilities for terminating an emergency. These should be considered in terms of:

- the return of control to the facility emergency controller by the emergency services; and
- the declaration by the facility emergency controller that the emergency has been terminated.

3.15 Management of the Plan

The criteria for what is required to manage the plan and how it is to be achieved should be included in the plan. Further details on management of the plan are provided in Section 4.

3.16 Supporting Information

Information required to support the plan includes:

- safety, health and environment information;
- the location map;
- the site layout plan;
- a list of emergency phone numbers; and
- relevant information on emergency resources and emergency equipment.

3.16.1 Safety, Health and Environmental Information

The plan should identify the locations of, and allow for access to, relevant safety, health and environmental information to assist with managing the emergency. This may include copies of MSDS, registers, exposure data for people and the environment, emergency service manifests, plans, neutralisation procedures, hazardous interactions and potential uncontrolled reactions. Safety information may also include summaries from the assessment of the consequences and impacts of potential incidents. This information should be located at a number of sites throughout the facility (including the facility emergency control centre - see Section 3.11.1) which should be marked on the site plan.

3.16.2 Location Maps

Location maps should be provided, detailing significant facility and local community features (see Figure 3-3 for an example). The location map(s) should include:

- name of the facility;
- street address of the facility (including the suburb or town);
- site boundaries;
- local neighbourhood details (covered by the hazard zone);
- main entry;
- alternative entrance(s);
- emergency access points;
- north point indicator;
- distance scale;
- location of alternative water supplies (lakes, creeks, reservoirs, etc.);
- land usage (e.g. residential, industrial, commercial, vacant, bushland, etc);
- places of possible concentrations of people (e.g. sports grounds. shopping centres);
- places of special interest in an emergency (e.g. hospitals, child care facilities, schools, nursing homes); and
- site topography (including slope of land, nearby watercourses and environmentally sensitive sites, drainage systems including access points, etc.).

3.16.3 Site Layout Plans

The site layout plan should detail significant facility features (see Figure 3-4) including:

- site boundaries;
- roadways, buildings and major tanks (labelled or numbered);
- normal entrances and exits;
- evacuation assembly points;
- emergency access points;
- grid references (if applicable);
- electrical supply isolation;
- gas supply isolation valves;
- town water isolation valves;
- emergency evacuation assembly points;
- first-aid stations;
- north point;
- distance scale;

- location of relevant emergency plan information and safety information;
- site topography (including bunding and site drainage);
- all hazardous materials under control of the facility (see Section 3.7.1);
- location of the facility emergency control centre; and
- location of emergency resources and equipment (e.g. neutralising agents, absorbents).

3.16.4 Emergency Contact Numbers

An easily accessible list of current emergency contact numbers should be provided, including:

- off-site emergency numbers;
- facility numbers;
- key facility personnel details (including job title, local extension and after-hours numbers);
- control rooms or distribution points;
- responsible officers (e.g. operations manager, production manager);
- Government, Local Authorities and other relevant statutory agencies;
- other company offices (head office, regional office, etc.);
- mutual aid organisations;
- water, gas and electricity supply authorities;
- specialist response services (e.g. in relation to an oil spill or an emergency concerning a ship in port);
- neighbours, including closely located facilities;
- community representatives and other places of special interest such as schools, hospitals, etc.
- contractors and material and equipment suppliers;
- legal adviser(s);
- industry organisations and unions; and
- media liaison organisations.

3.16.5 Other Supporting Information

Other information required to support the plan and assist the facility emergency controller and the emergency services should be identified and provided. This may include:

- capacities of primary and secondary containment systems (e.g. volume available for fire water retention);
- drainage plans covering stormwater, effluent and sewage layout and access points covering the facility and nearby areas;
- maps and information on the facility water reticulation system (including firewater mains, ring mains layout, pumps, boosters, hydrants, hose reel facilities, foam supplies, sprinkler control systems and the location of hydrants in the near vicinity of the facility);
- safety, health and environmental emergency information for hazardous materials on-site;
- decontamination procedures for exposed personnel on-site;
- information on the impacts of hazardous materials on people, property and the environment that may assist the management of the emergency;
- information on, and location of, specialised fire suppression and mitigation equipment;
- conditions that may yield hazardous interactions and uncontrolled reactions; and
- copies of the emergency plan and other information vital to executing the plan.

3.17 Glossary of Terms and Abbreviations

A glossary should be prepared that explains special terms, titles or personnel, names of parts of the facility and abbreviations used in the emergency plan.

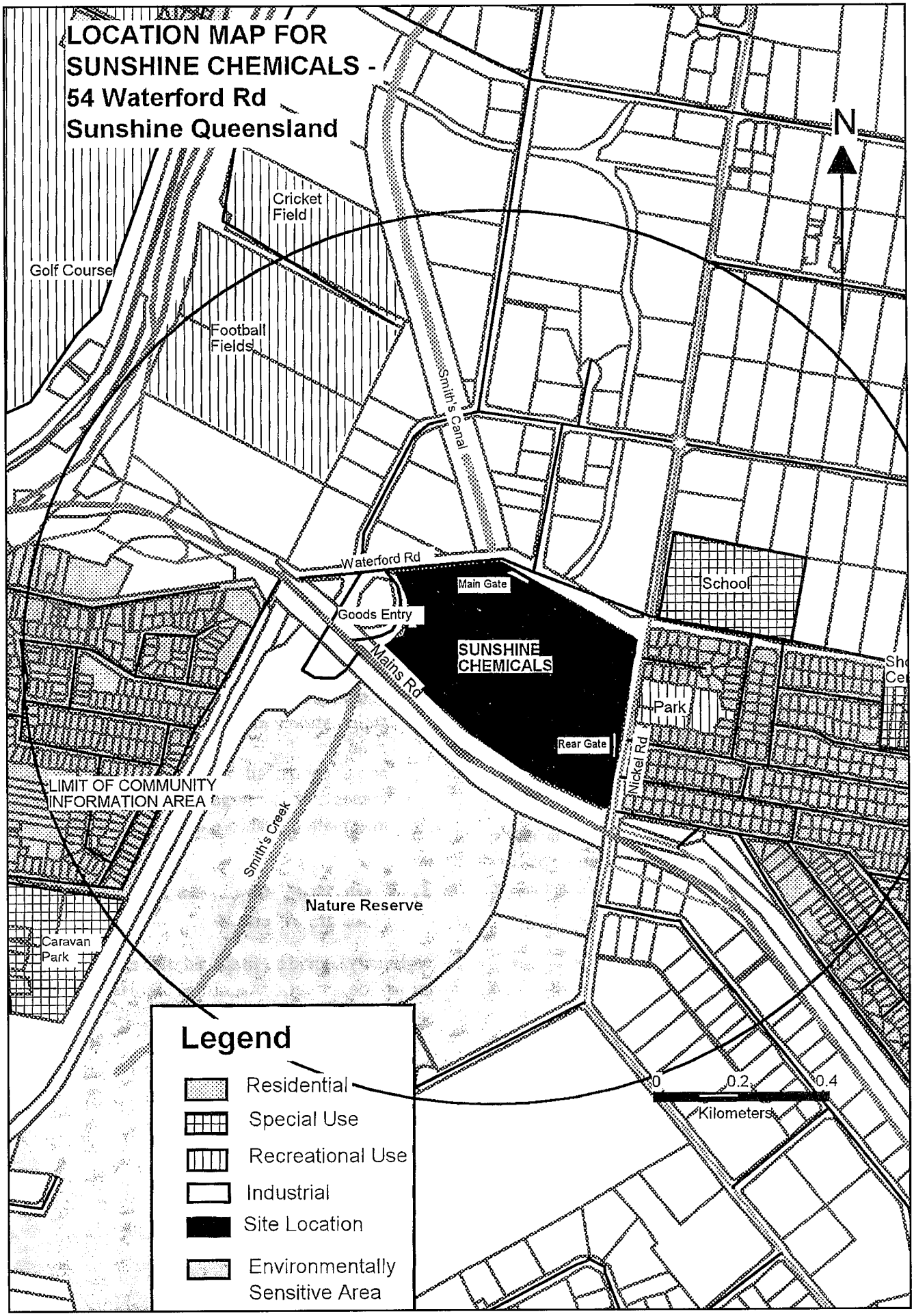


Figure 3-3: Location Map

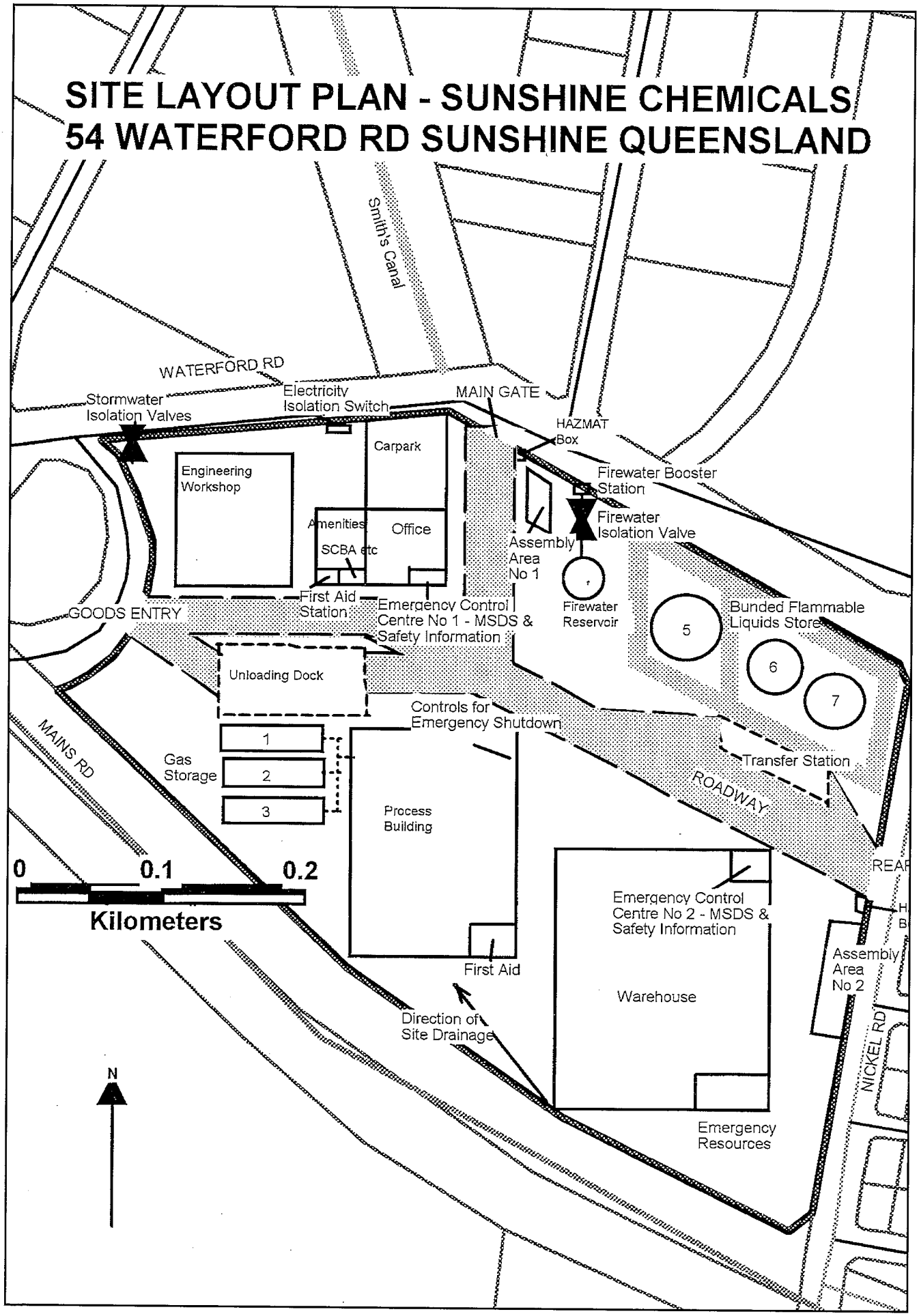


Figure 3-4: Site Layout Plan

MANAGEMENT OF THE EMERGENCY PLAN

4.1 Introduction

To remain a living document, the emergency plan must be properly supported and managed. It should be incorporated into the management system to ensure its continued effectiveness. The system should include measures to promote awareness and understanding of the plan (such as training and education), control measures (such as record-keeping), and evaluation measures (such as regular monitoring and review).

4.2 Training and Education

All persons on-site (including visitors and contractors) should be provided with induction, education and ongoing training so that they have a general awareness of the plan and the capability to undertake their roles and responsibilities in the event of an emergency. Training programs should be based on trainees' identified needs and should be modified on the basis of their evaluations of the training provided. Areas to be covered should include:

- general duties, roles and responsibilities under the plan;
- emergency functions of the organisational structure;
- emergency procedures; and
- emergency resources.

Training and education should be competency-based, enabling personnel to develop skills in the use of emergency equipment and a working knowledge of emergency procedures. The training program should provide access to information for designated personnel on the potential impacts of the range of emergencies identified; i.e., several key personnel at the facility should have developed an understanding of what could happen if things do go wrong.

All persons within the community information area should be provided with information on the appropriate actions to be taken during an emergency and the means by which they will be warned and kept informed during an emergency. (See also Section 2.2.2 and Appendix D.)

4.3 Support Action

In order to demonstrate and foster an ongoing commitment to the emergency plan, the facility should develop and maintain support policies and procedures. This should involve:

- raising and maintaining an awareness of the emergency plan;
- maintaining on-going training and education;
- ensuring that the plan is updated as required; and
- ensuring that the appropriate information is communicated to all stakeholders.

Continued communication with the community is also required to ensure that a high level of awareness is maintained. (See also Section 2.2.) For example, a facility should ensure that, if there is an emergency action card (refer to Appendix D), the latest version is available and is also provided to new residents in the community.

4.4 Operational Control

Controls should be established and maintained to ensure that the policy, objectives and targets of the emergency plan can be met. This should include ensuring that all equipment and resources are available, fully maintained and in a state of operational readiness at all times. Checks will include ensuring that:

- emergency resources are not located in the hazard zone and are accessible;
- perishables (e.g. batteries) are serviceable and spares are available;
- materials that have been consumed have been replaced (e.g. foam, neutralising agents); and
- new staff are fitted out with emergency protective equipment.

4.5 Record Keeping

Records, which are an integral part of the facility's management system, should be retained to verify the adequacy of the system.

Circumstances for which records should be kept include:

- all induction programs and on-going training (including details of personnel trained);
- desk-top simulations and practical exercises at the facility;
- all near-misses and incidents at a facility;
- testing of the plan (including the dates of testing, methods, personnel responsible, and the results of testing);
- the results of monitoring;
- the results of audits; and
- management reviews.

4.6 Documentation and Documentation Control

Documentation should contain sufficient detail to describe the core elements of the emergency plan. It may include directions on where to find more detailed information not included in the plan, such as information available on palm cards for the use of key personnel during an emergency.

The management system should control the distribution, presentation, revision, and accessibility of the plan and any supplementary information, such as palm card instructions. The system should ensure that all official copies of the document are the latest version. All superseded copies should be accounted for and filed or disposed of, as appropriate.

4.7 Investigation of an Emergency

Policies should be developed in relation to the investigation of emergencies in order to communicate the lessons learned. The role, responsibilities and duties of personnel in relation to investigating incidents should be defined.

Consideration should be given to issues such as:

- official investigations (e.g. by the Police, Fire Service or Coroner);
- the preservation of evidence for the investigation;
- consultation (including debriefings) with facility personnel, the community, Police, Fire and other emergency services, agencies and groups; and
- communicating the findings to stakeholders.

The investigation should focus on identifying opportunities to improve the effectiveness of the emergency plan. It should include details of:

- an analysis of the causes and contributing factors of the incident;
- the steps taken to mitigate the impacts;
- the provisions made to prevent a recurrence of the incident;
- the effectiveness of existing emergency procedures and lessons learnt; and
- all available data useful for assessing possible long-term impacts on facility personnel, the community and the environment.

4.8 Exercises and Testing of the Plan

The emergency plan should be tested when first developed, and then afterwards at suitable intervals to enable deficiencies to be identified and corrected. The two usual methods of testing are desktop simulations and practical exercises or drills. Testing should consider all components of the plan, including the effectiveness of training.

4.9 Monitoring and Review

The emergency plan should be reviewed at regular intervals to ensure its continued suitability and effectiveness.

Reviews could also be initiated by:

- changing legislation;
- advances in technology and equipment;
- changes in organisational direction;
- changes in products and activities;
- lessons from incidents; and
- findings of audits, reporting and communication.

Reviews would include an evaluation of the appropriateness of the objectives, targets and performance measures of the plan.

4.10 Auditing

Audits of the emergency plan should be conducted on a periodic basis to determine whether the system conforms to the stated aims and objectives and has been properly implemented and managed. The frequency of audits should be guided by the nature of the facility and the results of previous audits.

4.11 Updating of the Plan

The plan should be tested and reviewed regularly, and revised as necessary. It should be updated when:

- testing of the plan identifies shortcomings or omissions;
- modifications or alterations occur at the facility;
- the type and quantities of hazardous materials on-site change significantly;
- an incident or near miss indicates the need to do so;
- changes to surrounding land use impact upon the emergency plan; or
- changes occur that will impact on the execution of the plan, such as resources, safety systems, personnel and contact numbers.

Temporary modifications to the plan should be considered when undertaking non-routine activities at the hazardous facility, such as maintenance, construction, start-up or shut-down. The potential for accidents increases during such activities, which often involve extra personnel on-site. In the case of construction and maintenance, there is likely to be an increase in heavy vehicle traffic within the site, and in the lifting and moving of process equipment. Each of these activities introduces potential initiating events not present during normal operation. During start-up and shut-down procedures, there is a higher potential for human error as personnel are undertaking less familiar activities.

By constant monitoring, review and auditing, the plan will remain a dynamic document, alert to the needs of all stakeholders and responsive to changing circumstances.

GLOSSARY

ADG Code: Australian Code for the Transport of Dangerous Goods by Road and Rail.

BLEVE: Boiling Liquid Expanding Vapour Explosion, which refers to the sudden rupture (due to fire impingement) of a vessel/system containing liquefied flammable gas under pressure. The immediate ignition of the expanding fuel-air mixture leads to intense combustion creating a fireball, a blast wave and potential missile damage.

CAS No: Chemical Abstracts Service Number - used to identify specific chemicals.

community information area: an area surrounding the hazardous facility in which people are likely to be affected in the event of an incident.

competency-based training: training which focuses on the competencies gained by the trainee rather than on the training process itself.

consequence: the expected physical result of an incident (e.g. gas or liquid release, fire, explosion, overpressuring of vessel, discharge of contaminant into a waterway), including the characteristic of this physical result that causes harm to people, property and the environment (e.g. heat radiation, explosion overpressure, concentration of toxic gas, contamination of habitat).

emergency: an incident at a hazardous facility requiring activation of the emergency plan.

emergency services manifest(s): a manifest to inform the Police, Fire Service and other emergency services of the types, quantities and locations of stored hazardous substances as described in the NOHSC:3010 (1990).

environmental receptors: the various components of the surrounding environment including air, water systems, land, flora and fauna which may suffer a deleterious impact from a contaminant.

ERPGs: Emergency Response Planning Guidelines which are guidelines for air contaminants published by the American Industrial Hygiene Association.

facility emergency control centre (FECC): an area where designated personnel coordinate information, develop strategies for addressing the media and government agencies, handle logistical support for the response team, and perform management functions. A centralised support facility allows emergency managers and staff to contend with incident issues more effectively.

FECC: see facility emergency control centre

hazard(s): a situation or an intrinsic property with the potential to cause harm to people, property or the built or natural environment.

hazard zone: an area surrounding the hazardous facility where the consequences of a particular incident may impact on people, property and the environment.

hazardous facility: a facility which incorporates hazards which may pose a significant risk to the employees in the facility, the surrounding community and environment, and/or the facility itself.

hazardous material(s): any material which, because of its chemical, biochemical, microbiological or radiological properties, temperature or state of compression, could in sufficient quantity or concentration, cause harm to people, property or the environment.

HAZCHEM Code: the emergency action code associated with dangerous goods.

HAZOP: Hazard and Operability Study.

IDLH: Immediately Dangerous to Life or Health. An IDLH exposure condition is a condition that poses a threat of exposure to air-borne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment. Developed by the National Institute for Occupational Safety and Health (NIOSH).

impact: the physical damage to people, property or the environment from the consequences of an incident (e.g. property damage, injury, fatality, fish kill).

incident(s): a deviation from the intended operating conditions at a hazardous facility that has the potential to result in an emergency (e.g. hole in pipework or vessel, runaway reaction, overfilling of pressure vessel).

knock-on effects: the triggering of secondary events (such as toxic releases) by a primary event (such as an explosion), such that the result is an increase in consequences or in the area of an impact zone.

kPa(g): kiloPascals(gauge).

kW/m²: kilowatts per square metre.

LFL: lower flammable limit of a vapour or gas. The lowest concentration (lowest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc or flame) is present. Also known as LEL (lower explosive limit).

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

operator: an employer, occupier or person who has overall management or control of a hazardous facility.

overpressure: the pressure developed above atmospheric pressure at any stage or location from a blast wave or pressure.

protect-in-place: the concept of sheltering people when an evacuation would cause or threaten greater harm.

risk: the likelihood of harm occurring from a hazard.

risk assessment: the evaluation of the likelihood of undesired events and the likelihood of harm or damage being caused, together with the value judgements made concerning the significance of the results.

sensitive environmental receptors: an environmental receptor which is likely to suffer a deleterious impact from a contaminant.

sensitive land use: land use where there are concentrations of vulnerable people who are not capable of taking protective action for themselves during an emergency. This will include schools, child care centres, nursing homes, aged persons accommodation, hospitals, prisons and special care centres.

tabard: a short tunic, open at the sides, with identifying markings.

UN No: United Nations Number. In relation to dangerous goods, the UN No. means the number assigned to the goods by the UN Committee of Experts on the Transport of Dangerous Goods and published in the UN Recommendations as in force from time to time.

unstable material: a material that will vigorously polymerize, decompose or condense, become self reactive, react violently with water, or otherwise undergo a violent chemical change under conditions of shock, pressure, or temperature.

APPENDIX A:

EMERGENCY PLANNING CHECKLIST

The checklist is a quick ready reference to ascertain whether the plan has addressed the fundamental concepts of emergency planning. The questions, which are applicable to large and small facilities, refer to all important matters that should be considered and, if appropriate, addressed in the emergency plan.

GENERAL	
Does the plan: • fully prepare the facility for an emergency? • satisfy the needs of the facility? • provide a flexible and simple approach? • readily accommodate change? • have the full support of senior management?	
CONSULTATION	
Have the key stakeholders in the emergency planning process been identified and listed?	
Have the key stakeholders been consulted through all phases of the emergency planning process?	
Have the needs and concerns of all stakeholders been addressed?	
Has the emergency plan been communicated to all stakeholders?	
Are the stakeholders satisfied?	
THE AIM AND OBJECTIVES	
Does the aim reflect the reasons for developing the plan?	
Do the objectives list and prioritise the outcomes required?	
Do the objectives provide specifications for developing the emergency plan?	
THE PARAMETERS	
Does the definition of an emergency situation: • cover all incidents that would require activation of the emergency plan? • identify the types of incidents that would not be defined as an emergency situation?	
Do the types and levels of emergency identified cover all possible incidents?	
Does the plan: • identify all hazards which will have an impact? • recognise the importance of all hazards? • determine the potential impact on people, property and the environment?	

Are the incidents selected to assess consequences and impacts representative of the entire range?	
Are all areas on which an incident could impact covered by the plan?	
Is the basis for determining the area of impact of an emergency provided?	
Are all people on whom an incident could impact covered by the emergency plan?	
Have all specific groups of people and their numbers been identified?	
Are the assumptions in formulating the plan listed and are they reasonable?	
Do the contingency plans developed provide adequate coverage for failed assumptions?	
THE SYSTEM	
Does the system address the objectives of the plan?	
Does the system define its main focus and priorities?	
Is the system capable of: • managing an emergency until the emergency services assume control? • providing support and information to the emergency services and other external agencies? • managing smaller emergencies and environmental emergencies when the emergency services do not attend?	
Is the system automatically activated when the alarm is raised?	
Have the functions to be undertaken during an emergency been identified and listed?	
Have facility personnel been assigned to all functions identified?	
Is there an organisational structure in place with a clear chain of command?	
Does the organisational structure: • make adequate arrangements for back-up? • provide for emergencies under all circumstances, including out-of-hours?	
Have emergency procedures been developed and documented for all emergency activities?	
Are the emergency procedures: • safe to undertake? • supported by adequate resources? • achievable, taking into account potentially life-threatening situations?	
Are the emergency resources provided: • adequate to support the emergency functions and emergency procedures? • accessible during emergencies? • functioning at all times as intended?	
Does the system provide user-friendly and adequate information to manage an emergency?	

Do key personnel have the defined level of knowledge and skills necessary to carry out their responsibilities?	
MANAGEMENT OF THE PLAN	
Does the management of the plan: • allow for regular monitoring, testing, auditing and review of the emergency plan? • provide training and education for employees to a defined level of competency to fulfil their roles and responsibilities in the event of an emergency? • provide training in emergency procedures and in the use of emergency resources? • provide for the provision of information and promote the on-going awareness of the plan to the community and other stakeholders? • provide for regular exercises to be undertaken? • provide for the serviceability and adequate supply of emergency resources? • allow for the emergency plan to be updated as necessary? • allow for records of activities to be documented? • allow for emergencies to be investigated and the findings communicated?	

APPENDIX B:

EMERGENCY PLANS FOR SMALL FACILITIES

These guidelines introduce the concepts of emergency planning that can be applied to any type of facility, both small and large. For smaller facilities, however, the level of detail required to prepare an effective emergency plan is significantly reduced, particularly if an emergency would have minimal impact (or none) beyond the boundary of the facility. In order to make the task of emergency planning less onerous for small facilities, the attached proforma emergency plan has been developed.

This proforma covers all of the concepts addressed in these guidelines in a simplified manner. It should only be used for small facilities handling relatively low quantities of hazardous materials. If at any point, the proforma is inadequate for including information that the operator feels is necessary for the emergency plan, then an alternative and more detailed approach should be used.

Acknowledgement:
This proforma document has been based on a similar concept developed by the Noarlunga Industrial Chemical Project (now the Aware Project) of the City of Noarlunga (since renamed City of Onkaparinga), South Australia, and published in the fourth volume of their journal *Aware*, February 1995.

EMERGENCY PLAN

Date: ..... **Page 1** **Copy No:** .....

Name of Facility: .....

Address of Facility: .....

Type of Business: .....

Number of People On-Site: **Day** ..... **Night** .....

Emergency Contact Number: .....

General Contact Person: **Name** ..... **Telephone** .....

Aim of the Plan:
The aim of this plan is to minimise the damage to people, property and the environment as a result of an emergency involving this facility. The plan applies to emergencies that occur at this facility, and emergencies external to the facility that may impact on the operation and integrity of this facility.

Significant Hazards at the Facility

This section details the most significant hazards associated with this facility and gives a general description of the type of emergency that could occur, and some important points to note if an incident does occur. For the full details of the type and quantities of hazardous materials, see attached **Hazardous Materials List.**

Description of Hazard	**Type of Hazard (e.g. fire, explosion, toxic, water pollutant)**	**Details of Hazard (e.g. degree of flammability, toxic exposure limits, environmental concerns)**
Sample: 15 tonne LPG flammable pressurised gas	*Sample:* flammable vapour cloud fire, explosion	*Sample:* highly flammable, remove all ignition sources, evacuate immediate area, cool vessel if subject to heat from fire (only if safe to do so)

This proforma emergency plan is suitable for small facilities only. It has been prepared in support of the document "Emergency Planning: Guidelines for Hazardous Industry" CHEM Unit, Department of Emergency Services, Queensland and the Australia and New Zealand Hazardous Industry Planning Taskforce, 1998. For further information, please consult this document.

EMERGENCY PLAN

Date: ..... **Page 2** **Copy No:** .....

Name of Facility: .....

Address of Facility: .....

Emergency Resources

Type	Description	Quantity Available	Location
Fire Fighting			
Chemical Spill			
Protective Clothing			
First-aid			
Communication			
Other			

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EMERGENCY PLAN

Date: ..... **Page 3** **Copy No:** .....

Name of Facility: .....

Address of Facility: .....

Emergency Procedures

General procedures that should be adopted for all emergencies include:

1. Activate emergency alarm - notify all personnel.

   The emergency plan can be activated by.....

2. Initiate evacuation (if required).

   Upon hearing the evacuation alarm, all personnel on-site should proceed to the assembly point using the specified evacuation routes (see attached Site Layout Plan). Alternative assembly points (see attached Site Layout Plan) will be used if the emergency has the potential to impact on the primary assembly point.

3. Contact emergency services.

   The person responsible for initial advice to the emergency services is .....

4. Activate emergency response procedures appropriate to the type of emergency (see attached).

5. .....

6. .....

7. .....

8. .....

9. .....

10. .....

For emergency procedures for specific types of emergencies see attached sheets:

Type of emergency	Attachment Number and Title
.....	.....
.....	.....
.....	.....
.....	.....

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EMERGENCY PLAN

Date: ..... **Page 4** **Copy No:** .....

Name of Facility: .....

Address of Facility: .....

Emergency Functions and Organisational Structure

Position Title: Facility Emergency Controller

Functions: .....

Person Responsible - Name:..... Position: .....

Deputy - Name:..... Position:.....

Position Title: .....

Functions: .....

Person Responsible - Name:..... Position: .....

Deputy - Name:..... Position: .....

Position Title: .....

Functions: .....

Person Responsible - Name:..... Position: .....

Deputy - Name:..... Position: .....

Position Title: .....

Functions: .....

Person Responsible - Name:..... Position: .....

Deputy - Name:..... Position: .....

Position Title: .....

Functions: .....

Person Responsible - Name:..... Position: .....

Deputy - Name:..... Position: .....

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EMERGENCY PLAN

Date: ..... **Page 5** **Copy No:** .....

Name of Facility: .....

Address of Facility: .....

Management of the Plan

This emergency plan has been authorised by: **Name** .....

Title .....

Signature .....

Review: This plan will be reviewed once per ..... or when changes are made that will affect the plan.

Last review conducted on ..... Next review due on .....

Testing: This plan will be tested by way of an exercise once per .....

Last test conducted on ..... Next test due on .....

(see attached Register of Testing)

Register of Copies Distributed

Copy Number	Name	Organisation	Contact Number
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
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EMERGENCY PLAN

Date: ..... **Page 6** **Copy No:** .....

Name of Facility: .....

Address of Facility: .....

Management of the Plan

Register of Testing

Date of Test	Nature of Test	Evaluation of Test

Register of Training

Date	Nature of Training	Participants

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EMERGENCY PLAN

Date: ..... **Page 7** **Copy No:** .....

Name of Facility: ..... **Address of Facility:** .....

HAZARDOUS MATERIALS LIST

Include all hazardous materials including bulk storage, packaged storage, manufacturing and transport

UN No	**Name**	**DG Class Sub-Risk Packing Group**	**Type** Indicate: bulk/package/process above/under ground storage/processing pipe/vessel/drum/tank	**Tank Capacity** or **Package Size** or **Vessel/Pipe Volume**	**Number of items** (for varying inventories, indicate typical number and maximum number)	**Total Quantity**	**Location** (e.g. building no or map reference)
Sample: 1789	*Sample:* Hydrochloric acid	*Sample:* Class 8 PG II	*Sample:* Bulk, storage, aboveground Reaction vessel, processing Package, drum	*Sample:* 5000 L 500 L 200 L	*Sample:* 2 tanks(one bund) 4 vessels (two operating) 10 (maximum of 50)	*Sample:* 8000 L (80% of capacity) 800 L (80% of capacity) 2000 L (maximum of 10000 L)	*Sample:* SW Corner Bund Process building Chemical Store A

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EMERGENCY PLAN

Date: ..... **Page 8** **Copy No:** .....

Name of Facility: .....

Address of Facility: .....

SITE LAYOUT PLAN

Include the following

- site boundaries;
- roadways, buildings and major tanks (labelled or numbered);
- normal entrances and exits;
- evacuation assembly points;
- emergency access points;
- grid references (if applicable);
- electrical supply isolation;
- gas supply isolation valves;
- town water isolation valves;
- emergency evacuation assembly points;
- first-aid stations;
- north point;
- distance scale;
- location of relevant emergency plan information and safety information;
- site topography (including bunding and site drainage);
- all hazardous materials under control of the facility (see Section 3.7.1);
- location of the facility emergency control centre; and
- location of emergency resources and equipment (e.g. neutralising agents, absorbents).

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EMERGENCY PLAN

Date: ..... **Page 9** **Copy No:** .....

Name of Facility: .....

Address of Facility: .....

LOCATION MAP

Include the following:

- name of the facility;
- street address of the facility (including the suburb or town);
- site boundaries;
- local neighbourhood details (covered by the hazard zone);
- main entry;
- alternative entrance(s);
- emergency access points;
- north point indicator;
- distance scale;
- location of alternative water supplies (lakes, creeks, reservoirs, etc.);
- land usage (e.g. residential, industrial, commercial, vacant, bushland, etc);
- places of possible concentrations of people (e.g. sports grounds, shopping centres);
- places of special interest in an emergency (e.g. hospitals, child care facilities, schools, nursing homes); and
- site topography (including slope of land, nearby watercourses and environmentally sensitive sites, drainage systems including access points, etc.).

B

This proforma emergency plan is suitable for small facilities only. It has been prepared in support of the document "Emergency Planning: Guidelines for Hazardous Industry" CHEM Unit, Department of Emergency Services, Queensland and the Australia and New Zealand Hazardous Industry Planning Taskforce, 1998. For further information, please consult this document.

APPENDIX C:

ASSESSING THE CONSEQUENCES AND IMPACTS OF AN INCIDENT

It is extremely important at the time of an emergency for the responding personnel (including facility staff and emergency services) to appreciate the likely magnitude and duration of the emergency and the potential for the emergency to escalate. This will enable the facility operator and the emergency services to provide an appropriate level of response. Information about possible consequences and impacts also assists in preparing for an emergency by indicating the type and scale of resources required and determining appropriate emergency response procedures.

A potential incident should be identified in the hazard identification process and can be defined as a deviation from the intended operating conditions of the facility. Incidents can include a leak in a pipe or a vessel, a runaway reaction, overfilling of a pressure vessel, and the loading of incorrect materials into a batch reactor. Not all incidents will result in an emergency - many will be corrected through standard operating procedures.

The consequence of an incident is the expected physical result, and can include fire, explosion, release of toxic gas or liquid, overpressuring of a vessel, and discharge of a contaminant into a waterway. The potential consequences can be described using concepts such as heat radiation for fires, explosion overpressure for explosions, concentration of toxic gas, or the degree of contamination of a habitat.

The overall impact of the incident relates to the actual physical damage caused by the consequences. The degree of vulnerability of people, property and the environment, will determine the magnitude of the impact.

C1. Hazard Analysis

A hazard analysis focuses on determining the specific impacts of a particular incident in order to estimate the actual damage to people, property and the environment. In many cases, mathematical models based on thermodynamics, mass transfer and energy transfer phenomena, are available to perform these calculations. While earlier models have focussed on impacts on people and property, models determining the impact on the environment are becoming more readily available and should be used where appropriate.

The methodology used and assumptions made in the analysis of each incident should be documented. Details of the models used should also be provided. The results of the analysis should be supported by illustrative information such as graphs and site maps with overlays indicating the areas affected by a certain level of impact.

While there are many uncertainties associated with the models available and the results of the hazard analysis are dependent on the exact circumstances of an incident, some conclusions should be drawn about the extent of the impacts of an incident, using the models and information available.

C2. Types of Incidents

When considering the types of incidents that may have a detrimental impact, it is necessary to consider more than just a primary release of hazardous material. Several other initiating incidents need to be considered, including:

- the potential for toxic combustion products from fires; and
- fire, explosion or toxic release resulting from a chemical reaction.

C2.1 Toxic Combustion Products

Fires involving hazardous materials (and often materials not normally considered hazardous) can generate toxic combustion products which are then released and dispersed in the fire plume. The nature and quantities of toxic combustion products likely to be generated need to be considered. The fire plume could also contain uncombusted materials that are toxic.

Calculations to determine the dispersion of these materials need to take into account the buoyancy of the fire plume due to the heat generated by the fire.

C2.2 Unstable Materials

Unstable materials are capable of a rapid release of energy:

- by themselves, through self-reaction or polymerisation or thermal instability;
- because of potentially hazardous reactions with air, water or other chemicals; or
- because of friction or shock sensitivity.

The violence of a reaction or decomposition can be increased by:

- elevated heat or pressure;
- mixture with other materials to form fuel-oxidizer combinations; or
- contact with incompatible substances, sensitizing compounds, or catalysts.

The behaviour of these materials is often hard to predict and, as a result, it can be difficult to estimate the consequences of incidents involving these materials. The degree of the instability and reactivity hazard can significantly influence the management of an emergency and the procedures implemented to respond to the incident.

C2.2.1 Specific Characteristics of Unstable Materials

As a guide, these substances can often be identified through their dangerous goods classifications (as defined in the ADG Code), but they are not limited to these classifications:

- Class 1- some explosive compositions;
- Class 4.1 - flammable solids, self-reactive and related substances, and desensitized explosives;
- Class 4.2 - substances liable to spontaneous combustion, including pyrophoric substances and self-heating substances;
- Class 4.3 - substances which in contact with water emit flammable gases;
- Class 5.1 - oxidizing agents;
- Class 5.2 - organic peroxides; and
- goods too dangerous to be transported (as defined in the ADG Code).

Some of the important issues that need to be considered when determining the consequences of unstable and reactive materials are described below.

(a) Metal powders, when on fire, are difficult to extinguish because water and/or carbon dioxide react and increase the hazard.

(b) Self-reactive substances are liable to undergo exothermic decomposition initiated by heat, impurities, friction or impact. They may decompose explosively, particularly if confined.

(c) Self-heating substances may spontaneously ignite in air.

(d) Certain substances, when in contact with water, may emit flammable gases which can form explosives mixtures in air.

(e) Thermally unstable materials will, at a specific temperature, undergo some type of potentially hazardous reaction (decomposition, polymerization, rearrangement, etc) with a subsequence release of energy. The temperature at which the reaction begins is known as the Self-Accelerating Decomposition Temperature (SADT).

(f) Organic peroxides have both oxidizing and combustion properties and, in some cases, may undergo accelerating self-reaction which may be violent.

(g) Oxidizing agents are solids, liquids and gases that produce oxygen or other oxidizing gases during a reaction, or that readily react to oxidize combustible materials. The hazard is greatly increased at higher temperatures. Combustible materials that are contaminated or mixed with oxidizing agents may become sensitive to heat, shock, friction or impact.

(h) Some chemicals present a hazard because of their ability to undergo a self-sustaining exothermic polymerization reaction. The reaction sometimes produces significant quantities of gas and heat that are capable of rupturing vessels. Generally, this reaction is controlled or prevented by inhibitors, or by controlling the temperature of a bulk liquid. However, these safeguards can become ineffective if the materials are contaminated or exposed to external heat.

C3. Types of Models

C3.1 Release or Incident Modelling

Release models determine the rate of discharge of a liquid or gas, based on the size of the hole and the conditions of the fluid in the pipe or vessel. Models are also available for determining:

- the degree of aerosol formation for high pressure liquid releases;
- the rate of liquid rainout to form pools; and
- evaporation rates from pools.

Equivalent techniques should be used to determine the rate of generation of toxic products in the case of a fire, or reaction of an unstable material.

C3.2 Dispersion Modelling

Atmospheric dispersion models are available for:

- positively buoyant gases (lighter than air);
- neutrally buoyant gases (same density as air); and
- negatively buoyant or dense gases (heavier than air).

For emergency planning purposes, dense gases pose the greatest concern. These gases do not readily disperse and may remain close to the ground for extended periods of time. The dispersion of these gases is strongly dependent on obstacles (buildings, plant, vegetation) and the local wind patterns generated by these obstacles.

There are many factors affecting the degree of dispersion and the atmospheric concentrations of a material following a release, including:

- release velocity;
- release rate;
- release duration;
- height of the release;
- wind speed and weather conditions (e.g. day or night, sunny or overcast);
- surrounding terrain (e.g. urban or open grassland); and
- the effects of any buildings or surrounding structures on local air flow.

The dispersion calculations should provide distances to specified concentrations or impact levels (e.g. irritation, injury, fatality) for typical weather conditions for the facility. As a minimum requirement, weather conditions resulting in high concentrations at long distances from the source for both day and night (worst case day and night conditions) should be considered.

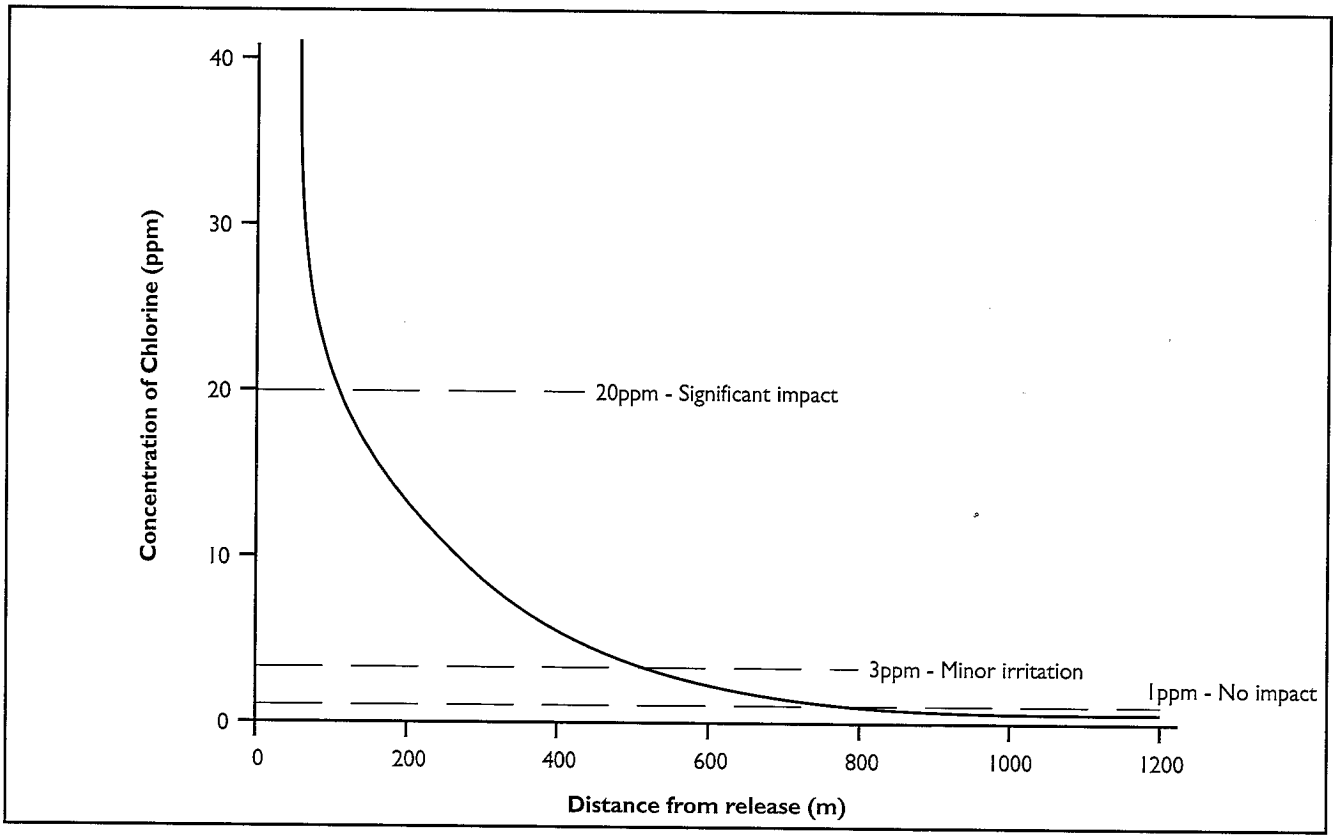
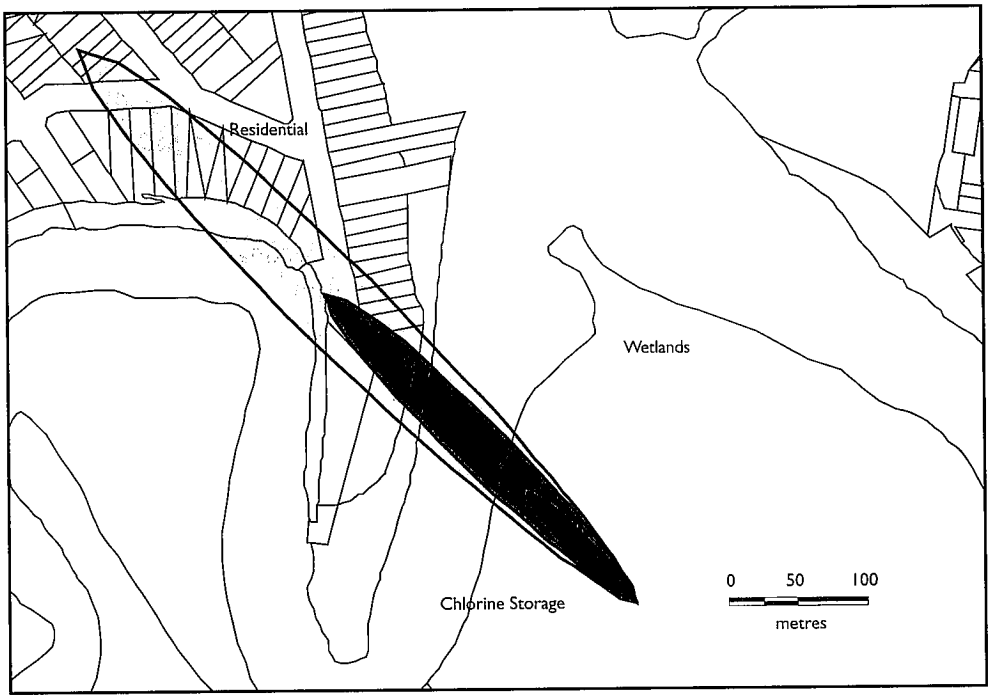


Figure C-1: Concentration-Distance Profile for a Chlorine Release



Weather Conditions:
Day-time only
Clear and sunny
Wind speed 3m/s

Release Conditions:
Chlorine drum (920 kg)
Liquid valve failure
Indoor release

1 ppm
No impact

3 ppm
Minor irritation

20 ppm
Significant impact

Figure C-2: Footprints of Different Concentrations for a Chlorine Release

The results of the dispersion calculations could be presented as:

- a concentration-distance profile (see Figure C-1); and
- footprints (an overhead view of the gas cloud showing where the concentration is greater than or equal to a specified level - see Figure C-2).

An analysis of the dispersion of flammable gases and vapours can be used to determine the extent of flammable (or explosive) atmospheres. This information can be used to identify areas in which ignition sources should be controlled during an emergency, e.g. areas with concentrations in excess of 10% LFL.

Consideration should also be given to the potential for increased oxygen concentrations due to oxidising reactions. While not a toxic gas, oxygen-enriched atmospheres increase the risk of ignition of flammable atmospheres, and special attention should be given to the control of ignition sources.

C3.3 Fire Modelling - Heat Radiation

Large fires have the capacity to cause injury to people and damage to property by flame impingement within the flame boundary, and by the radiation of intense heat beyond the immediate flame boundary. The most severe types of fires are those involving highly flammable and highly volatile substances such as LPG and petroleum fuels. Releases result in different types of fires including pool fires, jet fires, and flash fires, depending on the conditions of storage and the circumstances of the release.

Models are available for calculating thermal radiation levels at selected positions outside the flame. For a particular release, appropriate models should be selected, depending on the source and individual characteristics of the release and subsequent fire.

The potential impacts of heat radiation can be assessed by determining a relationship between the intensity of the heat radiation and the distance from the source of the fire. The impacts can then be assessed, using information similar to that presented in Table C-1 and Figure C-3.

Figure C-4 illustrates heat radiation from a 20 metre diameter burning pool of petrol. This information, together with details provided in Table C-1 and Figure C-3, can be used to determine the distance from the fire at which critical levels of injury or damage are likely to occur.

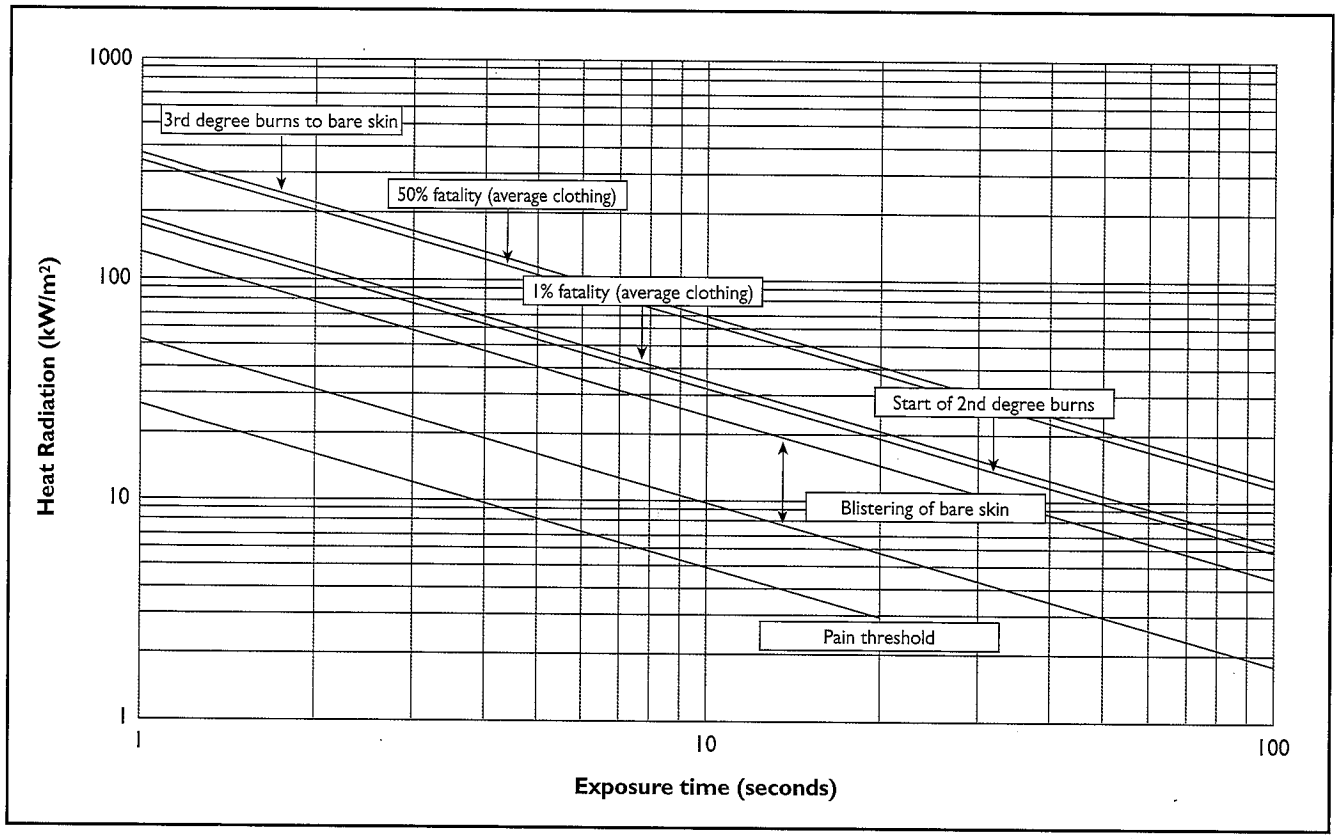


Figure C-3: Injury Due to Heat Radiation

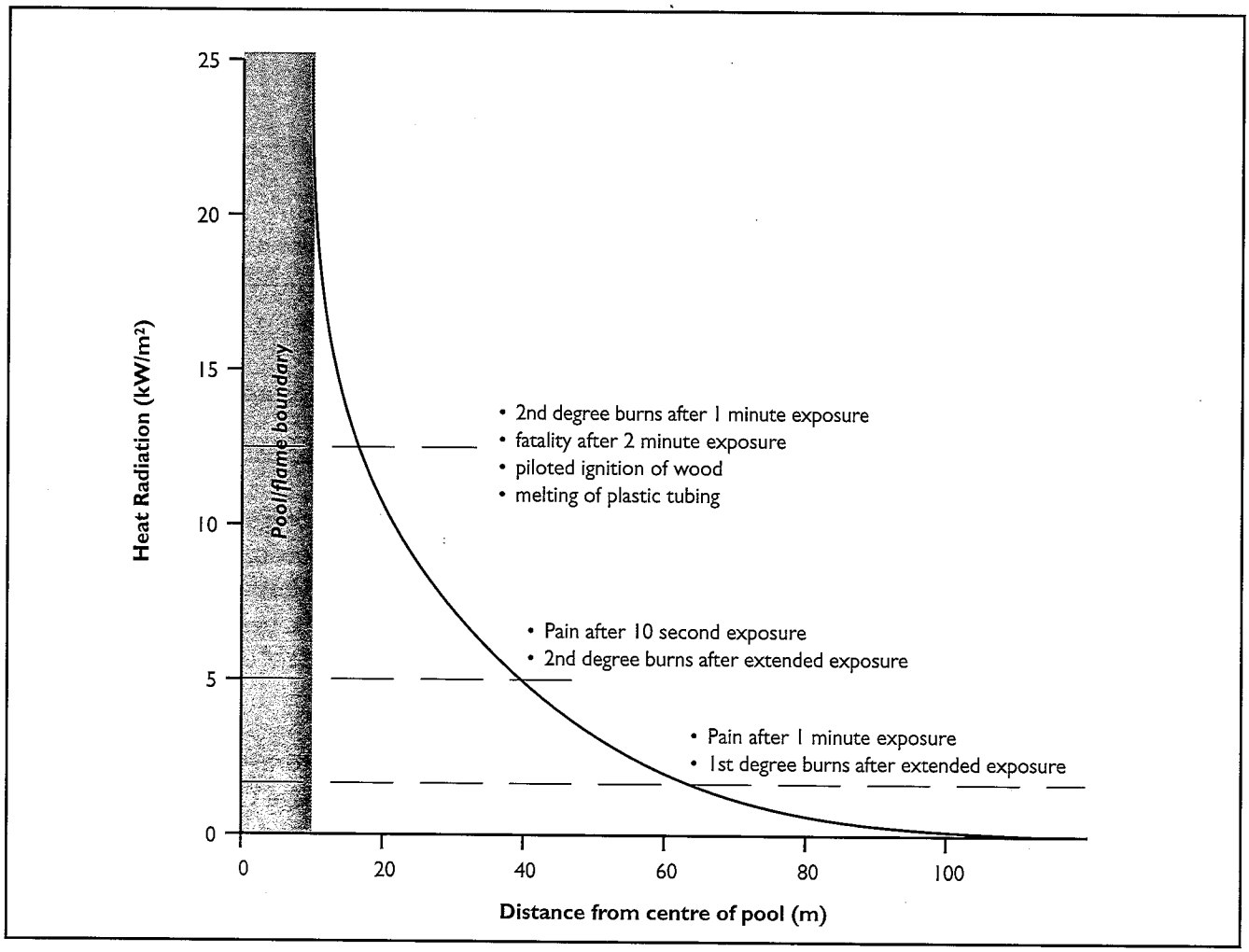


Figure C-4: Levels of Heat Radiation from a Petrol Fire

Table C-1: Impacts of Heat Radiation

Heat Radiation kW/m^2	Impact
2.0	• minimum to cause pain after 1 minute exposure • low chance (10%) of first degree burns to exposed skin after 1 minute exposure • moderate chance (50%) of first degree burns to exposed skin after 2 minute exposure • high chance (99%) of first degree burns to exposed skin after extended exposure
5.0	• minimum to cause pain after 10 second exposure • low chance (10%) of second degree burns to exposed skin after 1 minute exposure • moderate chance (50%) of second degree burns to exposed skin after 2 minute exposure • high chance (99%) of second degree burns to exposed skin after extended exposure
12.5	• moderate chance (50%) of second degree burns to exposed skin after 20 second exposure • high chance (99%) of second degree burns to exposed skin after 1 minute exposure • low chance (<1%) of fatality after 30 second exposure • moderate chance (50%) of fatality after 1 minute exposure • high chance (99%) of fatality after 2 minute exposure • minimum energy required for piloted ignition of wood and melting of plastic tubing • possible structural failure for thin steel with insulation on the side away from the fire
25.0	• high chance (99%) of second degree burns to exposed skin after instantaneous exposure • low chance (<1%) of fatality after 15 second exposure • moderate chance (50%) of fatality after 30 second exposure • high chance (99%) of fatality after 1 minute exposure • minimum energy required for non-piloted (spontaneous) ignition of wood after extended exposure • possible structural failure for unprotected steel • relief of pressure vessels necessary to prevent failure
35.0	• moderate chance (50%) of fatality after 10 second exposure • high chance (99%) of fatality after 30 second exposure • cellulosic material will pilot ignite within one minute of exposure • sufficient to cause damage to process equipment

C

C3.4 Explosion Modelling - Blast Overpressure

Damage or injury caused by an explosion is due to the excessive overpressure produced by the shock wave. Validated models should be used to calculate the consequences of an explosion (i.e. the resulting overpressure). The impacts of the explosion can be assessed by comparing the overpressure at a particular location with the level of damage to people and property (as described in Table C-2).

As an example, the consequences (with respect to explosions only) from the rupture of a liquid line attached to a propane storage vessel are illustrated in Figure C-5. The consequences of this incident have been calculated and are illustrated by a series of zones relating to a specific overpressure generated by the explosion. The impact on features within the facility is illustrated by:

- the rupture of oil storage tanks (21 kPa);
- light structural damage (3.5 kPa); and
- the limit of damage and injury from missiles (2 kPa).

Table C-2: Impacts of Explosion Overpressure

Overpressure kPa(g)	Impact
2.0	• low chance (5%) of damage beyond this point • low chance (5%) of projectiles beyond this point
3.5	• light structural damage (shattered window panes, light cracks in walls, minor damage to wall panels and roofs)
7.0	• moderate structural damage (partitions and joinery wrenched from fixings - still inhabitable but structural repairs required)
14.0	• significant structural damage (partial collapse of walls and roofs of houses, brickwork destroyed - uninhabitable)
21.0	• rupture of oil storage tanks • steel frame buildings distort and pull away from foundations
35.0	• severe structural damage (nearly complete destruction of buildings) • significant chance of fatality (20-50%) for people inside buildings - all people indoors would suffer significant injury • low chance (5%) of eardrum rupture for person in the open
70.0	• significant damage to loaded train wagons • total destruction of buildings • heavy machinery (15 tonne) moved and badly damaged • very heavy machinery (>25 tonne) unaffected • moderate chance (30%) of eardrum rupture for person in the open. • low chance (<1%) of fatality due to lung damage for person in the open.

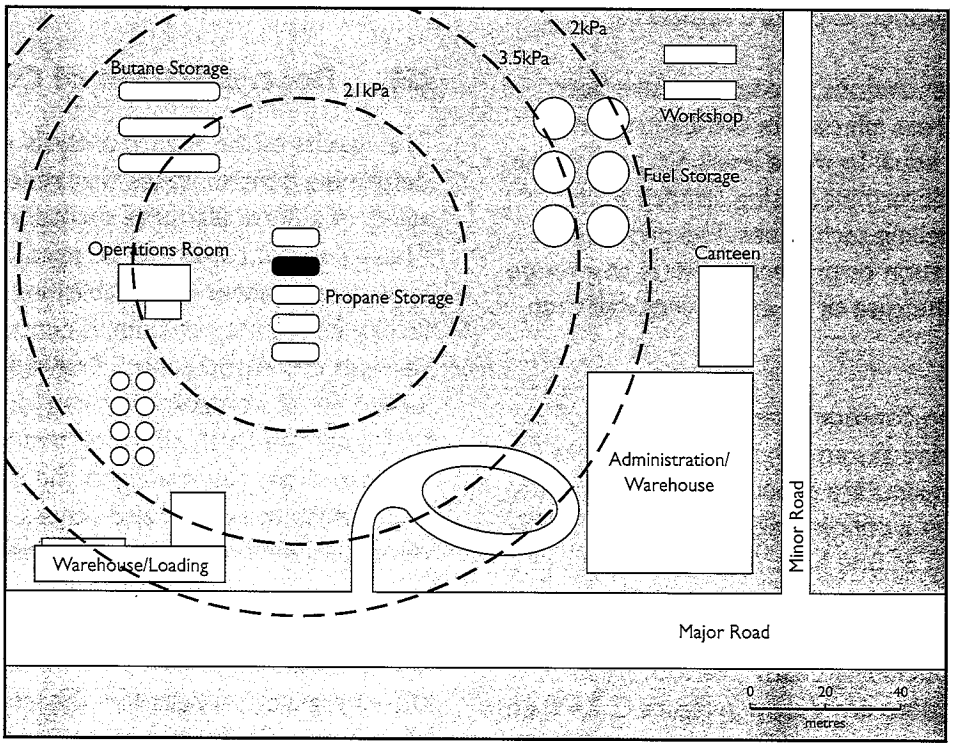


Figure C-5: Explosion Overpressure Contours for a Propane Release

C3.5 Toxic Impacts

For toxic releases, information should be provided on the expected ground-level concentrations of the material. First, it is necessary to define the concentrations at which the general public will experience adverse reactions, taking into account the vulnerability of different members of the community (e.g. young children/elderly people, asthma sufferers, etc). A range of impacts should be considered (e.g. minor irritation, no permanent harm, possible fatality, etc.).

The concentration at which these impacts occur should be based on recognised toxicological exposure limits or available dose-response data. For example, the American Industrial Hygiene Association (AIHA) has published Emergency Response Planning Guidelines (ERPGs). The level of ERPG-1 as defined by the AIHA is considered to be an appropriate concentration below which no adverse impacts are expected.

Other published sources of toxicity exposure limits include Immediately Dangerous to Life and Health (IDLH) values published by the United States National Institute for Occupational Safety and Health (NIOSH) and the Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment published by the Australian National Occupational Health and Safety Commission (NOHSC). The NOHSC exposure standards relate to workplace exposure (i.e. 8 hours/day, 5 days/week for a working lifetime) and are the only available Australian established exposure standards.

Once the concentrations of concern have been identified, the areas affected by concentrations greater than or equal to these levels for a particular release can be determined using atmospheric dispersion modelling techniques. The procedures required (evacuation or protect-in-place) to manage these areas in the case of an emergency can then be developed.

For example, the consequences and impacts of a release of chlorine gas are presented in Figures C-1 and C-2. No impacts are expected due to exposure to chlorine gas at a concentration of 1 ppm (ERPG-1) for a duration of one hour. A concentration of 3 ppm would result in minor irritation, while a higher concentration of 20 ppm could cause irreversible health impacts, including death. The footprints of these concentrations are shown in Figure C-2. When overlaid on a site map, these footprints would give an indication of the population at risk.

C3.5.1 Protect-in-Place or Evacuation

In relation to the release of toxic gases, the results of the hazard analysis can be used to determine the action required before the arrival of the emergency services, such as evacuation or protect-in-place (see Table C-3). In order to make this decision, it is necessary to firstly define criteria for acceptable exposure levels for the public.

Table C-3: Protect-in-Place or Evacuation

Protect-in-Place	Evacuation
Release of total inventory of material.	Continual release (including sustained fire with potentially toxic fumes).
The release is easily controlled.	Possibility of further failure.
Weather conditions promote rapid dissipation of vapours.	Weather conditions preclude rapid dissipation of vapours.
No explosive or flammable vapours exist.	Extended presence of explosive or flammable vapours.
	Shelter is inadequate for protection.

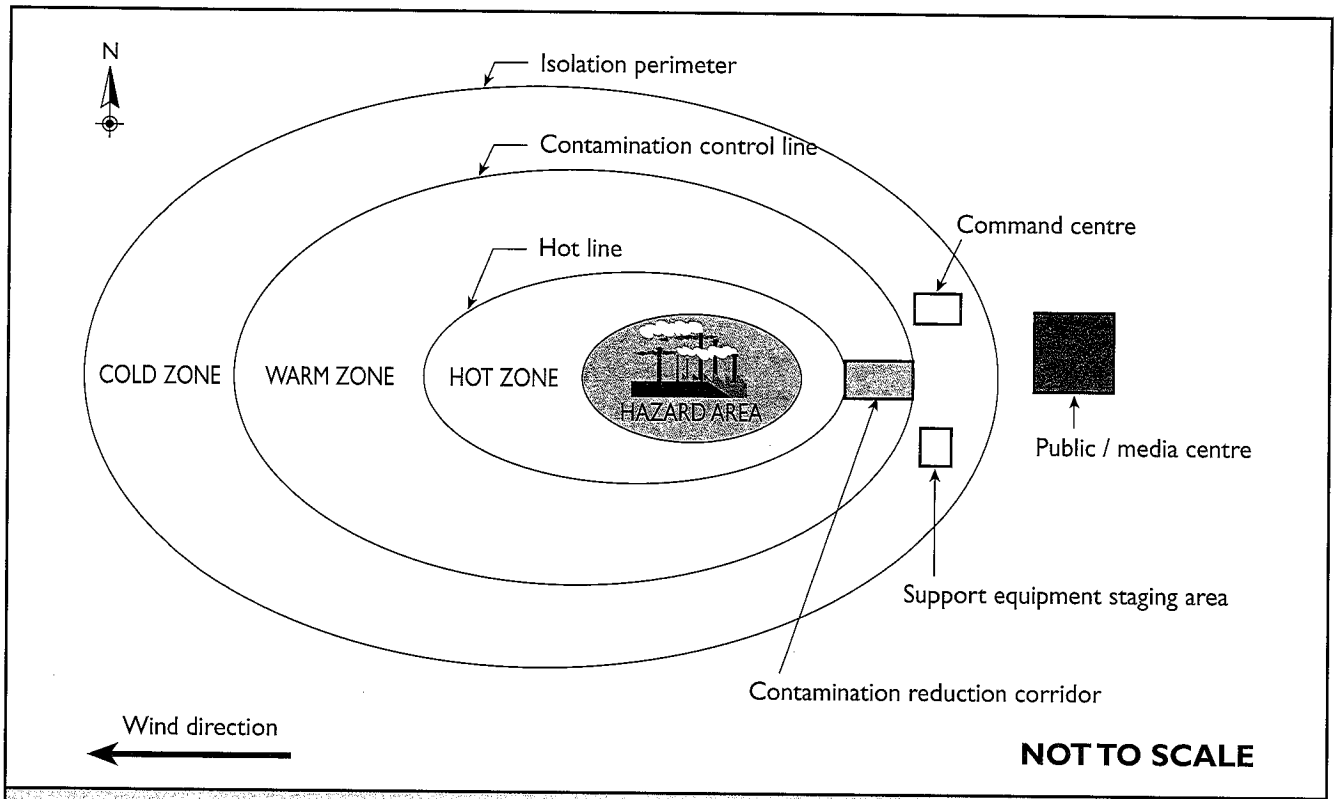
C4. Determination of Control Zones

The results of the hazard analysis can be used to determine control zones that reflect the level of safety in a particular area surrounding the incident. These control zones can be used to define appropriate places for establishing resources (e.g. facility emergency command centre, emergency services command centre, first-aid and ambulance bases). These control zones can also define areas in which certain levels of protective clothing must be worn by those responding to the incident, and areas from which the public and others not involved in the emergency response are to be excluded.

When developing the emergency plan, initial control zones should be determined, in consultation with the emergency services, for different types and levels of emergency. When the emergency plan is activated, these predetermined control zones provide a starting

point. The control zones in place at an emergency should be continuously reviewed, and altered if necessary, to account for changes in the conditions (such as potential escalation of the incident, changes in the weather conditions, etc), or as more information becomes available on the incident.

Figure C-6 presents a sample control zone structure. The terminology used is illustrative only, and many other terms (suggestions are provided) can be used, provided that there is a clear understanding of the function of each area within the control zone structure.



Cold Zone (clean zone, clear zone, support zone, outer hazard zone):
Command Centre, Support functions (first-aid)

Warm Zone (decontamination zone, limited access zone, protective action zone):
Support for direct response personnel, personnel and equipment decontamination

Hot Zone (exclusion zone, restricted zone, actual hazard zone, initial isolation zone):
Area in which direct response personnel are working

Hazard Area (spill, total exclusion zone, exclusion zone, contamination area):
Area involved in the actual incident

Figure C-6: Emergency Control Zones

Sources:

Andrews, L.P. (1992). *Emergency Responder Training Manual for the Hazardous Materials Technician.*
Hosty, J. (1992). *A Practical Guide to Chemical Spill Response.*
National Fire Protection Association. (1992). *NFPA 471 Responding to Hazardous Materials Incidents.*

C5. Impacts on the Environment

The protection of human life at any emergency is the highest priority, and response to the emergency should reflect this. However, the mitigation of environmental impacts from incidents must also be considered when developing the emergency plan. Industry has a duty to minimise environmental impact from such incidents. In addition, appropriate environmentally sensitive incident management can reduce costs during the clean-up phase of the emergency. Therefore the consequences and impacts of the incident on the environment should be assessed.

It is necessary to identify the sensitive features of the environment surrounding the facility (e.g. waterways), and then to assess the impacts of the identified incidents on these features. Protocols can then be determined to ensure the protection of sensitive features during an emergency. Accidental emissions to the atmosphere, and accidental discharges to water and land, should be considered.

It is also important to recognise the difference between the impacts on people and the impacts on the environment. Significant environmental impacts may result from a wider range of incidents. For example, an accidental release of milk from a processing plant to a waterway may have significant environmental impacts while the impacts on people and property are minimal. All significant potential environmental impacts need to be considered in the emergency plan.

When considering response actions, the overall impact of the incident needs to be taken into account. For instance, a large pesticide manufacturer, in developing an emergency plan, may decide that the 'let it burn' approach is appropriate for a fire in its storage facility. This strategy may be adopted because the hazard analysis has identified that the smoke from such a fire would be less damaging to the environment and public health than the large volumes of highly contaminated fire water runoff which would enter the local waterways if an attempt were made to put the fire out.

Identifying the sensitive environmental features and determining acceptable environmental impacts as well as appropriate emergency management protocols, will depend on the regulatory regime within which the facility operates. However, industry codes of practice and in-house standards may be of assistance.

APPENDIX D:
COMMUNITY CONSULTATION

D1. Consultation Program

For successful emergency planning to occur, there is a need to ensure that the community is aware of the hazards to which they are exposed. Community consultation processes should be developed to ensure that the community is aware of:

- the hazards;
- the warning systems in place to alert the community of an emergency; and
- the appropriate actions to take in the event of an emergency.

A properly conducted consultation program should result in informed discussion between industry and community representatives leading to better community preparedness. An effective community consultation program can benefit emergency planning by:

- gathering relevant local information (e.g. the presence and location of any members of the public with specific health conditions);
- identifying specific concerns of members of the public; and
- developing and selecting strategies for community protection.

The program should be adaptable and flexible in order to adopt and respond to feedback. The first step is to identify who should be consulted. Initially, this should occur informally by contacting local community leaders and interest groups. All groups that could possibly be interested should have the opportunity to be involved.

Consultation works best when it is a continuing dialogue rather than a once-off meeting or discussion. Adequate resources, in terms of time, money and the availability of personnel, must be made available to ensure that the program can be flexible, responsive and of a high priority.

The program should incorporate a range of activities. Planning an effective program involves careful selection of the activities to be used and their timing.

The range of activities to be considered should include:

- media releases and advertisements;
- newsletters, brochures, information bulletins;
- displays in community centres (e.g. shopping centres, local council offices);
- organised site visits;
- meetings for both individuals and groups;
- problem solving workshops and seminars; and
- telephone contact and information services.

D2. Community Information and Awareness

A vital part of the community consultation is the preparation and distribution of community information outlining the actions to be taken by members of the community in the event of an emergency. The information provided should:

- be clear, concise and user-friendly;
- be endorsed by the emergency services, local government authorities, community representatives and the facility;
- address the needs of local residents, including those from non-English speaking backgrounds;
- use straightforward terms;
- avoid complicated technical terms and jargon, as far as practical;
- explain any technical terms and jargon (if used); and
- be readily understood.

The information may include:

- an introduction;
- the purpose of the information;
- details of emergency warning systems;
- emergency action;
- action to be taken after the emergency; and
- additional information.

D2.1 Introduction

The introduction may include a commitment to safety. For example:

- It can not be emphasised too strongly that the chances of a major emergency occurring at the industrial facilities in this area are very slight.
- Safety is a top priority of the management at this facility. The thorough approach to safety includes emergency arrangements for the protection of the community and the environment.

D2.2 The Purpose of the Information

The information provided should include a statement of purpose which identifies the agency preparing and issuing the information. For example:

- The purpose of this information is to describe how these emergency arrangements will help you as a resident. This information has been issued on behalf of .....
  by.....

D2.3 Details of Emergency Warning Systems

Details of the emergency warning system, including regular testing, should be provided, for example:

- The emergency warning signal will be a distinctive, continuous alarm.
- You may be advised of an emergency situation by:
  - a representative of the organisation on whose site the emergency has arisen;
  - an emergency services organisation representative; or
  - the media.
- The alarm will be tested at 11.00 a.m. the second Sunday of every month for a period of sixty seconds.

D2.4 Emergency Action

Summarised safety instructions should be provided to reinforce the essential information about the means of warning and safety actions to be taken during an emergency. This information may be presented on a durable emergency action card, as illustrated in Figure D-1.

D2.5 After the Emergency

Information on what to do after an emergency may be provided, for example:

- When the emergency is over you will be advised by the emergency services or by radio. You will be told when it is safe for you to go outside or to obtain fresh air by opening doors and windows.
- Please make sure that your neighbours have heard the all clear signal or announcement.

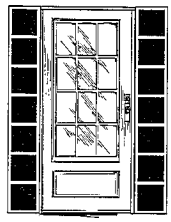
D2.6 Additional Information

Details should be provided of the locations for obtaining extra copies of this information and further explanatory information.

EMERGENCY ACTION CARD

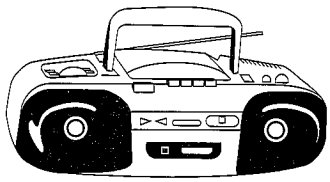
What you should do upon hearing the emergency warning signal (unless otherwise advised)

- Go inside immediately.



- Close external doors, turn off air-conditioners and extinguish all open flames.
- Close windows and pull the curtains.
- Move away from the windows.

- Stay in a room away from the industrial area.
- Do not attempt to evacuate unless directed to do so by the Police, Fire Service or other emergency services.



- Tune in to the local radio station and listen for authorised information or instructions about the emergency.
- Leave children at school where they will be cared for.

- Do not use the telephone except for urgent calls.
- Remain indoors until you receive instructions from the Police, Fire Service or other emergency services personnel or the radio station. Doors and windows should only be opened to restore ventilation when advised to do so.

- Depending on the type of emergency, these guidelines may be overruled by the Police, Fire or other emergency services who will give more specific instructions at the time.

- Please co-operate fully with the instructions given by Police, Fire or other emergency services.

XYZ Industries Pty Ltd
123 Chemical Street, Industry Town

Figure D-1: Example of an Emergency Action Card

APPENDIX E:

EMERGENCY FUNCTIONS AND ORGANISATIONAL STRUCTURE

The functions listed below are suggested functions that may be used as the basis for a facility's emergency response organisation. The information provided in this section gives guidance on the roles, responsibilities, duties, and the expectations that are associated with these functions. The suggested functions are:

- facility emergency response;
- damage control;
- facility emergency support;
- operations control;
- protecting people;
- protecting the environment;
- facility security and traffic control;
- communications; and
- public relations and media relations.

E1. Facility Emergency Response

The facility emergency response function involves determining the measures required to reduce or terminate identified causes of the emergency (including suppression of fire, isolation of fuel, stemming of toxic release, etc.) and to minimise environmental damage. These tasks should be outlined in the plan and should state the actions to be taken before the arrival of the emergency services. The plan should also account for variations in staffing levels at the facility (e.g. an unstaffed facility, or night-shift when there are fewer staff available).

Details may include information on automatic shutdown systems, and manual control and response procedures. The following are examples of control measures:

- To control fires, the fuel supply should be isolated and the spread of the fire limited by cooling the adjacent areas. The likelihood of re-ignition sources being present should be assessed.
- To control toxic gas release, water screens should be activated.
- To control spillage and containment, bunding procedures should be adopted.
- To control any gas or liquid release, control/isolation valves should be activated.
- To control wastes and firewater run-off generated during the emergency, drainage systems should be isolated.

E2. Damage Control

The damage control function aims to minimise the damage caused by an incident, and to prevent (or minimise) any secondary damage (i.e. knock-on or domino effects).

The details of damage control measures provided in the plan will depend on the nature and types of emergencies identified. Consideration should be given to people, property and the environment in the vicinity of the incident, and in other parts of the facility and neighbouring facilities. In some cases, this function may be combined with facility emergency response. Examples of damage control measures include:

- protection of neighbouring tanks from pool fires and jet fires;
- protection systems which can be activated to protect people, the facility, equipment, stores and the environment;
- measures available to ensure safe operating conditions of the facility in the case of interruption or failure of services (e.g. electricity, water, gas supply); and
- protection and preservation of vital company records.

E3. Facility Emergency Support

The facility emergency support function is responsible for operation of the facility emergency control centre, the provision of supporting information, and the provision of additional resources, materials and equipment as necessary to support the management of the emergency. Another important function is to maintain a record of the emergency, including the time at which specific actions and events occur.

E4. Operations Control

The aim of the operations control function is to manage the safe operation of the facility (or parts of the facility) not directly involved in the emergency. Operations that should be considered include those that may be affected by, or which may affect, the emergency. This function includes managing the continuing operation and staged shut-down (if required) of processes which cannot be immediately shut-down safely.

Specific activities may include:

- a staged shut-down over a period of time; or
- the maintenance of operation at normal capacity, or a reduced capacity, in order to maintain the integrity and safety of the processes and plant.

E5. Protecting People

The role, responsibilities and duties of those responsible for protecting people and responding to medical needs during and after the emergency should be identified.

The plan should identify the facility's strategy for protecting people during an emergency. It should address the provision of advice to people on-site and off-site as to the appropriate action to be taken when there is a threat to their safety and health. This function is responsible for ensuring that this information is communicated and acted upon during an emergency, prior to the arrival of the emergency services.

Protective actions may include stand-by alerts, partial evacuations, full evacuation, or the use of shelters and havens. The actions taken will depend on the nature, scale and the likely duration of the emergency. Appropriate methods of protection may be determined by reference to the levels of emergency (see Section 2.5.1.2) and the control zones (see Section C-4) for various emergencies.

In addition, health issues should be considered in broad terms. First-aid considerations are of vital importance. However, there are other issues that should be addressed, such as long-term impacts of exposure and trauma.

A number of specific aspects that need to be considered are outlined in this section. However, not all of these matters will need to be considered for all facilities (or even all emergencies), and there may be other relevant issues for particular facilities that have not been identified.

E5.1 Protecting People On-Site

The role, responsibilities and duties of the person in charge of on-site safety, and all other on-site personnel in relation to personal protection, should be specified. Part of this function is to oversee and manage roll-call and search and rescue activities.

In addition to considering the protection of on-site personnel, the protection of people involved in the facility emergency response needs to be considered. Factors that need to be taken into account include estimating the likely impacts of the incident, determining appropriate control zones, and assessing the adequacy of protective clothing and equipment. Some of these issues are covered in Section 2.5.2 and Appendix C.

E5.1.1 Roll Call

The role, responsibilities and duties of the roll-call monitor should be defined. The system should ensure procedures for the safe evacuation of, and accounting for, all people on-site throughout the emergency. There also needs to be a system for identifying all people (including visitors and contractors) who are on-site .

Duties of the roll-call monitor may include:

- status reporting to the facility emergency controller;
- compilation of a list of persons on-site immediately prior to the emergency;
- compilation of lists of persons at normal work stations, assembly or sheltering points, and those who have left the facility;
- actions to be taken for those people not accounted for; and
- arrangements to respond to inquiries about all persons who may have been on-site.

E5.1.2 Search and Rescue

Facility emergency personnel may be required to carry out some initial search and rescue activities. The role, responsibilities and duties of the search and rescue personnel should be stated. The plan

should state the scope and limitations of these search and rescue procedures. For example, this activity should only be carried out to the point where the rescuers are not put at significant risk - their safety should not be compromised.

E5.2 Protecting People Off-Site

The role, duties and responsibility of the person(s) initiating the off-site warning system should be defined. The plan should identify the means by which the facility operator will warn (and keep informed) people likely to be affected by the emergency. This should cover the activation of the warning system to alert people to take protective action. An example of the steps involved in a plan for community protection during and after an emergency is provided in Figure E-1. The key step is to determine when there is a threat to the community.

The evacuation of people outside the facility and the control of public roads, pedestrians and vehicles is the responsibility of the Police. Procedures should be established for liaison with the Police and Fire Service and for the provision of information which will assist in making decisions regarding public protection issues.

E5.3 Medical Attention

Health issues should relate to both acute exposure and the potential long-term impacts from low levels of exposure. Consideration should also be given to the provision of trauma counselling and addressing the long-term impacts of the stresses induced by an emergency.

E5.3.1 First-Aid

The role, responsibilities and duties of first-aid personnel should be defined. Suitably qualified facility personnel may be responsible for the provision of first-aid until the Ambulance (or other emergency service) arrives. Consultation with the Ambulance Service is recommended in determining the extent of the facility's response, including decontamination procedures required before patients can be treated by the ambulance service. The plan should document these responsibilities and state the methods of handling injured people. Training requirements and the first-aid resources provided should be detailed in the plan.

E5.3.2 Other Health Issues

Other issues relating to health should also be considered. These may include estimating and recording the exposures during an incident and assessing their short-term and long-term impacts. Continued health surveillance should be considered for all employees and members of the public exposed.

The plan may provide for a critical incident stress program that manages the stress-response syndrome through awareness of potential problems and proper stress debriefings by qualified personnel. This assists in dealing with the stress encountered and the impacts on both personal and professional life.

E6. Protecting the Environment

Environmental issues that need to be considered include both the short-term and long-term impacts of the incident on the environment. Some impacts may not be immediately apparent, and a number of apparently minor incidents may cause cumulative impacts.

The overall objective of this function is to minimise environmental harm due to the incident. Specific duties may include:

- closing all site drain valves (a visual inspection may be required);
- arranging for earth bunding of liquid spills or firewater run-off to minimise water and soil contamination;
- assisting emergency services personnel to identify and monitor airborne pollutants;
- advising on the potential environmental impacts of proposed response activities (e.g. use of neutralising agents); and
- liaising with environmental agencies.

E7. Facility Security and Traffic Control

The role, responsibilities and duties of facility security and traffic controllers should be listed.
Issues may include:

- access for emergency vehicles;
- means of controlling access to authorised people only;
- personnel permitted to remain during an evacuation (e.g. combatant authorities, carriers delivering emergency equipment and materials, etc.);

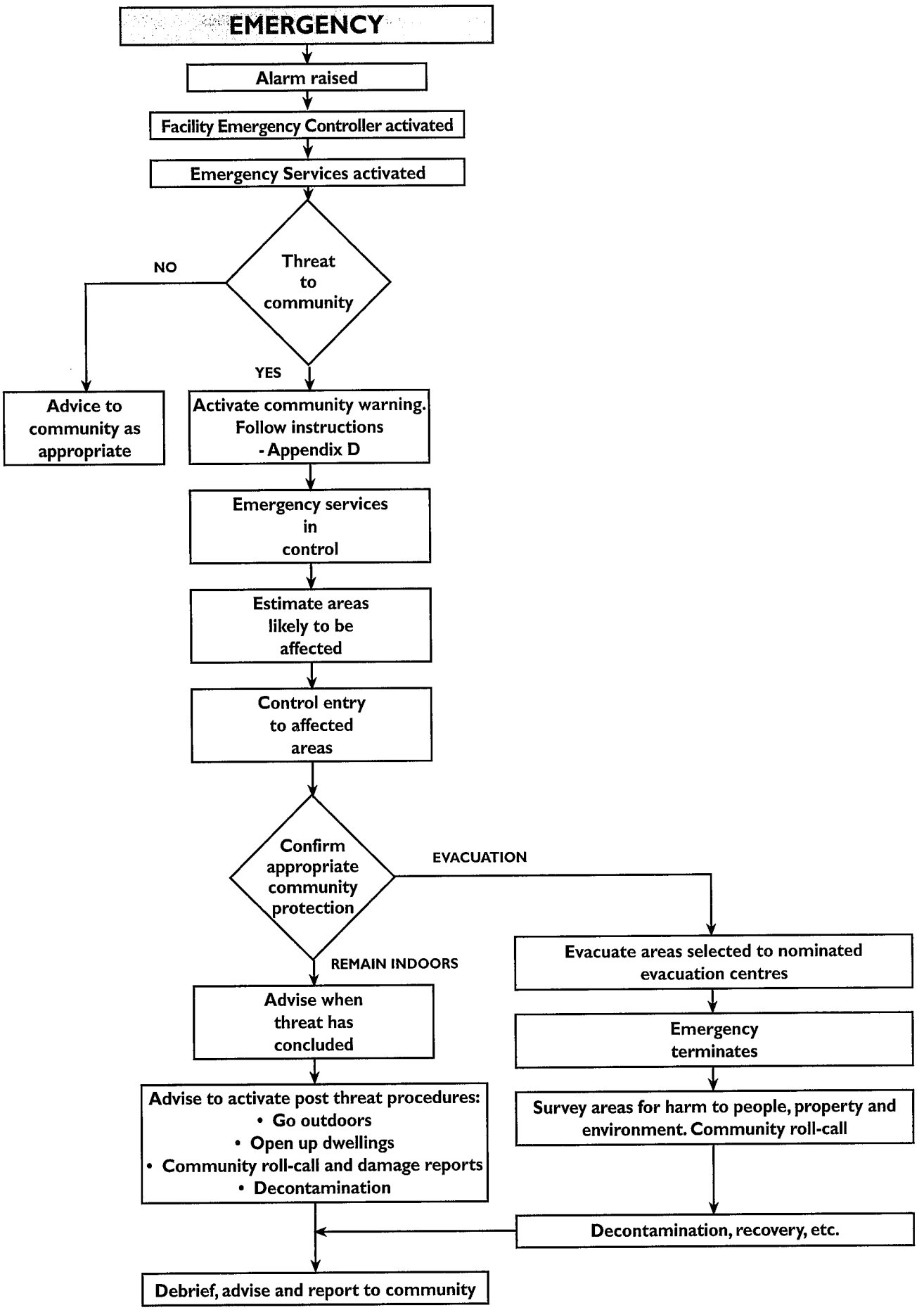


Figure E-1: Community Protection Plan

- methods of notifying the facility emergency controller of arrivals;
- any additional requirements for traffic movement on facility roadways; and
- broad indications of the way that the Police will control external roadways, pedestrians and vehicles.

E8. Communications

The roles, responsibilities and duties of communications personnel should be defined and details provided of the equipment required to execute identified positions. Effective communications on-site and off-site are vital.

The communications process should include the identification of personnel involved, the provision of a communications centre (refer to Section 3.11.1), call signs, and details of the internal telephone network, including a list of telephone numbers. Details of the equipment provided for internal and external communications should be listed. Information should include the quantities and their location, type, limitations on use, and performance parameters. Consideration should be given to providing back-up equipment.

E9. Public Relations and Media Liaison

The roles, responsibilities and duties of facility personnel involved in public relations and media liaison during an emergency should be described.

The appointment of a media liaison officer should be considered as a way of regulating the release of information to the media. Information should be provided to the media only after consultation with the Police and Fire Service media liaison staff, the incident coordinator and the incident commander. Consideration should also be given to the timing of the release information to facility personnel. Topics for consideration might include:

- liaison with Police and Fire Service media staff before the release of any information to the media;
- the person(s) authorised to liaise with the media;
- company policies on information to be released;
- the training required for the media liaison person(s);
- the standard format of media releases;
- the provision of pre-prepared sample statements;
- community contact persons/organisations after the incident; and
- the process of community liaison after the incident.

APPENDIX F:
FURTHER READING

Australian Code for the Transport of Dangerous Goods by Road and Rail. (6th ed.) (1998).

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