

Chapter 10.1 — Hazardous Facilities and Substances

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This describes Council's responsibilities with regard to hazardous facilities and substances throughout the City.

10.1.2 Resource Management Issues

This outlines the significant resource management issues affecting the use, storage and transportation of hazardous substances throughout the City.

10.1.3 Objectives

This sets out the overall desired environmental outcomes for the use, storage and transport of hazardous substances throughout the City.

10.1.4 Policies

These describe how Council intends to ensure that the objectives for hazardous facilities and substances are met.

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This broadly describes the regulatory and non-regulatory methods used to implement the policies for the management of hazardous facilities and substances throughout the City.

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10.1.11 Rules — Assessment Criteria: Discretionary Activities

These outline the assessment criteria that Council will consider in addition to other relevant matters set out in Section 104 of the Act when assessing resource consents for discretionary activities.

10.1.1 INTRODUCTION

Under the Resource Management Act 1991 (RMA), the control of the use of land for the management of hazardous substances is a function shared by territorial local authorities and regional councils.

The Auckland Regional Policy Statement contains provisions for the co-ordinated management of hazardous substances throughout the region and for the regulation of regionally significant activities. The provisions of this Plan have been formulated so as to give effect to those in the Regional Policy Statement as required by Section 75(3)(c) of the Act, and be consistent with any relevant regional plan.

[AM89]

The emphasis of the RMA is on sustainable management and the avoidance, remediation and mitigation of environmental effects. Therefore, it is appropriate that the control mechanisms for hazardous substances focus on the facilities or activities generating the effect, rather than on the intrinsic properties of the hazardous substance alone, as has been the case in the past with a list based approach.

The proposed planning framework for hazardous facilities and activities involving hazardous substances includes a range of objectives, policies and methods, describes anticipated environmental outcomes and outlines a management strategy. The framework also introduces the *Hazardous Facility Screening Procedure* (HFSP). This Procedure has been designed as a tool to assist Council in making decisions on whether a proposed hazardous facility is a permitted, controlled or discretionary activity requiring additional, merit-based assessment of risks.

The planning framework also provides a range of minimum performance standards which should be adhered to by hazardous facilities, regardless of whether they are permitted, controlled or discretionary activities. It also contains guidelines on the additional assessment of risks that may need to be carried out once it has been ascertained that a proposed facility is an activity that requires a consent.

This document is supported by a background report produced by the Hazardous Facility Screening Procedure Review Group which outlines the origins and history of the HFSP, and provides detailed reasons relating to the technical aspects of the Procedure. This background report also provides a detailed overview of current legislation and responsibilities for hazardous substances management.

A further report has been prepared to detail the implementation of the HFSP into the Plan. In addition, a Section 32 Analysis as required by the Resource Management Act 1991 has been prepared to compare alternative methods of implementation and discuss why any particular methods have been chosen.

10.1.2 RESOURCE MANAGEMENT ISSUES

10.1.2.1 **The potential for short and long-term damage to the environment, including ecosystems, caused by the accidental, unintentional or uncontrolled release of hazardous substances resulting in contamination of water, soil and air, or risk of fire and explosion events.**

This is of particular concern where hazardous facilities are located next to coastal waters, waterways, above aquifers or close to environmentally sensitive areas such as wetlands where there is increased risk of direct effects. Indirect effects may result from bioaccumulation or sediment accumulation.

10.1.2.2 **The potential for damage to human health and property caused by the accidental, unintentional or uncontrolled release of hazardous substances.**

This can occur through the accumulation of persistent substances in the bodies of humans and animals, resulting in chronic and/or long-term damage to their health. Acute damage to human health can also occur through exposure to substances affecting skin, mucous membranes, respiratory, digestive, nervous and reproductive systems.

The safety and health of the people working in hazardous facilities and in the wider community may also be at risk if these facilities are not adequately controlled, especially if they are located in the vicinity of residential areas. While the safety and health of workers are subject to regulations under the Health and Safety in Employment Act 1992, which control conditions on the site, any off-site environmental effects that may impact on the wider community are dealt with under the RMA.

10.1.3 OBJECTIVES

Objective

10.1.3.1 To protect the environment from the adverse effects and risks from facilities and activities involving the use and/or storage, and transport of hazardous substances.

(This objective relates to Issue 10.1.2.1).

Objective

10.1.3.2 To protect the community and its assets from unacceptable risks from hazardous facilities and substances.

(This objective relates to issue 10.1.2.2).

10.1.4 POLICIES

Policy

10.1.4.1 Hazardous facilities and activities involving the use and/or storage of hazardous substances should be managed in such a way that avoids, remedies or mitigates adverse effects and unacceptable risks to the environment, human health and property, including:

- (a) contamination of water, soil and air;
- (b) short and long-term damage to ecosystems;
- (c) accumulation of persistent substances in the bodies of humans and animals, resulting in chronic and/or long-term damage to their health;
- (d) acute damage to human health through exposure to substances affecting skin, mucous membranes, respiratory and digestive systems; and
- (e) damage through fire and explosion events.

(This policy relates to Objectives 1 and 2)

Explanations and Reasons

Facilities and activities involving the use and/or storage of hazardous substances have the potential to cause adverse effects through the discharge or accidental release of hazardous substances. Such adverse effects are related to the hazards of particular substances in terms of their intrinsic properties such as flammability or toxicity, whereas the level of risk is related to the probability of release of hazardous substances, combined with the potential effects caused by their release. Such adverse effects need to be avoided, remedied or mitigated to safeguard the life-supporting capacity of air, water, soil and ecosystems.

Methods**Regulatory**

- locational controls (zoning)
- hazardous facility screening procedure
- site management practices and plans
- emergency plans

Non-Regulatory

- cleaner production ethic
- education to raise public awareness

Policy**10.1.4.2 Hazardous facilities and substances should be managed to ensure they do not cause levels of risk that are incompatible with those of surrounding land use activities by:**

- (a) managing the off-site risks to minimise their effects beyond the site boundary;
- (b) ensuring that the cumulative effects of the operation of hazardous facilities do not cause unacceptable risks to the environment or community.

(This policy relates to Objective 2)

Explanation / Reasons

The level of risk resulting from the quantities and types of hazardous substances used or stored at a hazardous facility has been set through the Hazardous Facility Screening Procedure. Where it has been determined that a proposed facility requires a Discretionary Activity Resource Consent, the level of risk from that facility will be assessed in terms of potential adverse effects and conditions will be attached to ensure that the facility does not have an adverse effect including off-site effects, or a cumulative effect on the environment and communities.

The use of hazardous substances can provide benefits to the community by meeting the need for certain products and services. However, any facilities or activities involving hazardous substances can also result in possible risks to the environment and communities which need to be controlled both within the site and at the site boundary.

Some hazardous facilities may be permitted to operate without a resource consent because their anticipated adverse effects are expected to be low. However, an aggregation of such facilities may cause unacceptable adverse effects which need to be controlled.

Methods**Regulatory**

- hazardous facility screening procedure

- resource consent conditions
- buffer yards
- locational controls (zoning)

Non-Regulatory

- education of businesses and general public.

10.1.5 IMPLEMENTATION

10.1.5.1 Regulatory Methods

While developments involving hazardous substances are vital to our economic well-being, it is essential that such developments are demonstrably safe, and receive an appropriate level of scrutiny.

The rules for hazardous facilities apply to any activity or development throughout the city and must be complied with when using land for a hazardous facility.

10.1.5.1.1 Hazardous Facility Screening Procedure

The *Hazardous Facility Screening Procedure* (HFSP) is adopted in the District Plan to overcome the limitations of previous methods, which defined a use as being hazardous on the basis of a particular business activity, or a substance threshold lists. The HFSP provides a mechanism to ensure that hazardous facilities or activities are not only safely located, designed and built, but also that they continue to operate safely throughout their life.

The HFSP operates as a screening tool which focuses on the potential effects caused by hazardous substances release or accident. It involves the assessment of effects in three groups, namely effects caused by fire and/or explosion, effects on human health, and environmental effects. Potential adverse effects of hazardous substances can be predicted by assessing the hazards presented by the substance and the anticipated consequences of their release to the environment.

Any proposed hazardous facility is to be assessed using the HFSP to determine the consent status of the activity in a given zone or area. Once it has been ascertained that a proposed facility requires a resource consent, a more detailed assessment of risks may become necessary. This risk assessment needs to take account of both the probability and effects of potential hazardous substances accidents, and the proposed measures to mitigate and manage risks. The granting of a resource consent will then be considered on the basis that the off-site risks presented by a hazardous facility are adequately contained and managed.

The HFSP is to be applied to all new hazardous facilities except those set out in 10.1.8.2.3. Existing facilities will not be subjected to the HFSP unless they expand or alter their operations. A significant expansion or alteration means a change in the type of process used in a manner or to an extent that section 10 of the Act would no longer apply. As a general guide, a greater than 20% increase in the quantities of hazardous substances used or stored may give rise to effects that are different in character, intensity and scale from the existing facility. The day to day movement of hazardous substances around a hazardous facility site such as Mobile Mixing Units (MMU's) or tanks is considered to form part of an existing operation. The changing location of activities within a site is not considered to be a significant expansion or alteration of an existing operation. However, Council will also monitor existing facilities to ensure compliance with other relevant legislation. Where it is considered that an existing facility is operating at a level of risk which has, or may have, a significant adverse effect on the surrounding environment, Council may consider using its enforcement powers under the RMA.

The HFSP is a tool for the determination of consent status, and forms only one component of the management strategy. Other essential and complementary elements include the *Consent Status Matrix* (Rule 10.1.8.2.1), minimum performance standards for hazardous facilities and methods to control land use, such as the zoning strategy.

A full description of the HFSP is provided in Appendix II to this Chapter.

10.1.5.1.2 Where the HFSP fits into the range of controls for hazardous facilities

Because the HFSP is simply a tool for determining the consent status of a proposal (that is, whether it needs a resource consent or not), it forms only one component of a resource management strategy containing other complementary elements.

The following provides an overview of the tools available for regulatory bodies to control hazardous facilities (refer Figure 10.1.1).

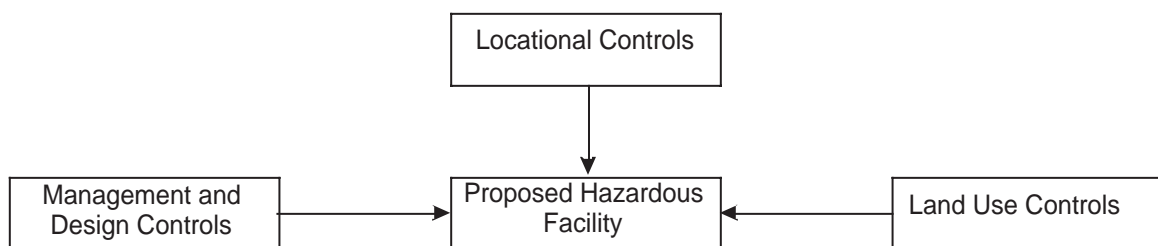


FIGURE 10.1.1 REGULATORY TOOLS FOR HAZARDOUS FACILITIES

- **Locational controls** such as zoning determine generally where hazardous facilities may locate.
- **Management and design controls** embodied in development standards and performance standards control how hazardous facilities go about their activities.
- **Land use controls** imposed by way of a land use consent may also be required when the HFSP screens out hazardous facilities which require more specific controls.

10.1.5.1.3 Hazardous Substances and New Organisms Act 1996

10.1.5.2 Non Regulatory Methods

- Industrial Standards and Codes of Practice
- Guidelines
- Site Management Plans
- Emergency Plans
- 'Cleaner Production' Techniques
- Advocacy

10.1.6 ANTICIPATED ENVIRONMENTAL RESULTS

The anticipated environmental results throughout the City are:

- safe and healthy environment
- appropriately sited and controlled hazardous facilities
- fewer newly contaminated sites

10.1.7 PROCEDURES FOR MONITORING

In order to assess the suitability and effectiveness of the objectives, policies and methods in achieving the anticipated environmental results contained in this chapter, the Council will develop a monitoring programme (see Chapter 1, Section 1.7.3) which may include the following monitoring procedures:

- Maintaining a register of the location, nature and quantity of hazardous substances used, stored and transported in the City, which is continually updated as new information becomes available. Current use and technology procedures may be included on the register.
- Monitoring the bulk transport of hazardous substances throughout the City, including the nature and quantities of hazardous substances transported and routes taken.
- Monitoring complaints and enforcement actions regarding the nuisance aspects of hazardous substance activities and facilities.
- Monitoring all reported incidents concerning the accidental or unintentional release, or loss of control of hazardous substances and the adverse effects of such incidents on the environment including the health and safety of people and property.
- Monitoring resource consents for hazardous substance activities including the number of applications granted consent, compliance with consent conditions, and the effectiveness of those conditions. Where consent holders are required to undertake self-monitoring, they shall supply monitored reports to Council for auditing purposes whenever the Council deems it necessary. Such reports shall include information relating to:
 - Changes to the type and quantities of hazardous substances used and stored;
 - Notification of any changes to operating procedures and/or process conditions and disposal practices;
 - The quantities of hazardous substances transported to and from the site and the routes used for this transport;
 - Any related or inadvertent release or discharge of hazardous substances and the reporting of all accidents/incidents resulting in adverse effects;
 - Hazardous waste management;
 - Records of inspection and testing of critical equipment and instrumentation;
 - Maintenance programmes;
 - Reviews of the emergency plan;
 - Training programmes;

- Safety management systems and practices;
- Quality control system(s) in place.

10.1.8 RULES — ACTIVITIES

Rule

10.1.8.1 Activities — City-wide

- (a) All hazardous facilities and substances that are determined as permitted activities through the Consent Status Matrix below shall comply with all rules in 10.1.9 Development and Performance Standards, and all rules in the District Plan for the zone in which the activity is located.
- (b) All hazardous facilities and substances that are determined as controlled activities through the Consent Status Matrix below shall comply with all rules in 10.1.9 Development and Performance Standards and Council shall exercise control over those matters specified in Rule 10.1.10.
- (c) All hazardous facilities and substances that are determined as discretionary activities through the Consent Status Matrix below will comply with Rule 10.1.9 Development and Performance Standards, and will be assessed against Rule 10.1.11 Assessment Criteria for Discretionary Activities, together with the relevant matters set out in S104 of the Act.
- (d) For notification procedures under the Resource Management Act 1991 see Rules 5.2.2, 5.2.3, 5.2.4 and 5.3.3.1 of Chapter 5 – General Procedures and Rules.

Rule

10.1.8.2 Activity List

Rule

10.1.8.2.1 Determination of Consent Status

- (a) The Consent Status Matrix forms the basis to determine the consent status of any hazardous facility, and to determine whether an activity is permitted, controlled or discretionary. The Matrix lists Effects Ratio trigger levels against which the Effects Ratios calculated for the HFSP are compared to determine the consent status of a hazardous facility in a particular zone.
- (b) The Consent Status Matrix provides a signal to hazardous facilities operators as to which zones are best suited for a proposed development, what controls will apply, and the likely outcome of a consent application. In addition, communities will be given some certainty over where hazardous facilities are likely to be located.

Table 1: Consent Status Matrix

ZONE	PERMITTED ACTIVITY	CONTROLLED ACTIVITY	DISCRETIONARY ACTIVITY
• Explosives	<4	4–8	>8
• Quarry Zone	<2	2–4	>4
• Business 6	£1	>1–2	>2
• Business 5 • Rural 1 and Special Rural 1 • Mangere — Puhinui Rural • Auckland International Airport	<0.75	0.75–1.5	>1.5
• Business 4 • Rural 2 • Whitford Rural A and B [AM99] • Hospital Zone • Papakainga	<0.5	0.5–1	>1
• Business 2, 3 • Rural 4 • Open Space 2, 3, 4 • Boat Harbours	<0.2	0.2–0.4	>0.4
• Business 1 • Rural 3 • Mangere — Puhinui Heritage • Community Health Facilities • Community Health Support	<0.1	0.1–0.2	>0.2
• Residential Settlement Serviced • Residential Settlement Unserviced • Main Residential • Integrated Intensive Housing • Residential Heritage 1–8 • Open Space 1, 5 • Future Development • Education Purposes • Maori Purposes	<0.02	–	>0.02
• Road Zones	N/A	N/A	N/A

Rule**10.1.8.2.2 Consent Procedure**

The consent procedure as outlined in Figure 10.1.2 is to be adopted once the consent status has been determined through the Consent Status Matrix.

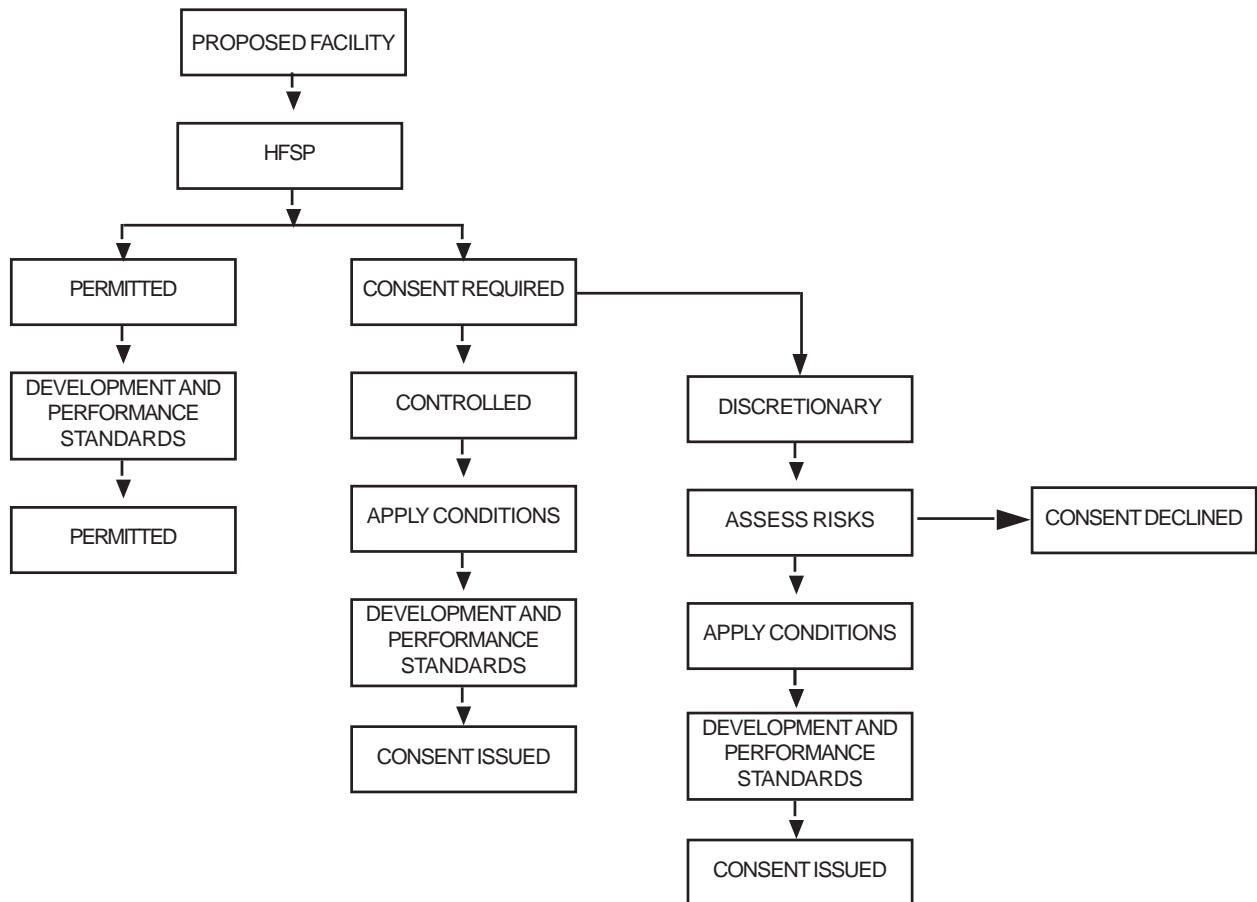


FIGURE 10.1.2 CONSENT PROCEDURE

Rule**10.1.8.2.3 Exceptions and Exemptions**

- (a) The rules for hazardous facilities and substances apply to any activity or development in the Plan's activity zones.

Hazardous Facility

means activities involving hazardous substances; sites where these substances are used, stored, handled and disposed of; and installations containing a hazardous substance including vehicles with hazardous substances parked on any site. Hazardous facility does not include:

- (i) the incidental use and storage of hazardous substances in minimal domestic scale quantities;
- (ii) hazardous activities where an activity does not use, store, transport or dispose of hazardous substances but which poses a risk to the environment or the community (for example earthworks).

Note that use includes production and manufacture, and storage includes both temporary and long-term storage.

Hazardous Substance

means any substance:

- (a) with one or more of the following intrinsic properties:
 - (i) explosiveness;
 - (ii) flammability;
 - (iii) a capacity to oxidise;
 - (iv) corrosiveness;
 - (v) toxicity (both acute and chronic)
 - (vi) ecotoxicity, with or without bio-accumulation; or
- (b) which on contact with the air or water (other than air or water where the temperature or pressure has been artificially increased or decreased) generates a substance with any one or more of the properties specified in paragraph (a) of this definition.

Refer to Appendix 1 — Glossary to this Chapter for any other definitions.

(b) Exceptions

The definition for hazardous facilities does not apply to:

- (i) Storage or use of hazardous consumer products for private domestic purposes.
- (ii) Retail outlets for the domestic scale usage of hazardous substances (ie supermarkets, hardware shops, pharmacies).
- (iii) Those hazardous activities which do not use, store, transport or dispose of hazardous substances but which pose a risk to the environment or the community (for example earthworks).
- (iv) Facilities using genetically modified or new organisms
- (v) Facilities using radioactive substances.
- (vi) Trade waste sewer and waste treatment or disposal facilities.
- (vii) Gas and oil pipelines.
- (viii) Fuel in motor vehicles, boats and small engines.

The rules for hazardous facilities do not apply to:

- (ix) Existing facilities except where significant expansion or alteration of existing operations is to occur.
- (x) The day to day movement of hazardous substances around a hazardous facilities site, such as for Mobile Mixing Units (MMUs) or mobile tanks.

(c) Exemptions

The following activities are exempt from the HFSP but not Rule 10.1.9 (Rules: Development and Performance Standards):

- The retail sale of petrol (up to a storage 100,000 litres in underground tanks) and diesel (up to 50,000 l in underground storage tanks) provided that the Code of Practice for “*Design, Installation and Operation of Underground Petroleum*”, published by the Department of Labour, OSH, is adhered to.
- Retail LPG outlets (up to 6 tonnes, single vessel storage), provided that the Australian Standard “AS 1596—1989 for *LPG Gas — Storage and Handling*” and “AS 1596 Supplement 1 – 1994” is adhered to.

Explanation/Reasons

Hazardous facilities for which industry specific standard and/or codes of practice have been developed which specifically focus on enhancing safety and minimising the risk of releases or loss of control of hazardous substances, may be exempt from the HFSP. This is applicable on the basis that these standards or codes of practices are employed in the design and construction of the facility, and that the development and performance standards described in Section 10.1.9 are adhered to. These activities are then considered to have satisfactorily avoided, remedied or mitigated potential environmental risks. However, each activity will also need to be evaluated in accordance with general zone provisions.

Rule**10.1.8.2.4 Facilities Using Radioactive Substances**

- Any facilities using radioactive materials, the use of which is exempt from licensing requirements of the Radiation Protection Act 1965 (for example, domestic smoke detectors, demonstration radioactive sources for school laboratories, some medical uses) shall be considered a permitted activity in all zones in the City.
- Except as provided for in Rule 10.1.8.2.4 (i), any facilities on a site zoned Residential that use radioactive material with an activity level greater than 1 terabecquerel (1x10¹²) and less than 10 terabecquerel shall be considered as a discretionary activity in all Residential zones. Discretionary activities will be assessed against criteria in rule 10.1.11.
- Except as provided for in Rule 10.1.8.2.4 (i), any facility using radioactive material with an activity level of greater than 1 terabecquerel and less than 10 terabecquerel shall be considered as a discretionary activity in all Business zones. Discretionary activities will be assessed against criteria in Rule 10.1.11.
- Nothing in Rules 10.1.8.2.4 (ii) and (iii) shall apply where health care facilities require the use of radioactive materials for medical and dental treatment of patients, and the use of such radioactive materials is under the control of a person licensed under the Radiation Protection Act.
- Unless provided for above, the use of radioactive material shall be a non-complying activity.

Explanation/Reasons:

While the Radiation Protection Act 1965 and Radiation Protection Regulations 1982 control activities involving radioactive substances, broader environmental effects need to be considered in the use of such substances. The permitted activity category above provides for commonly found items that contain minor

amounts of radioactive materials without the need for resource consent such as domestic smoke detectors. The discretionary activity category is intended to manage the use of larger amounts of radioactive materials that would be common to some business activities (e.g. medical laboratories, dentists etc.) including those that may seek to establish in residential zones.

Any facility that uses radioactive material in quantities beyond those that could be expected within the zone will be considered as a non-complying activity. The two latter categories will allow wider consideration of the potential effects of using and storing such materials in the city.

Rule

10.1.8.2.5 Buffer for Sensitive Land Uses

- (a) In areas where a land use zone catering for increased usage by hazardous facilities lies adjacent to a sensitive land use zone, a buffer distance is applied on the inside of the boundary of the land use zone within which the hazardous facility is located. In this buffer distance, any proposed hazardous facilities will be measured against an Effects Ratio trigger level calculated on the Effects Ratio trigger level of the more sensitive land use zone.
- (b) The width of the buffer distance applied on the inside of the zone within which the hazardous facility is located if adjacent to a more sensitive land use zone is as follows.

ZONE	BUFFER APPLIED ON THE INSIDE OF THE LAND USE ZONE IF ADJACENT TO A MORE SENSITIVE LAND USE ZONE
Explosives	100 metres
Mineral Extraction Business 6	30 metres
Business 5 Rural 1 (Special Rural 1) Mangere — Puhinui Rural Auckland International Airport	20 metres
Business 1,2, 3, 4 Rural 2, 3, 4 Whitford Rural A and B [AM99] Hospital Zone Boat Harbours Papakainga	10 metres

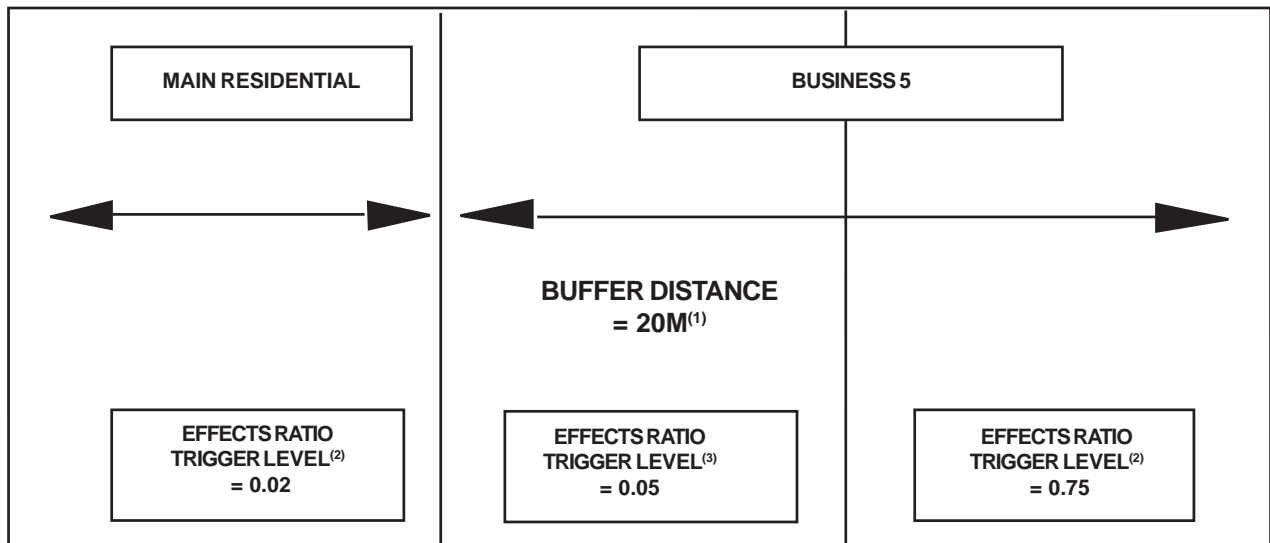
- (c) The Effects Ratio trigger level to be applied within the buffer distances of the zones within which hazardous facilities are located, if adjacent to more sensitive land use zones are as follows:

MORE SENSITIVE ZONE	EFFECTS RATIO TRIGGER LEVEL APPLIED IN THE BUFFER DISTANCE
Business 6	1.5
Business 5 Rural 1 (Special Rural 1) Mangere — Puhinui Rural Auckland International Airport	1
Business 4 Rural 2 Whitford Rural A and B [AM99] Hospital Zone Papakainga	0.75

MORE SENSITIVE ZONE	EFFECTS RATIO TRIGGER LEVEL APPLIED IN THE BUFFER DISTANCE
Business 2, 3 Rural 4 Open Space 2, 3, 4	0.5
Business 1 Rural 3 Mangere — Puhinui Heritage Community Health Facilities Community Health Support	0.2
Residential Settlement Serviced Residential Settlement Unserviced Main Residential Integrated Intensive Housing Residential Heritage 1–8 Open Space 1, 5 Future Development Education Purposes Maori Purposes	0.05

Explanation/Reasons

The purpose of the buffer distance is to protect more sensitive land use zones from the adverse effects of hazardous facilities. The proposed buffer distance is intended to mitigate or avoid adverse effects, particularly on health and safety.



(1) From Table in 10.1.8.2.5 (b)
 (2) From 10.1.8.2.1, Consent Status Matrix
 (3) From Table in 10.1.8.2.5 (c)

FIGURE 10.1.3 APPLICATION OF BUFFER DISTANCE — AN ILLUSTRATED EXAMPLE

10.1.9 RULES: DEVELOPMENT AND PERFORMANCE STANDARDS

10.1.9.1 General Development and Performance Standards

The following site design and management controls apply to facilities involved in the manufacturing, mixing, packaging, storing, loading, unloading, using or handling of hazardous substances, which are *contaminants* as specified in the Resource Management Act 1991 in order to establish and/or operate in the city.

Rule

10.1.9.1.1 Site Design and Management

The site or part(s) of the site immediately involved in the manufacturing, mixing, packaging, storing, loading, unloading, using or handling of hazardous substances, which are *contaminants* will be designed, constructed and managed so as to ensure:

- (a) That any accidental or unintentional spillage, release or loss of control:
 - (i) will not contaminate land, ground water, any water body, or potable water supply; and
 - (ii) will not enter or be discharged into any drainage or sewerage utility system, except when permitted by a licence or consent issued by the utility operator.
- (b) That any stormwater originating on site or connected on site:
 - (i) will not contaminate land, ground water, any water body, or potable water supply by acting as a carrier or transport medium for hazardous substances which are contaminants; and
 - (ii) will not enter or be discharged into any drainage or sewerage utility system rules except when permitted by a licence or consent issued by the utility operator.
- (c) That for any hazardous substance where the proposed activity requires that it is placed in, on or over land or water, it shall be managed in such a way that:
 - (i) the effects of the proposed activity are not manifested outside the intended or target area contrary to the manufacturer's specified limits or accepted industry standards; and
 - (ii) the hazardous substance will not contaminate land, ground water, any surface water body, or potable water supply outside the intended area; and
 - (iii) the hazardous substance will not enter or be discharged into any drainage or sewerage utility system unless permitted by a licence or consent issued by the network utility holder.

Managed so as to ensure, in relation to achieving any purpose in any circumstances, means all steps to achieve the purpose that are reasonably practicable to take in the circumstances, having regard to:

- (a) the nature and severity of the contamination that may be suffered if the purpose is not achieved; and

- (b) the current state of knowledge about the likelihood that contamination of that nature and severity will be suffered if the purpose is not achieved; and
- (c) the current state of knowledge about contamination of that nature; and
- (d) the current state of knowledge about the means available to achieve the purpose, and about the likely efficacy of each; and
- (e) the availability and cost of each of those means.

Explanation / Reasons

The primary purpose of the Site Design and Management Controls is to ensure the reduction of hazardous substances spillage which can occur from the accidental or deliberate discharge of hazardous substances to land or water which often occur from poor site management practices. These rules should not only reduce the number of spills, but reduce the adverse effects of those that do occur.

10.1.9.1.2 Methods of complying with the Development and Performance Standards for Site Design and Management

- (i) That part(s) of the site referred to in Rule 10.1.9.1.1 above shall be protected by a spill containment system. The spill containment system shall be:
 - (a) constructed from impervious materials that are resistant to the hazardous substances involved;
 - (b) able to contain the maximum volume of the largest tank used. Where drums or other containers are used, the spill containment system shall be able to contain half of the maximum volume of substances stored or a minimum of 5,000 litres; and
 - (c) designed, constructed and managed so that any spill or release of any hazardous substances (including hazardous substances used for firefighting purposes) and any stormwater that may have entered and become contaminated in the spill containment system is:
 - (i) prevented from entering the stormwater drainage or sewerage system; and
 - (ii) prevented from discharging into or onto land or ground water, any surface water body, or potable water supply.
- (ii) Underground storage tanks shall be designed and constructed to contain any leakage. A leak detection system shall be integral to the design of the tank backed up with an effective monitoring programme. *For petroleum products, compliance with the Code of Practice for “Design, Installation and Operation of Underground Petroleum Systems”, by the Department of Labour, OSH, is deemed satisfactory.*
- (iii) All stormwater grates shall be clearly marked to ensure that hazardous substances are not inadvertently released into the stormwater system.
- (iv) Any part of the site where vehicles, equipment or containers that are or may have become contaminated with hazardous substances are washed, shall be designed and constructed so that any contaminated effluent from the wash-down area or washing facility cannot be discharged to the stormwater or sewerage drainage system, to land, to ground water, to any water body, or to potable water supply unless a resource consent or permit allows otherwise.

Rule**10.1.9.1.3 Hazardous Waste Disposal****Rule**

- 10.1.9.1.3.1 (a) The disposal of waste hazardous substances shall be undertaken only at suitable facilities. Such facilities will require a land use consent and a discharge consent from the Council or the Auckland Regional Council, unless disposal occurs in a specified co-disposal landfill holding relevant resource consents.
- (b) Any hazardous waste or any waste containing hazardous substances will be managed so that they are not:
- (i) discharged into any drainage or sewerage utility system unless permitted by a licence or consent issued by the utility operator;
 - (ii) discharged into or onto land, ground water, any water body, or potable water supply unless a resource consent allows otherwise.
- (c) The storage of any waste or any waste containing hazardous substances shall comply at all times with all rules contained in Section 10.1.9 Rules: General Development and Performance Standards.

Explanation / Reasons

Hazardous waste includes all materials that are, or contain considerable quantities of hazardous substances that cannot be used in a particular site, plant or process. There is a need to ensure proper management and disposal of these wastes because of their potential to harm the environment.

10.1.9.1.4 Methods of complying with the Development and Performance Standards for hazardous waste disposal:

- (i) At all times, sites which generate any hazardous waste, or waste containing hazardous substances shall dispose of this waste to approved facilities, or be regularly serviced by waste disposal service companies.
- (ii) On every site where any hazardous waste is collected in containers, the containers shall be:
 - (a) suitably designed for such waste;
 - (b) protected so that any stormwater cannot enter and cause the containers to overflow.

Rule**10.1.9.1.5 Signage**

All hazardous facilities shall be adequately signposted, and indicate the nature of the substances stored, used, or otherwise handled.

10.1.9.1.6 Method of complying with the Development and Performance Standards for Signage:

Compliance with the Code of practice for “Warning Signs for Premises Storing Hazardous Substances” of the New Zealand Chemical Industry Council shall be deemed to conform with this rule.

Explanation / Reasons

It is important that in the case of any accident or fire, the emergency services are able to determine what materials are on, or could be expected, to be on site.

Rule**10.1.9.1.7 Traffic Safety and Access**

The HFSP has not been developed for the transport of hazardous substances off-site. Therefore the transport of hazardous substances off-site requires separate controls, as follows:

- (a) Hazardous facilities shall be located, so far as is practicable, to utilise primary routes and business roads, and to minimise the use of secondary roads. Primary routes are identified in Appendices 1 and 2 to the Planning Maps.
- (b) When a hazardous facility is the subject of a resource consent, routes may be specified as part of the conditions of consent.

In addition, a range of existing legislation, regulations and Codes of Practice addressing the transport of hazardous substances that need to be referred to are listed below:

- *Transport Amendment Act 1989*
- *Traffic Regulations 1976*
- *Recommended Code of Practice for the Safe Carriage of Hazardous Goods Traffic (Railways Corporation)*
- *NZS 5417: Transportation Labels for Hazardous Substances (Standards Association of NZ)*
- *NZS 5433: Code of Practice for the Transportation of Hazardous Substances (Parts 1 and 2, Standards Association of NZ)*
- *Code of Practice for Vehicles Transporting LP Gas in Bulk by Road (Department of Labour)*
- *Draft Code of Practice for Corrosives Tankwagons (Department of Labour)*

Explanation / Reasons

No significant adverse effects on the safe operation of the road network from the transportation of hazardous substances are considered acceptable and therefore controls may be imposed which require access along specified routes.

10.1.9.1.8 Methods of complying with the Development and Performance Standards for Traffic Safety and Access:

- (i) Generally it must be demonstrated that vehicles transporting hazardous substances will not utilise local roads in residential areas. Conditions may be imposed which require access along specified routes.
- (ii) Sites should be accessible from the major roading network to avoid heavy traffic volumes in local roads (particularly residential local roads). Of particular concern is the location of the entry and exit points to the site and inter-relation with existing intersections so as to ensure safety of operation.

Rule**10.1.9.1.9 Cross-Boundary Mechanisms**

Where a hazardous facility is proposed to be located at a site which abuts the boundary of the City with that of an adjoining territorial local authority, or the site is sufficiently close to such boundary that the potential off-site effects of that facility may adversely impact on the adjoining territorial local authority, then the affected territorial local authority shall be notified by an applicant for resource consent to enable that territorial local authority to make relevant submissions.

Explanation / Reasons

The HFSP and the management strategy of which it is a part focus on the potential off-site effects a hazardous facility may have on the environment, people and property, including surrounding land use. Liaison between adjacent territorial local authorities is essential to ensure that zoning or land use strategies are compatible. This is of particular importance where a hazardous facility is located at boundaries with other territorial local authorities, and has the potential to affect the neighbouring district. Where this is the case, consultation with affected local authorities will be undertaken, and joint hearings will be initiated if appropriate so as to ensure a co-ordinated response.

10.1.10 RULES: MATTERS FOR CONTROL — CONTROLLED ACTIVITIES**Hazardous Facilities and Substances****Rule****10.1.10.1 Council reserves control over the following matters for hazardous facilities and substances and may impose conditions in respect of each:**

- (a) **Risk Assessment** — An assessment of the risk of the proposed facility in descriptive terms may be required, with particular emphasis on:
 - (i) Identification of potential hazards, failure modes and exposure pathways;
 - (ii) The sensitivity of the surrounding natural and physical environment (eg aquifers, streams, wetlands, habitats);
 - (iii) The separation distances from neighbouring activities and the number of people potentially at risk from the facility;
 - (iv) The risk to adjacent property;
 - (v) Cumulative risks of hazardous facilities in the area;
 - (vi) Site drainage and off-site infrastructure (eg stormwater, sewer type and capacity; and
 - (vii) Transport of hazardous substances on and off the site.
- (b) **Risk Mitigation** — Specific requirements may be imposed to ensure that any undue risk posed by the facility is avoided or mitigated. Particular regard will be given to:
 - (i) Site layout and management;
 - (ii) Stormwater management;
 - (iii) Fire safety;

- (iv) Spill contingency and emergency planning, monitoring and maintenance schedules.

Conditions may be imposed to ensure that particular measures are undertaken so that any risk posed by the proposal is avoided or satisfactorily mitigated.

Rule

10.1.10.2 Assessment Criteria for Controlled Activities

Where hazardous activities and substances are to be considered as a controlled activity, Council shall have regard to the relevant sections of the Resource Management Act, the objectives and policies of the District Plan, the Development and Performance Standards in rules contained in Section 10.1.9 — Rules: Development and Performance Standards and the following assessment criteria:

- (a) Whether the potential hazards, failure modes and exposure pathways can be identified and adverse effects on the surrounding environment can be avoided or mitigated.
- (b) Whether the life-supporting capacity and amenity values of the surrounding natural and physical environment can be protected from the accidental release or loss of control of hazardous substances.
- (c) Whether there is a sufficient separation distance between the proposed activity and adjacent activities with regard to the safety of people potentially at risk from the facility.
- (d) Whether adjacent properties can be protected from unacceptable risks of the accidental release or loss of control of hazardous substances.
- (e) Whether the aggregation of hazardous facilities in the area result in unacceptable risks to the environment, people and property if further applications for hazardous facilities and substances are approved.
- (f) Whether satisfactory provision can be made for site drainage and off-site infrastructure to minimise the risk of adverse effects on the water quality of the receiving environment.
- (g) Whether the transport of hazardous substances caused by the proposal will have no significant adverse effect on the safe operation of the adjoining roadwork. Generally it must be demonstrated that vehicles transporting hazardous substances will not use local roads in residential areas. Conditions may be imposed which require access along specified routes.
- (h) Whether the site design and management of controls will minimise the likelihood of accidental or deliberate discharge of hazardous substances to land or water.
- (i) Whether stormwater management controls can be imposed to minimise the risk of adverse effects on the water quality of the receiving environment.
- (j) Whether satisfactory provision can be made for fire control.
- (k) Whether spill contingency and emergency planning, monitoring and maintenance schedules will protect the environment and enhance health and safety.

10.1.11 ASSESSMENT CRITERIA: DISCRETIONARY ACTIVITIES

10.1.11.1 General Assessment Criteria

For all discretionary activity resource consent applications throughout the City, Council will have regard to the following assessment criteria in addition to those matters listed in all rules contained in Section 10.1.9 — Rules: Development and Performance Standards and Section 10.1.10 Rules: Matters for Control — Controlled Activities and relevant matters set out in S104 of the Act.

(a) Whether the proposal is acceptable after a Risk Assessment as described below:

A qualitative or quantitative risk assessment may be required depending upon the scale or potential effects of the proposed activity with specific emphasis on the following:

- (i) Separation distance to people-sensitive activities (particularly activities such as schools, rest homes, hospitals, shopping centres, etc);
- (ii) Location in relation to nearest aquifer, surface water body or the coast;
- (iii) Nature of subsoil and site geology;
- (iv) Distance to sensitive habitats in the area or water catchment;
- (v) Cumulative and synergistic effects and bio-accumulation of hazardous substances used or stored;
- (vi) Fire control and fire water management;
- (vii) Adherence to health and safety, or environmental management systems. Council considers that the use of any one of the following systems, such as the NZCIC *Responsible Care Programme*, the ISO 9000 and the ISO 14000 systems, the BS 7750 system, the ISRS system, or any other recognised and accepted system will satisfy this requirement if included in the resource consent. The Council will give consideration to any other alternative site management system which will achieve the same intent of any of the above systems;
- (viii) Spill contingency and emergency planning, monitoring and maintenance schedules;
- (ix) Site drainage and off-site infrastructure (eg stormwater, sewer type and capacity); and
- (x) The transportation of hazardous substances, especially for large proposals:

(b) Whether appropriate site management systems are proposed for risk mitigation.

Consideration will be given to specific spill contingency plans, emergency procedures and equipment relating to the particular risk posed by the facility; stormwater detention and treatment appropriate and sustainable treatment and disposal procedures for hazardous waste, provision for fire control, transportation, monitoring and maintenance procedures.

(c) Whether there are reasonable alternatives to the proposal:

- (i) A description of any possible alternative locations or methods for undertaking the activity shall be submitted, where it is likely that an activity will result in any significant adverse effects on the environment.

- (d) Whether there will be any unacceptable effects on traffic safety:
 - (i) No significant adverse effect on the safety of the operation of the adjoining road network caused by the proposal will be accepted. Generally it must be demonstrated that vehicles transporting hazardous substances will not use local roads in residential areas. Conditions may be imposed which require access along specified routes.
- (e) Whether the proposal will comply with the development controls in the Plan for the zone and the development standards and performance standards of rules contained in Section 10.1.9 — Rules: Development and Performance Standards.

APPENDIX I: GLOSSARY

For the purposes of this chapter the following definitions apply:

Accident

means a sudden event causing harm to people, to property or to the natural environment.

Acute Toxicity

means adverse effects caused by a toxic agent occurring within a short time following exposure to that agent.

Adjusted Threshold

means the amount (mass in tonnes, or volume in cubic metres (m³) at a pressure of 101.3 kilo Pascals (kPa) and a temperature of 20°C for compressed gases) of a substance that has been assessed as generating no significant off-site effects in a heavy industrial area, after site and substance specific considerations have been taken into account.

Adjustment Factor

means the product of the individual factors for each *Effects Group* (i.e. Fire/Explosion, Human Health and Environment) which increase or decrease the likelihood and consequences of the release of a hazardous or environmentally damaging substance.

Base Threshold

means the amount (mass in tonnes, or volume in cubic metres (m³) at a pressure of 101.3 kilo Pascals (kPa) and a temperature of 20°C for compressed gases) of a substance that has been assessed as generating no significant off-site effects in a heavy industrial area before site and substance specific considerations have been taken into account.

Bioaccumulation

means accumulation of a substance within the tissues of living organisms.

BOD₅

means the Biochemical Oxygen Demand (measured over a five day period) which is the amount of dissolved oxygen in a body of water required for the breakdown of organic material in the water.

Carcinogen

means a substance which causes a statistically significant increase in the incident of cancerous tumours.

Chronic Toxicity

means adverse effects caused by a toxic agent which occur either after prolonged exposure, or an extended period following initial exposure.

Cleaner Production

means the use of techniques to reduce the need for raw materials and energy and the amount of wastes generated. These techniques may include the use of recyclable materials, the use of less hazardous substances, and the use of renewable resources.

Contaminant

is as defined in the Resource Management Act 1991 Part 1, Section 2, and includes:

any substance (including gases, odorous compounds, liquids, solids, and micro-organisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy, or heat-

[AM89]

- (a) When discharged into water, changes or is likely to change the physical, chemical, or biological condition of water; or
- (b) When discharged onto or into land or into air, changes or is likely to change the physical, chemical, or biological condition of the land or air onto or into which it is discharged.

EC₅₀

means the Effective Toxicant Concentration resulting in a 50% response for a given parameter (for example, reproduction rate, mobility) in a given period.

Ecotoxicity

means adverse toxic effects on ecosystems or ecological communities, harmful to any living organism or ecosystem.

Effects Groups

means the effects generated when a hazardous or environmentally damaging substance is released:

- Fire/Explosion Effects Group — concerned with damage to property, the built environment and people.
- Human Health Effects Group — concerned with the well being, health and safety of people.
- Environmental Effects Group — concerned with damage to ecosystems and natural resources.

Effects Ratio

means a dimensionless number representing the proposed quantity of a substance or group of substances to be used or stored, divided by the Adjusted Threshold.

Effects Ratio Trigger Level

means the value of the Effects Ratio which is used in the Consents Status Matrix to define whether or not a proposed development requires a land use resource consent. The Effects Ratio Trigger Level differs for different land uses, depending on for the difference in acceptable levels of risk.

Emergency Plan

means a regularly updated document serving as an emergency response guide, by identifying and cataloguing the elements required to respond to an emergency, and defining responsibilities and specific tasks in an emergency.

Environment

is as defined in the Resource Management Act 1991 under Part 1, Section 2, and includes:

- (a) ecosystems and their constituent parts, including people and communities;
- (b) all natural and physical resources;
- (c) amenity values; and
- (d) the social, economic aesthetic, and cultural conditions which affect the matters stated in paragraphs a) to c) of this definition or which are affected by those matters.

Environmentally Damaging Substance

means any substance which, by effects other than toxicity, is able to damage an aquatic ecosystem (for example, milk or oil).

Environmentally Persistent Substance

means a substance resistant to natural breakdown in the environment.

Environmentally Sensitive Areas

means areas that, in the judgement of the local community and/or regulatory authority, should not be subject to more than a specified low risk. Environmentally sensitive areas may include aquifers, water ways, wetlands, coastal environments, special ecosystems or species habitats.

Hazard

means any intrinsic property of a substance which makes it capable of causing adverse effects to people, the environment or property.

Hazardous Activity

means an activity which does not use, store, transport or dispose of hazardous substances but which poses a risk to the environment or the community (for example, earthworks).

Hazardous Facility

means activities involving hazardous substances and sites, including vehicles for their transport, at which these substances are used, stored, handled and disposed of. Hazardous facility does not include:

- the incidental use and storage of hazardous substances in minimal domestic scale quantities;

- hazardous activities (as defined above).

Hazardous Substance

means any substance:

- (a) with one or more of the following intrinsic properties:
 - (i) explosiveness;
 - (ii) flammability;
 - (iii) a capacity to oxidise
 - (iv) corrosiveness;
 - (v) toxicity (both acute and chronic);
 - (vi) ecotoxicity, with or without bioaccumulation; or
- (b) which on contact with air or water (other than air or water where the temperature or pressure has been artificially increased or decreased) generates a substance with any one or more of the properties specified in paragraph a) of this definition.

LC₅₀

means the Lethal Concentration of a substance at which 50% of the test organisms die in a given period, and as such is a measure of acute toxicity.

LD₅₀

means the Lethal Dose of a substance at which 50% of the test organisms die in a given period, and as such is a measure of acute toxicity.

Off-Site Effects

means the effects on people, property, and the natural environment outside of the boundary of the site of a hazardous facility.

Risk

means the likelihood of occurrence of an adverse effect from a substance combined with the magnitude of the consequences of that adverse effect.

Separation Distance

means the distance from the edge of the area where hazardous substances are used, stored or otherwise handled, to the edge of the area exposed to adverse effects.

Significant Expansion or Alteration

means a change in the type of process used in a manner or to an extent that section 10 of the Act would no longer apply. As a general guide, greater than a 20% increase in the quantities of hazardous substances used or stored may give rise to effects that are different in character, intensity and scale from the existing facility.

The day to day movement of hazardous substances around a hazardous facilities site such as Mobile Mixing Units (MMU's) or tanks is considered to form part of an existing operation. The changing location of activities within a site is not considered to be a significant expansion or alteration of an existing operation.

Site Management System

means the way of ensuring the ongoing safety of a hazardous facility by sound management. A site management system should include safety policy, provide a description of organisational structure and responsibilities, include operating, emergency and monitoring procedures, and carry out regular performance auditing.

Spill Containment System

means a structure which will contain liquids or solids in the event of a spill, and prevent them from entering the stormwater system or a natural water body.

Storage

the containment of a substance or mixture of substances, either above ground or under ground, which is not being used for manufacturing or altered to another substance, but excludes substances used as cooling or heating media. Storage does include the filling and emptying of the container.

Unintentional Release

means the unplanned or unwanted releases of hazardous substances that may or may not be detected immediately.

Use

means the manufacturing, processing or handling of a substance or mixture of substances for a particular activity without necessarily changing the physical state or chemical structure of the substance involved. This includes mixing, blending and packaging operations, but does not include the filling or drawing of substances from bulk storage tanks unless the processing is permanently connected to the bulk storage, and does not include loading out and dispensing of petroleum products.

APPENDIX II: HAZARDOUS FACILITIES SCREENING PROCEDURE

1 INTRODUCTION

The *Hazardous Facilities Screening Procedure* (HFSP) has been designed as a screening tool to assist territorial local authorities in making decisions on whether a proposed hazardous facility is permitted, or whether it is a controlled or discretionary activity requiring additional, merit-based assessment of risks.

The HFSP should be applied to any proposed facility using or storing hazardous substances. Its purpose is to determine whether the facility will be permitted subject to defined minimum performance standards, or will require a land use consent.

Hazardous facilities range from home occupations using hazardous substances, to large chemical factories. Common examples of hazardous substances are acids, solvents, paints, fuels and pesticides. They also include environmentally damaging substances, which include seemingly harmless substances such as foodstuffs, which potentially kill aquatic life when released into waterways in large quantities due to the depletion of oxygen.

2 OVERVIEW AND TERMINOLOGY

The HFSP is based on the assessment of hazardous substances in terms of three major *Effects Groups*: Fire/ Explosion, Human Health, and the Environment. Each substance is assigned a *Base Threshold* (B) — expressed as a weight or a volume — for each of *the three Effects Groups*. The *Base Threshold* is a pre-calibrated quantity, and dependent on the intrinsic hazardous properties of a substance.

Depending on the physical state of the substance(s), the type of storage or use, site separation distances, and the environmental sensitivity of the location, *Adjustment Factors* (F) are applied to the *Base Thresholds*. *Base Thresholds* and *Adjustment Factors* are then multiplied to generate an *Adjusted Threshold* (T) for each of the *Effects Groups*.

The next step is the calculation of the *Effects Ratio* (R), which represents the proposed quantity of a substance (Q) to be used/stored, in relation to the *Adjusted Threshold*. The *Effects Ratio* forms the basis to determine the consent status of a particular facility, and to evaluate the cumulative effects presented by multiple substances held on a site.

A more precise description of the above terms is provided in Sections 2.1 – 2.6. An overview of the HFSP concept is shown in Figure 10.1.4.

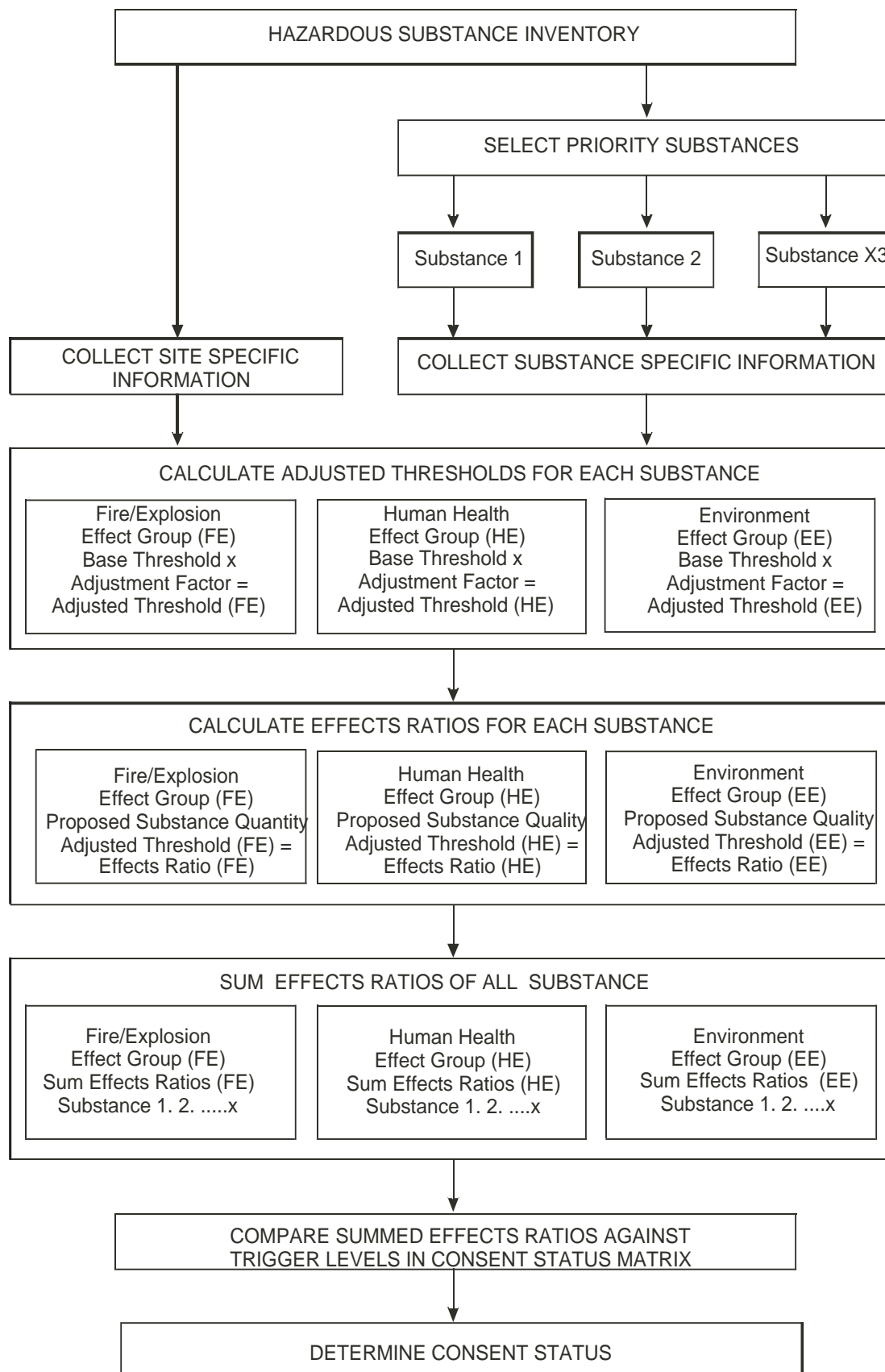


FIGURE 10.1.4 HFSP: CONCEPTUAL OVERVIEW

2.1 Effects Groups and Hazard Levels

For the purposes of the HFSP, the effects of any particular substance are categorised into three *Effects Groups*:

- **Fire/Explosion Effects (FE):**

This *Effects Group* is concerned with damage to property, the built environment, and people.

- **Human Health Effects (HE):**

This *Effects Group* is concerned with the well-being, health, and safety of people.

- **Environmental Effects (EE):**

This *Effects Group* is concerned with damage to ecosystems and natural resources.

Each *Effects Group* is divided into four hazard levels:

- **extreme**
- **high**
- **medium**
- **low**

The division into low, medium, high and extreme hazard levels in each of the *Effects Groups* is predominantly based on the United Nations (UN) classification system for the transport of hazardous substances (UNRTDG, 8th Edition, 1993), and the classification for ecotoxic substances proposed by the Organisation for Economic Cooperation and Development (OECD, 1993)¹.

For the purposes of the HFSP, the above classification systems have been further refined for certain hazardous substances classes to account for extremely hazardous substances. This applies to toxic substances (Class 6.1), toxic gases (Class 2.3), and ecotoxic substances (Ecotoxic Class). In addition, environmentally damaging substances have been placed into the “Ecotoxic” Class. Environmentally damaging substances have been defined as those substances which affect receiving waters through the addition of organically degradable material, resulting in the depletion of oxygen. Environmentally damaging substances include, for example, milk and alcohol.

Classification systems for hazardous substances such as the UNRTDG (1993) often only list a primary hazard, and sometimes a subsidiary hazard of a substance. However, in many cases hazardous substances present more than two types of hazards, and fit into more than one *Effects Group*. For example, a substance may exhibit a medium fire hazard, an extreme human health effect, and a medium environmental effect. This must be taken into account in the assessment of effects. The HFSP allows for the fact that many substances present multiple hazards, which is in alignment with the approach taken in proposed HSNO (Hazardous Substances and New Organisms) legislation. The hazardous substances classification system adopted for the HFSP is outlined in greater detail in **Attachment A**.

1. United Nations, 1993. Recommendation on the Transport of Dangerous Goods, 8th Edition, 1993. United Nations, New York.
European Community, 1993. Official Journal of the European Community, No L 110A/68.

2.2 Base Threshold

The *Base Threshold* (B) is a pre-calibrated hazardous substances quantity (in tonnes or m³ for compressed gases), which differs for each *Effects Group* and hazard level. It takes into account the intrinsic hazard of a hazardous substance, and represents the quantity of a substance which has been assessed as generating no significant off-site effects in a heavy industrial zone, before substance- and site-specific conditions have been taken into account.

2.3 Adjustment Factors

Pre-calibrated *Adjustment Factors* (F) are applied to the *Base Thresholds* to take account of substance- and site-specific conditions which will affect the potential severity of an effect.

Adjustment Factors differ for each of the *Effects Groups*, and take into account the following considerations:

- the physical state of a substance
- storage temperatures
- the type of storage facility
- the type of activity or use
- separation distances to the site boundary
- the environmental sensitivity of the location

2.4 Adjusted Threshold

The *Adjusted Threshold* (T) is the quantity of a hazardous substance (in tonnes or m³ for compressed gases), which, after application of *Adjustment Factors*, has been assessed as having no potentially significant off-site environmental effects in a heavy industrial zone. *Adjusted Thresholds* are determined separately for each *Effects Group*.

2.5 Effects Ratio

The *Effects Ratio* (R) is a dimensionless number. It is obtained by dividing the quantity of a substance (Q) that is proposed to be used or stored at a site, by the *Adjusted Threshold*. The *Effects Ratio* fulfils two important purposes:

- 1 By using a dimensionless ratio of the proposed quantity of a hazardous substance over the *Adjusted Threshold*, it is possible to aggregate the effects presented by multiple substances held on the same site. Hence, it becomes possible to assess cumulative potential environmental effects which may be created by several substances on the same site, and which have similar hazardous properties.
- 2 The *Effects Ratio* forms the basis to determine the consent status of a facility, by comparing *Effects Ratios* to the trigger levels in the Consent Status Matrix. Whether or not a proposed facility requires a resource consent is determined by the highest *Effects Ratio* in any of the three *Effects Groups*.

3 USING THE HFSP — A STEP BY STEP GUIDE

This section works through a step-by-step of the HFSP, following the steps shown in Figure 10.1.5, and using a series of five **Worksheets**. These illustrate the HFSP's individual steps and required long-hand calculations. It is noted that the longhand calculations can be facilitated by using standard commercial spreadsheet packages. Also, a customised HFSP computer software package will be made available to future users.

3.1 Step 1 — Assemble Site Specific Information

Site specific information is an essential component of the HFSP. This relates in particular to site lay-out, and the presence of any sensitive land uses or environmental features. An example of a site information sheet is shown in **Attachment B, Worksheet 1**.

3.2 Step 2 — Compile Hazardous Substances Inventory

To use the HFSP, it is necessary to create a full inventory of hazardous substances held on a site, including substances and wastes that are only stored or used temporarily. The inventory should contain:

- the names of hazardous substances (chemical or proprietary, including names of suppliers),
- quantities in weight (tonnes) or volume (m^3 for compressed gases, at 101.3 kPA and 20oC), and
- known hazardous substances classifications (eg. UN Number and Class)

A form to assist with this task is provided in **Attachment B, Worksheet 2**.

It is noted that the HFSP is based on the standard units of tonnes (for solids, liquids and liquefied gases), and m^3 (for compressed gases). It is therefore sometimes necessary to convert substance quantities to these units. In the case of liquids and liquefied gases, it is necessary to apply the specific gravity. The specific gravity is the specific weight of a substance in relation to that of water. Therefore, a liquid with a specific gravity of greater than 1.0 sinks, while a liquid with a specific gravity of less than 1.0 will float on water. For example, 1000 litres of petrol weigh approximately 800 kg or 0.8 tonnes.

Conversions of quantities are also necessary where substances are diluted or mixed with other substances. In this instance, only the percentage of the pure substance in the dilution or mixture is accounted for. For example, if it is proposed to store 10 tonnes of a substance that has a concentration of 30%, the proposed quantity of that substance on **Worksheet 2** should be 3 tonnes.

An exception to this are substances, where the UN Class is sometimes applied directly applied to specific commercially available concentrations.

This occurs particularly with corrosive substances (Class 8) and oxidising substances (Class 5). In these instances, conversions are only applied if commercially available concentrations are further diluted for specific purposes. Pesticides are also substances which are commonly available as diluted commercial products. The UNRTDG (1993) lists a range of pesticides and their dilutions in relation to Packaging Groups under poisonous substances (Class 6.1) (note that this only refers to human toxicity, but not ecotoxicity).

If a substance forms part of a mixture, the individual components of the mixture are assessed individually, based on the relative percentages of the components. However, where a substance mixture is rendered significantly more hazardous by a combination of different hazardous substances, it may need to be

assessed through appropriate testing procedures. In some instances, relevant information on the classification of mixtures is already available (for example, formaldehyde).

It is noted that the HFSP is applied to small package users as if it were a bulk quantity. While small hazardous substances packages reduce the risk of a major spill, they may in the case of still react like a bulk quantity in the case of an emergency. For this reason, a conservative approach has been taken, especially as the HFSP does not apply to retail outlets selling hazardous substances for domestic-scale use.

3.3 Step 3 — Select Priority Substances

Often, a large number of hazardous substances may be held on a site, and it is neither necessary nor practical to carry out an assessment of all of these. The following “common sense” guideline applies for sites where multiple hazardous substances are held:

- if there are ten or fewer substances, the HFSP is carried out on all substances unless it is evident that one single substance is likely to exceed the relevant trigger levels in the Consent Status Matrix (in which case the facility would require a resource consent);
- if there are more than ten substances held on the site, the HFSP is carried out on those substances which are:
 - known to be highly or extremely hazardous; and/or
 - held in quantities exceeding 10% of the total stock of hazardous substances listed in the inventory (**Attachment B, Worksheet 2**).

3.4 Step 4 — Collate Substance Specific Information

To be able to carry out the HFSP calculations, it is necessary to collate a range of substance specific information. This information forms the basis to assign the corresponding *Effects Groups* and hazard levels, as discussed in Section 2.1.

The Hazardous Substance Worksheet in **Attachment B, Worksheet 3** has been designed to help with the task of recording the information required to assess hazardous substances, and the subsequent classification into *Effects Groups* and hazard levels. Relevant information on hazardous substances can be extracted from a range of sources, such as packaging materials, Material Safety Data Sheets, text/reference books, as well as national and international data bases. A summary of such information sources is available from the council upon request. Occasionally, data on hazardous substances is found in units other than those indicated on **Worksheet 3**. Some helpful conversions are summarised in **Attachment C**.

Worksheet 3 also forms the basis for a HFSP hazardous substances data base which will be shared among users through the HFSP Network administered by the Auckland Regional Council. Information for some commonly used substances, and completed worksheets have already been accumulated and will be updated regularly, and are available upon request from the Council.

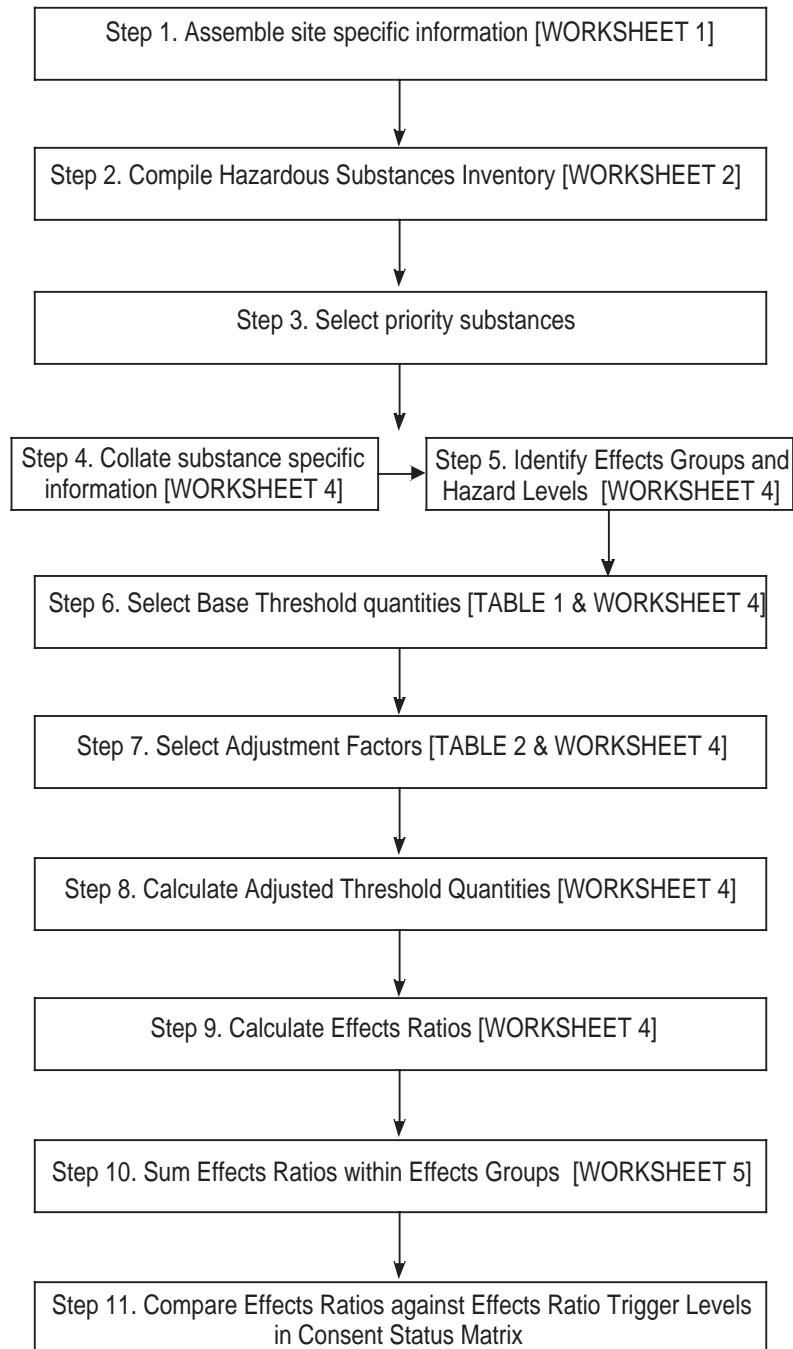


FIGURE 10.1.5 HFSP — STEP BY STEP GUIDE

3.5 Step 5 — Identify Effects Groups and Hazard Levels

Once the necessary background information has been collated, the user will proceed to assign *Effects Groups* and hazard levels to individual hazardous substances, including raw materials, products, and

wastes. The classification of hazardous substances into *Effects Groups* and hazard levels for each *Effects Group* is carried out with the help of **Attachment A**.

Where the necessary information on a hazardous substance is not available from the mentioned sources, a precautionary approach should be taken. In such an instance, the hazardous substance concerned should be assigned at least a medium hazard level for the Fire/Explosion and Human Health *Effects Groups*, and a high hazard level for the Environmental *Effects Group*.

This is based on the fact that available hazardous substances information generally focuses on health effects, and explosive or flammable properties. If a substance rates highly in any of these groups, the information is generally available due to occupational health and safety concerns. In contrast, environmental information on hazardous substances is often lacking, and therefore the precautionary approach is to adopt a “high” hazard level.

Effects Groups and corresponding hazard levels are then recorded in **Worksheet 3**, and also in the column marked “Step 5” on the Summary Sheet for Manual HFSP Calculations in **Attachment B, Worksheet 4**.

3.6 Step 6 — Select Base Threshold Level

The *Base Threshold* (B) is a pre-calibrated quantity, as discussed in Section 2.2. A specific *Base Threshold* is assigned to each *Effects Group* and hazard level. These are listed in **Table 1**.

For example, in the Fire/Explosion *Effects Group*, [Sub-Category Flammables], non-significant off-site effects would be represented by Base Thresholds of:

- 100 tonnes of a combustible liquid, which has a low hazard level in the Fire/Explosion *Effects Group* (for example, diesel).
- 30 tonnes of a Class 3, Packaging Group III substance, which are flammable liquids with a medium hazard level in the Fire/Explosion *Effects Group* (for example, turpentine).

The *Base Thresholds* for each substance used or stored on a site are selected from **Table 1**, and then recorded in the column marked “Step 6” on the Summary Sheet for Manual HFSP Calculations in **Attachment B, Worksheet 4**.

3.7 Step 7 — Select Adjustment Factors

Adjustment Factors (FF, FH, and FE) are applied to individual *Base Thresholds* under each *Effects Group* to take account of substance and site specific conditions, as discussed in Section 2.3. For each *Effects Group*, different types of *Adjustment Factors* are relevant. For example, for the Fire/Explosion *Effects Group*, the temperature is relevant, while for the Human Health *Effect Group*, proximity to a potable water resource is relevant.

In some instances, more than one *Adjustment Factor* will need to be applied to a substance within each *Effects Group*. Where this is the case, the *Adjustment Factors* are multiplied to generate one combined *Adjustment Factor* (FF, FH, or FE) for each *Effects Group*, and the *Base Threshold* is then multiplied by the combined *Adjustment Factor*.

For each *Effects Group*, pre-calibrated *Adjustment Factors* are listed in **Table 2**. The *Adjustment Factors* for each substance are recorded in the column marked “Step 7” on the “Summary Sheet for Manual HFSP Calculations” in **Attachment B, Worksheet 4**.

TABLE 1: BASE THRESHOLDS (B) FOR EFFECTS GROUPS AND HAZARD LEVELS

FIRE EXPLOSION EFFECTS GROUP (E)					
UN CLASS	HAZARD	HAZARD LEVEL			
		LOW	MEDIUM	HIGH	EXTREME
SUB-CATEGORY: FLAMMABLES					
2.1	LPG		LPG		
	Flammable Gases			2.1	
3	Flammable Liquids	Combustible Liquids	3 PGIII	3PGI/ II	
4	Flammable Solids			4.1	4.2/4.3
5	Oxidisers			5.1	5.2
Base Threshold (B) (tonnes)		100	30	10	1
Base Threshold (B) (m³)¹				10,000	
SUB-CATEGORY: EXPLOSIVES					
1	Explosives		1.3	1.2	1.1
Base Threshold (B) (tonnes)			3	1	0.1
HUMAN HEALTH EFFECTS GROUP (H)					
UN CLASS	HAZARD	HAZARD LEVEL			
		LOW	MEDIUM	HIGH	EXTREME
2.3	Toxic Gases			2.3 (b)	2.3 (a)
6.1	Poisons	6.1 PGIII	6.1 PGII	6.1 PGI (b)	6.1 PGI (a)
	Carcinogens			carcinogen	
8	Corrosives		8 PGI/ II		
Base Threshold (B) (tonnes)		30	10	1	0.1
Base Threshold (B) (m³)¹				500	50
ENVIRONMENT EFFECTS GROUP (E)					
UN CLASS	HAZARD	HAZARD LEVEL			
		LOW	MEDIUM	HIGH	EXTREME
3	Flammable Liquids		Combustible Liquids		
8	Corrosives			8 PGI/II/III	
	Ecotoxic	Group 1 (d) Group 2 (d)	Group 1 (c) Group 2 (c)	Group 1 (b)	Group 1 (a)
	Pesticides				Pesticides
Base Threshold (B) (tonnes)		100	30	3	0.3

NOTE: 1 Base Threshold in m³ at 101 kPa and 20°C for permanent or compressed gases.

TABLE 2: ADJUSTMENT FACTORS (F)

ADJUSTMENT FACTORS FOR FIRE/EXPLOSION EFFECTS GROUP	ADJUSTMENT FACTORS FOR HUMAN HEALTH EFFECTS GROUP	ADJUSTMENT FACTORS FOR ENVIRONMENT EFFECTS GROUP
F1: SUBSTANCE FORM	F1: SUBSTANCE FORM	F1: SUBSTANCE FORM
Solid = 1 Liquid, powder = 1 Gas (101.3 kPa and 20°C) = 0.1	Solid = 3 Liquid, powder = 1 Gas (101.3 kPa and 20°C) = 0.1	Solid = 3 Liquid, powder = 1
F2: HANDLING/STORAGE CONDITIONS (Class 3 substances [Flammable Liquids] only)	F2: SEPARATION DISTANCE FROM SITE BOUNDARY (Gases only)	F2: ENVIRONMENTAL SENSITIVITY
Temperature < Flash Point = 1 Temperature > Flash Point < Boiling Point = 0.3 Temperature > Boiling Point = 0.1	< 30 metres = 1 > 30 metres = 3	More than 25 m from a waterbody ¹ =1 Adjacent or within 25 m of a waterbody ¹ =0.3
F3: SEPARATION DISTANCE FROM SITE BOUNDARY	F3: PROXIMITY TO POTABLE WATER RESOURCE	F3: TYPE OF ACTIVITY
< 30 metres = 1 > 30 metres = 3	Not applicable = 1 Proximity to potable water resource ² = 0.3	Use = 0.3 Above ground storage = 1 Underground storage ³ = 3
F4: TYPE OF ACTIVITY	F4: TYPE OF ACTIVITY	
Use = 0.3 Above ground storage = 1 Underground storage ³ = 10	Use = 0.3 Above ground storage = 1 Underground storage ³ = 10	
F1 x F2 x F3 x F4 = FF	F1 x F2 x F3 x F4 = FH	F1 x F2 x F3 = FE

Note:

- 1 Waterbody includes streams, springs, lakes, wetlands, sea and estuaries, but does not include aquifers and entry points to the stormwater network.
- 2 Potable water resource as defined by the regional council
- 3 Applicable to Class 3 substances [Flammable Liquids] only

3.8 Step 8 — Calculate Adjusted Threshold Quantities

The *Adjusted Threshold* (T) is calculated for each *Effects Group* by multiplying the *Base Threshold* (B) by the relevant *Adjustment Factor* (FF, FH, FE), as follows:

- 1 $T = B \times FF$ provides the *Adjusted Threshold* for a substance in the *Fire/Explosion Effects Group*.
- 2 $T = B \times FH$ provides the *Adjusted Threshold* for a substance in the *Human Health Effects Group*.
- 3 $T = B \times FE$ provides the *Adjusted Threshold* for a substance in the *Environmental Effects Group*.

The *Adjusted Thresholds* quantities are recorded for each substance in the column marked “Step 8” on the “Summary Sheet for Manual HFSP calculations” in **Attachment B, Worksheet 4**.

3.9 Step 9 — Calculate Effects Ratios

The *Effects Ratio* (R) is a dimensionless number. It is obtained by dividing the quantity of a substance (Q) that is proposed to be used or stored on a site by the *Adjusted Threshold* (T):

$$\text{Effects Ratio (R)} = \frac{\text{Proposed quantity of substance (Q)}}{\text{Adjusted threshold (T)}}$$

The *Effects Ratio* (R) for each substance needs to be recorded in the column marked “Step 9” on the “Summary Sheet for Manual HFSP Calculations” in Attachment B, Worksheet 4.

3.10 Step 10 — Sum the Effects Ratios to Find the Total Effects Ratio

When assessing several hazardous substances on a site, it is necessary to add the *Effects Ratios* within each *Effects Group* together for all substances. When carrying out a manual calculation, this is done with the use of **Attachment B, Worksheet 5**.

3.11 Step 11 — Determine Consent Status against Consent Status Matrix

The sum of all *Effects Ratios* within each *Effects Group* determines the consent status of a particular site when compared against the *Effects Ratio* trigger levels in the Consent Status Matrix for that *Effects Group*. Only the highest *Effects Ratio* in any of the three *Effects Groups* needs to be considered to identify the consent status, that is, whether a hazardous facility or activity is permitted, controlled or discretionary.

ATTACHMENT A — CLASSIFICATION OF HAZARDOUS SUBSTANCES

UN CLASS	HAZARD	DIVISION	DESCRIPTION	EFFECTS GROUP	HAZARD LEVEL
1	Explosives	1.1	Articles and substances having a mass explosion hazard.	Fire/Explosion	Extreme
		1.2	Articles and substances having a projection hazard, but not a mass explosion hazard.	Fire/Explosion	High
		1.3	Articles and substances having a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard. This division comprises articles and substances that: <ul style="list-style-type: none"> • give rise to considerable radiant heat, or • burn one after another, producing minor blast and/or projection effects. 	Fire/Explosion	Medium
		1.4, 1.5, 1.6	Not applicable.		
2	Gases	LPG	LPG	Fire/Explosion	Medium
		2.1	Flammable gases: gases which at 20°C and a standard pressure of 101.3 kPa: <ul style="list-style-type: none"> • are ignitable when in a mixture of 13% or less by volume with air, or • have a flammable range with air of at least 12% regardless of the lower flammability limit. This class includes aerosols containing flammable propellants.	Fire/Explosion	High
		2.2	Not applicable.		
		2.3	Toxic gases: gases which are known to be toxic or corrosive to humans and pose a hazard to health. This division is divided into the following categories: a) Inhalation toxicity vapours LC ₅₀ : <200 ppm (= ml/m ³) and V ⁽¹⁾ > 10 x LC ₅₀	Human Health	Extreme
b) Inhalation toxicity vapours LC ₅₀ : <5,000 ppm (=ml/m ³) and V ⁽¹⁾ > LC ₅₀	Human Health			High	
3	Flammable Liquids		Flammable liquids comprising liquids, mixtures of liquids, or liquids containing solids in suspension which give off a flammable vapour at specific temperatures. This class is divided into three packaging groups (PG).		
		3 PGI	Flash point: < 23°C Initial boiling point: < 35°C	Fire/Explosion	High
		3 PGII	Flash point: < 23°C Initial boiling point: > 35°C	Fire/Explosion	High
		3 PGIII	Flash point: > 23oC; < 61oC Initial boiling point: > 35oC	Fire/Explosion	Medium
		3 C	Flash point: > 61°C	Fire/Explosion	Low
Environment	Medium				

(1) $V=(p/P) \times 10^6$ ppm or ml/m³, where P = 760 mm Hg and p = Vapour Pressure (20° C)

UN CLASS	HAZARD	DIVISION	DESCRIPTION	EFFECTS GROUP	HAZARD LEVEL
4	Flammable Solids	4.1	<ul style="list-style-type: none"> Flammable solids that are readily combustible or may cause fire easily through an ignition source or friction. Self-reacting substances that are thermally unstable and are liable to undergo a strongly exothermic decomposition even without the participation of oxygen. Desensitised explosives: substances which are wetted with water or alcohol or diluted with other substances to suppress their explosive properties. 	Fire/Explosion	High
		4.2	Substances liable to spontaneous combustion: <ul style="list-style-type: none"> pyrophoric substances: liquid or solid substances which, even in small quantities, ignite within 5 minutes of coming in contact with air. self-heating substances: solid substances which generate heat when in contact with air without additional energy supply. 	Fire/Explosion	Extreme
		4.3	Substances, which in contact with water, become spontaneously flammable, or emit flammable gases.	Fire/Explosion	Extreme
5	Oxidising substances and	5.	Oxidising substances: substances which, in themselves are not necessarily combustible, but may cause or contribute to the combustion of other materials by yielding oxygen.	Fire/Explosion	High
	organic peroxides	5.2	Organic peroxides: organic substances that are thermally unstable and may undergo exothermic, self-accelerating decomposition. They may: <ul style="list-style-type: none"> be liable to explosive decomposition burn rapidly be sensitive to impact or friction react dangerously with other substances cause damage to the eyes. 	Fire/Explosion	Extreme

UN CLASS	HAZARD	DIVISION	DESCRIPTION	EFFECTS GROUP	HAZARD LEVEL
6	Poisonous (toxic) substances	6.1	Poisonous substances: substances which are liable to cause death or injury, or to harm human health if swallowed, inhaled, or contacted by the skin. This division is divided into three packaging groups (PG).		
		6.1 PGI	a) Oral toxicity LD ₅₀ (mg/kg): <1 Dermal toxicity LD ₅₀ (mg/kg): <10 Inhalation toxicity dust/mist LC ₅₀ (mg/l): <0.5 Inhalation toxicity vapours LC ₅₀ : <200 ppm (=ml/m ³), V ⁽¹⁾ > 10 x LC ₅₀ (extreme)	Human Health	Extreme
			b) Oral toxicity LD ₅₀ (mg/kg): <5 Dermal toxicity LD ₅₀ (mg/kg): <40 Inhalation toxicity dust/mist LC ₅₀ (mg/l): <0.5 Inhalation toxicity vapours LC ₅₀ : <1,000 ppm (=ml/m ³), V ⁽¹⁾ > 10 x LC ₅₀ (high)	Human Health	High
		6.1 PGII	Oral toxicity LD ₅₀ (Mg/kg): <50 Dermal toxicity LD ₅₀ (mg/kg): <200 Inhalation toxicity dust/mist LC ₅₀ (mg/l): <2 Inhalation toxicity vapours LC ₅₀ : <3,000 ppm (=ml/m ³), V ⁽¹⁾ >LC ₅₀ (medium)	Human Health	Medium
		6.1 PGIII	Oral toxicity LD ₅₀ (mg/kg): <500 (liquids), <200 solids Dermal toxicity LD ₅₀ (mg/kg): <1,000 Inhalation toxicity dust/mist LC ₅₀ (mg/l): <10 Inhalation toxicity vapours LC ₅₀ : <5,000 ppm (=ml/m ³) and V ⁽¹⁾ > 0.2xLC ₅₀ (low)	Human Health	Low
			Recognised carcinogen	Human Health	High
6.2	Not applicable				

UN CLASS	HAZARD	DIVISION	DESCRIPTION	EFFECTS GROUP	HAZARD LEVEL
8	Corrosives	8 PGI	Substances which, by chemical action, can cause severe damage when in contact with living tissue or, in the case of leakage, will materially damage or destroy other materials. Corrosives are divided into three packaging groups (PG).		
			Very dangerous substances and preparations.	Human Health	Medium
		8 PGII	Substances and preparations presenting medium hazard.	Human Health	Medium
				Environment	High
		8 PGIII	Substances and preparations presenting minor hazard.	Environment	High
	Ecotoxic	Group 1	Ecotoxic substances: any substance exhibiting a toxic effect on the ecosystem, based on the toxicity to aquatic life. This division is divided into four categories.		
			a) 96 hr LC ₅₀ salmonid fish (mg/l): <0.1 48 hr EC ₅₀ daphnia (mg/l): <0.1 72 hr EC ₅₀ algae (mg/l): <0.1	Environment	Extreme
			b) 96 hr LC ₅₀ salmonid fish (mg/l): <1.0 48 hr EC ₅₀ daphnia (mg/l): <1.0 72 hr EC ₅₀ algae (mg/l): <1.0	Environment	High
			c) 96 hr LC ₅₀ salmonid fish (mg/l): <10.0 48 hr EC ₅₀ daphnia (mg/l): <10.0 72 hr EC ₅₀ algae (mg/l): <10.0	Environment	Medium
			d) 96 hr LC ₅₀ salmonid fish (mg/l): <100.0 48 hr EC ₅₀ daphnia (mg/l): <100.0 72 hr EC ₅₀ algae (mg/l): <100.0	Environment	Low
		Group 2	Environmentally damaging or persistent substances: any substance exhibiting a damaging (other than toxic) effect on the ecosystem. This division is divided into two categories.		
			c) BOD ₅ (mg/l): >10,000	Environment	Medium
			d) BOD ₅ (mg/l): >1,000	Environment	Low
		Pesticides	Pesticides are deemed to have an extreme hazard level unless data can be provided to demonstrate lesser toxicity.	Environment	Extreme
		Corrosives	All corrosives (Class 8, PG I–III) have a high Environmental Effects hazard level. However, to avoid repetition, assessment should be made under Class 8 only.	Environmental	High

(1) $V=(p/P) \times 10^6$ ppm or ml/m³, where P = 760 mm Hg and p = Vapour Pressure (20° C)

ATTACHMENT B — WORKSHEETS

WORKSHEET 1: SITE INFORMATION SHEET

Facility name	
Address	
Map reference	
Description of activity	
Nature of adjoining land use	
Proximity to potable water resource ¹	
Within 25 m of a waterbody ²	

Map of site

(show adjoining land uses and location of water resources and sensitive features)

- 1 Waterbody includes streams, springs, lakes, wetlands, sea and estuaries, but does not include aquifers and entry points to the stormwater drainage network.
- 2 Groundwater reservoir as identified by the regional council.

WORKSHEET 3: HAZARDOUS SUBSTANCE WORKSHEET

1 SUBSTANCE DESCRIPTION						
Substance Name						
Proprietary Name and Supplier						
Substance Form [Gas, liquid, solid, powder]						
2 AVAILABLE INFORMATION [Extract from packaging material, MSDS, UN Recommendation for the Transport of Dangerous Goods (8th edition)]						
UN Number						
UN Primary Class						
UN Subsidiary Class						
3 ADDITIONAL INFORMATION REQUIREMENTS [Extract from data sources listed in Appendix C and Material Safety Data Sheets]			DATA SOURCE			
Physical parameters	Initial boiling point (°C)					
	Flash point (°C)					
	Specific gravity @ 20°C					
	Molecular weight					
	Vapour pressure (mm Hg at 20°C)					
Toxicity Data ¹	Oral toxicity LD ₅₀ (mg/kg)					
	Dermal Toxicity LD ₅₀ (mg/kg)					
	Inhalation Toxicity LC ₅₀ (ppm)					
	Carcinogen ²					
Ecotoxicity Data ³	96hr LC ₅₀ (Salmonid fish) (mg/l)					
	48hr EC ₅₀ (Daphnia) (mg/l)					
	72hr EC ₅₀ (Algae) (mg/l)					
	BOD ₅ (mg/kg)					
	Pesticide [indicate yes/no]					
Other						
4 ASSESSMENT [Extract from information in categories 2 and 3 above and Appendix A]						
Hazard	UN Class	Division/ Packaging Group	Does hazardous property apply? [Indicate yes/no]	Effects Groups and Hazard Level ⁴		
				Fire/Explosion	Human Health	Environmental
Explosive	1.1- 1.3					
Flammable Gas	2.1					
Flammable Liquid	3					
Flammable Solid	4.1- 4.3					
Oxidiser	5.1- 5.2					
Toxic Gas	2.3					
Toxic Material	6.1					
Corrosive	8					
Ecotoxic						

1 List lowest level available for human or mammalian species, type of species, test duration

- and data source.
- 2 See Appendix B.
 - 3 For LC_{50} and EC_{50} list lowest levels for indicated or other aquatic species, type of species and data source.
 - 4 Use E for extreme hazard level, H for high, M for medium, L for low and OSL if hazard is outside specified limits.

WORKSHEET 4: SUMMARY SHEET FOR MANUAL HFSP CALCULATIONS

SUBSTANCE	Step 5		Step 6	Step 7				PRODUCT OF ADJUSTMENT FACTORS FF, FH, FE	Step 8	PROPOSED QUANTITY Q (t or m ³)	Step 9 EFFECTS RATIO $R = \frac{Q}{T}$
	EFFECTS GROUP	HAZARD LEVEL	BASE THRESHOLD B (t or m ³)	F1	F2	F3	F4		ADJUSTED THRESHOLD T (t or m ³)		
1	Fire/Explosion										
	Human Health										
	Environment										
2	Fire/Explosion										
	Human Health										
	Environment										
3	Fire/Explosion										
	Human Health										
	Environment										
4	Fire/Explosion										
	Human Health										
	Environment										
5	Fire/Explosion										
	Human Health										
	Environment										
6	Fire/Explosion										
	Human Health										
	Environment										
7	Fire/Explosion										
	Human Health										
	Environment										
8	Fire/Explosion										
	Human Health										
	Environment										
9	Fire/Explosion										
	Human Health										
	Environment										
10	Fire/Explosion										
	Human Health										
	Environment										



WORKSHEET 5: TOTAL EFFECTS RATIOS MANUAL CALCULATION SHEET

Note: Only fill out those sections applicable to the substance being assessed: for example, non-flammables need not be assessed in the Fire/Explosion *Effects Group*.

SUBSTANCE	Fire/Explosion Effects Ratio	Human Health Effects Ratio	Environmental Effects Ratio
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Total Effects Ratios			

ATTACHMENT C — UNIT CONVERSIONS

1. Conversions of temperature

To convert degrees Fahrenheit to degrees Celsius, use the following formula:

$$^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32)$$

2. Conversions of concentrations for solids

$$1 \text{ ppm} = 1 \text{ mg/kg}$$

3. Conversions of concentrations for liquids

$$1 \text{ ppm} = 1 \text{ mg/l or } 1 \text{ g/m}^3$$

$$1 \text{ ppb} = 1 \text{ } \mu\text{g/l or } 1 \text{ mg/m}^3$$

4. Conversions of concentrations for gases

$$\text{mg/m}^3 = \text{ppm} \times \frac{\text{molecular weight}}{24.04}$$