

HAZARDOUS SUBSTANCES

Hazardous substances are used by the agriculture, horticulture, forestry and industrial sectors, as well as the domestic sector (but usually only in small amounts). As such, hazardous substances are a common and important part of modern life. If properly handled, used, stored and disposed of, the risks to the environment and to human health and safety are very small. However, there are many examples both in New Zealand and internationally that illustrate the effects of accidents and inappropriate use, storage, transportation and disposal of hazardous substances.

In an effort to avoid the repetition of previous mistakes and in order to reduce the chance of an environmental incident in the Ruapehu District, management and control of hazardous substances is required.

The Resource Management Act 1991 does not clearly separate the roles and responsibilities of regional and district councils in the matter of hazardous substances.

Section 31 (b) of the Resource Management Act 1991 charges district councils with the function of:

"The control of any actual or potential effects of the use, development, or protection of land, including the prevention or mitigation of any adverse effects of the storage, use, disposal, or transportation of hazardous substances."

This is complemented by the function prescribed for the regional councils under Section 30(1)(c) of the Act for:

"The control of the use of land for the purpose of the prevention or mitigation of any adverse effects of the storage, use, disposal, or transportation of hazardous substances."

Section 62(1)(ha) of the Act requires that the responsibilities for developing objectives, policies and rules relating to the control of the use of land in respect to hazardous substances be specified in the Regional Policy Statement. Policy P31.2 of the Proposed Manawatu-Wanganui Regional Policy Statement (as changed by decisions on submissions) has allocated the Regional Council the responsibility for the control of the use of land for the purpose of prevention or mitigation of any adverse effects of the **disposal** of hazardous substances; and the control of the effects of **discharges** of hazardous substances. The Ruapehu District Council is responsible for the control of the use of the land for the **storage, use and transportation** issues associated with hazardous substances.

Many of the methods used to manage hazardous substances are outside the District Plan and are subject to other legislation (e.g. Transport Amendment Act 1989 which relates to the transportation of hazardous substances and is administered by the New Zealand Police and the Occupational Safety and Health Service, Department of Labour particularly in relation to the work environment). The focus of this Plan should be on the prevention and minimisation of risk to the environment and human health.

One of the major environmental tasks presently being addressed is the "clean up" of existing contaminated sites. The District Plan contains rules that enable this activity to be undertaken within specified controls.

HS 1.0 ISSUE

(a) Risk associated with transportation of hazardous substances.

HS 1.1 OUTCOME

- (a) The prevention of adverse affects on the environment from the transportation of hazardous substances.

HS 1.2 OBJECTIVE

- (a) The avoidance, remedying or mitigation of adverse effects to the environment and the community associated with the transportation of hazardous substances.

HS 1.3 POLICIES

- (a) To ensure that any adverse effects of activities on the efficiency and safety of the transport routes are avoided, remedied or mitigated.
- (b) To provide for the use and storage of hazardous substances in locations that are readily able to gain access to the main transport routes.
- (c) To assess the likely adverse effects on the environment from the transportation of hazardous substances from or to a site, for any resource consent required for the use, storage or disposal of hazardous substances.

Explanation of Policies

The control of the actual transportation of hazardous substances rests with the New Zealand Police (Transport Amendment Act 1989) and the Department of Labour (Dangerous Goods Regulations), not with the District Council. Further, the Proposed Regional Policy Statement for Manawatu-Wanganui as changed by decisions on Submissions (May 1995 states that the District Council will address the specific issues associated with the transportation of hazardous substances.

The District Plan has a role to play in protecting the transportation resource from the adverse effects of other adjoining activities.

HS 2.0 ISSUE

- (a) Risk associated with use and storage of hazardous substances.

HS 2.1 OUTCOME

- (a) The prevention of adverse environmental effects from the use and storage of hazardous substances.

HS 2.2 OBJECTIVE

- (a) The avoidance, remedying or mitigation of the adverse effects to the environment and the community associated with the use and storage of hazardous substances.

HS 2.3 POLICIES

- (a) To ensure spatial separation of those facilities that involve the use and/or storage of hazardous substances from environments that would be adversely affected by the inadvertent release of hazardous materials.
- (b) To assess the risks to the environment and community associated with the hazardous facility when assessing a resource consent application.

Explanation of Policies

The potential adverse effects from the use and storage of some hazardous substances are such that in some locations (e.g. residential, wetlands, reserves) the risk to the environment, amenity values, health and wellbeing of people and the community should be avoided.

HS 3.0 ISSUE

- (a) **Risk associated with the disposal of hazardous substances including contaminated material.**

HS 3.1 OUTCOMES

- (a) **The prevention of adverse environmental effects from the disposal of hazardous substances.**
- (b) **That the legacy of environmental degradation caused by the use and mismanagement of hazardous substances in the past will not be repeated, and that contaminated sites will be decontaminated and rehabilitated.**

HS 3.2 OBJECTIVE

- (a) **The avoidance, remedying or mitigation of adverse effects on the environment and the community from the disposal of hazardous substances that occurred in the past, that are currently occurring and that will occur in the future.**

HS 3.3 POLICIES

- (a) **To ensure that the decontamination and rehabilitation of any existing landfill or disposal site containing hazardous substances by or under the direction of the Regional Council is able to be carried out**
- (b) **To discourage and avoid the disposal of any hazardous substance anywhere in the District, apart from co-disposal in sites where this is provided for.**
- (c) **To promote the establishment of facilities outside the District to safely dispose of hazardous substances.**

Explanation of Policies

The Proposed Regional Policy Statement for Manawatu-Wanganui as changed by decisions on Submissions (May 1995 states at Policy P31.2 that the Region will be responsible for the development of objectives, policies and rules relating to the disposal of hazardous substances.

Accordingly, the District Plan is limited to objectives and policies which provide a management direction that the disposal of hazardous substances is not encouraged or provided for in locations where suitable facilities for receiving hazardous substances are not available. This is seen as not being inconsistent with the Regional Policy Statement.

HS 4.0 ISSUE

- (a) **Lack of knowledge by users about what are hazardous substances and their likely adverse effect on the environment makes their integrated management and control difficult for those agencies responsible for that function.**

HS 4.1 OUTCOME

- (a) **That, in conjunction with the responsibilities and work undertaken by other agencies, the awareness and knowledge of hazardous substances will be increased, and as a result of this, the risks and adverse effects on the environment will be reduced.**

HS 4.2 OBJECTIVE

- (a) **Increased level of public and user knowledge, education and involvement in minimising the use of hazardous substances and the safe and correct methods of the use, storage and disposal of hazardous substances.**

HS 4.3 POLICIES

- (a) **To identify and promote suitable industrial standards and Codes of Practice to prevent or mitigate environmental effects and risks associated with hazardous substances and environmentally damaging substances and facilities.**
- (b) **To continue to work with organisations (e.g. Manawatu-Wanganui Regional Council, Ministry of Health, Police Department, New Zealand Chemical Industry Council, Occupational Safety and Health Service, Department of Labour), and in forums that seek to inform and educate the specific users and the public in general on the ways in which to minimise the use and the risks associated with hazardous substances.**

Explanation of Policies

A range of methods is required to inform and educate the public and users of the risks and effects of hazardous substances.

HS 5.0 METHODS

- (1) **To educate and inform the users of hazardous substances of ways to reduce the risks and adverse effects of hazardous substances.**
- (2) **To monitor the changes in legislation, technology, new products and new processes for the use, storage, disposal and transportation of hazardous substances.**
- (3) **To network to establish a Substance Data Record Sheet data base for a wide range of common hazardous and environmentally damaging substances.**
- (4) **To liaise with other bodies involved with the management and use of Hazardous Substances.**
- (5) **To prepare a Hazards Register, or record, of confirmed contaminated sites in the District.**

- (6) To include Consent Notices on a Certificate of Title, using the PIM and LIM systems and other appropriate records, identifying those sites that are confirmed to be contaminated.
- (7) To, as appropriate, require an investigation and/or assessment of a site for potential contamination as part of any resource consent application.

HS 6.0 RULES

HS 6.1 Permitted Activities

The following are permitted activities in all zones:

- (a) Any hazardous facility with an Effects Ratio that equals or falls below the Effects Ratio (R) specified for the zone in which it is proposed to locate, as indicated in the HFSP Consent Status Matrix in Rule HS 8.0 below.
- (b) Any use or storage of radio-active materials with an activity below that specified as an exempt activity in the Radiation Protection Regulations 1982.
- (c) The decontamination and rehabilitation of contaminated sites by or under the control and direction of the Manawatu-Wanganui Regional Council, or which is undertaken in accordance with the "Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (1992)" - Australian and New Zealand Environment and Conservation Council and the National Health and Medical Research Council.

(NOTE: Refer to the exemptions in Rule HS 7.2)

HS 6.2 Discretionary Activities

The following are discretionary activities in all zones and shall be assessed in relation to the criteria in Rule HS 6.2.1 below:

- (a) Any hazardous facility with an Effects Ratio above the Effects Ratio (R) specified for the zone in which it proposes to locate, as indicated in the HFSP Consent Status Matrix in Rule HS 8.0 below.
- (b) The decontamination and rehabilitation of contaminated sites not provided for as a permitted activity.

(NOTE: Refer to the exemptions in Rule HS 7.2)

HS 6.2.1 Assessment Criteria for Discretionary Activities

The following criteria will be used to assist the assessment of a discretionary activity, but in no way restricts the exercise of the Council's discretion:

- (a) The degree to which the location of the use or storage of the hazardous substance/facility in relation to other activities and environments mitigates the risks of adverse effects on those activities and environments. In particular the following will be taken into account:
 - (i) the separation distance to neighbouring activities, with emphasis on people sensitive activities such as child care facilities, rest homes, hospitals, shopping centres and residential areas;
 - (ii) the location of the facility in relation to the nearest aquifer, waterway, coast or other sensitive environments; the distance to environmentally sensitive areas such as wildlife habitats or water catchments.
- (b) Action or works undertaken to reduce the degree of risk to a level that is acceptable in the circumstances e.g.:

- (i) identification of potential hazards, failure modes and exposure pathways;
 - (ii) investigation of the nature of the sub-soil and the site geology;
 - (iii) assessment of the probability and potential consequences of an accident leading to a release of a hazardous substance or loss of control;
 - (iv) identification of cumulative and/or synergistic effects;
 - (v) site drainage and off-site infrastructure, e.g. stormwater drainage system, sewer type and capacity.
- (c) The management practices in place (and will continue to be in place) that significantly reduce the level of risk e.g. fire safety and fire water management; adherence to health and safety and/or environmental management systems; spill contingency and emergency planning, monitoring and maintenance schedules.
 - (d) Alternative locations and processes evaluated, and respective benefits and costs compared with the proposal.
 - (e) The level and detail of the qualitative and/or quantitative risk assessment required to adequately assess the risk associated with the facility.
 - (f) The level of risk associated with the transportation of hazardous substances, both for the roading network and for the amenity values and environment through which the transport route concerned takes.
 - (g) The potential restriction on the existing or potential use of adjacent land.
 - (h) The degree to which the "direction" of the adverse effect is influenced by factors, such as topography of the site and surrounding area, and existing structures.
 - (i) The rehabilitation of the hazardous disposal site so that the level of contamination and risk is significantly reduced, and the activities proposed for that site can be carried out in a "normal" manner (i.e. without compromise to the "containment" of contaminants on the site).

HS 6.3 Non-Complying Activities

The following are non-complying activities and shall be assessed in relation to the Assessment Criteria for Discretionary Activities in Rule HS 6.2.1. above:

- (a) Any hazardous facility in a zone not specified in the Hazardous Facilities Screening Procedure Consent Status Matrix in Rule HS 8.0
- (b) Any facility for the disposal of hazardous substances not provided in Rule HS 6.1 and 6.2.
- (c) Any use or storage of radio-active materials with an activity in excess of that specified as exempt activities in the Radiation Protection Regulations 1989.

HS 7.0 HAZARDOUS FACILITIES SCREENING PROCEDURE (HFSP) ACTIVITY MATRIX

- (1) The matrix below shall be used to determine the consent status of a hazardous facility in the zone that it is to be located.
- (2) The calculation of the Effects Ratio (R) shall be undertaken by a person or organisation experienced, qualified and presently operating in the field of hazardous substances and facilities, using the "Hazardous Facilities Screening Procedure" contained in HS8.0.

- (3) Where there is any disagreement as to the Effects Ratio (R) value, then the matter shall be referred to an independent expert agreed to by both parties for a determination.
- (4) If a zone is not included in the Matrix, the hazardous facility shall be a non-complying activity. There are no prohibited activities for hazardous substances.

HS 7.1 Conditions for Permitted Activities

Compliance with the following conditions is required for Hazardous Substances Activities to be permitted activities.

HS 7.1.1 Site Design

- (1) Any part of a hazardous facility site where hazardous substances are used for their intended function shall be designed, constructed and managed in a manner that prevents:
 - (i) any effects of the intended use from occurring outside of the intended target area;
 - (ii) the entry or discharge of the hazardous substance into the stormwater drainage system;
 - (iii) the entry or discharge of the hazardous substance into the sewerage system unless permitted by the sewerage utility operator.
- (2) Any part of a hazardous facility site where hazardous substances are used, stored, manufactured, mixed, packaged, loaded, unloaded or otherwise handled, shall be designed, constructed and managed in a manner that prevents:
 - (i) the contamination of any land and/or water (including groundwater and potable water supplies) in the event of a spill or other unintentional release of hazardous substances;
 - (ii) the entry or discharge of the hazardous substance into the stormwater drainage system in the event of a spill or unintentional release;
 - (iii) the entry or discharge of the hazardous substance into the sewerage system in the event of a spill or other unintentional release.
- (3) The hazardous facility site shall be designed, constructed and managed in a manner that any stormwater originating on or collected on site that has become contaminated:
 - (i) does not contaminate any land and/or water (including groundwater and potable water supplies) by acting as a transport medium for hazardous substances unless permitted by a resource consent;
 - (ii) does not enter or discharge into the stormwater drainage system;
 - (iii) does not enter or discharge into the sewerage system unless permitted by the sewerage utility operator.

Adherence to the following design guidelines is deemed to comply with this condition:

- (A) Spill Containment System

The parts of the hazardous facility site described in parts 2 and 3 above shall be serviced by a spill containment system that is:

- (i) constructed from impervious materials resistant to the hazardous substances used, stored, manufactured, mixed, packaged, loaded, unloaded or otherwise handled on the site;
- (ii) able to contain the maximum volume of the largest tank used, or where drums or other containers are used, able to contain half of the maximum volume of substances stored;
- (iii) able to prevent any spill or other unintentional release of hazardous substances, and any stormwater and/or fire water that has become contaminated, from entering the stormwater drainage system;
- (iv) able to prevent any spill or other unintentional release of hazardous substances, and any stormwater and/or fire water that has become contaminated, from discharging into or onto land and/or water (including groundwater and potable water supplies) unless permitted by a resource consent.

(B) Stormwater Drainage

All stormwater grates on the site shall be clearly labelled "Stormwater Only".

(C) Washdown Areas

Any part of the hazardous facility site where vehicles, equipment or containers that are or may have become contaminated with hazardous substances are washed shall be designed, constructed and managed to prevent the effluent from the washdown area from:

- (i) entry or discharge into the stormwater drainage system;
- (ii) entry or discharge into the sewerage system unless permitted by the sewerage utility operator;
- (iii) discharge into or onto land and/or water (including groundwater and potable water supplies) unless permitted by a resource consent.

HS 7.1.2 Underground Storage Tanks

Underground tanks for the storage of petroleum products shall be designed, constructed and managed to prevent leakage and spills.

Adherence to the Code of Practice for "Design, Installation and Operation of Underground Petroleum Systems" (Department of Labour - Occupational Safety and Health) is deemed to be one method of complying with this condition.

HS 7.1.3 Signage

Any hazardous facility shall be adequately signposted to indicate the nature of the substances stored, used or otherwise handled.

Adherence to the Code of Practice for "Warning Signs for Premises Storing Hazardous Substances" of the New Zealand Chemical Industry Council, or any other Code of Practice approved by the New Zealand Fire Service is deemed to be one method of complying with this condition.

HS 7.1.4 Waste Management

- (1) Any process waste or waste containing hazardous substances shall be managed to prevent:
 - (i) the waste entering or discharging into the stormwater drainage system;
 - (ii) the waste entering or discharging into the sewerage system unless permitted by the sewerage utility operator;
 - (iii) the waste discharging into or onto land and/or water (including groundwater and potable water supplies) unless permitted by a resource consent.
- (2) The storage of any process waste or waste containing hazardous substance shall at all times comply with the conditions in Section A.
- (3) The storage of any waste containing hazardous substance shall be in a manner that prevents:
 - (i) the exposure to ignition sources;
 - (ii) the corrosion or other alteration of the containers used for the storage of the waste;
 - (iii) the unintentional release of the waste.
- (4) Any hazardous facility generating waste containing hazardous substances shall dispose of these wastes to appropriately permitted facilities, or be serviced by a reputable waste disposal contractor.

HS 7.2 Exemptions from the HFSP

The following are exempt from the HFSP:

- (1) Service stations in the Industrial and Commercial Zones where the following are complied with:
 - (a) the retail sale of petrol, up to a storage of 100,000 litres of petrol in underground storage tanks and up to 50,000 litres of diesel, provided that the "Code of Practice for the Design, Installation and Operation of Underground Petroleum Systems", published by the Department of Labour - OSH, is adhered to.
 - (b) Retail LPG outlets, with storage of up to 6 tonnes (single vessel storage) of LPG, provided that the "Australian Standard (AS 1596-1989) for LP Gas Storage and Handling - Siting of LP Gas Automotive Retail Outlets" is adhered to.

Reason

Because control of these developments is provided for elsewhere and well established industry codes of practices or suitable regulations exist.

- (2) Trade waste sewer and waste treatment of disposal facilities.

Reason

The difficulty of identifying the quantity and nature of the substances involved.

- (3) Storage or use of hazardous consumer products for private domestic purposes.

Reason

The degree of hazard is generally below the scale of potential effects considered by the HFSP.

- (4) Retail outlets for the domestic usage sale of hazardous substances (e.g. supermarkets, hardware shops, pharmacies).

Reason

Storage of hazardous substances is generally in small packages.

- (5) Facilities using genetically modified or new organisms.

Reason

Controlled by other legislation.

- (6) Developments that are or may be hazardous but do not involve hazardous substances (e.g. mineral extraction, high voltage transmission lines, radio masts, electrical substances).

Reason

These are controlled by other district plan provisions.

- (7) Dust explosions.

Reason

Controlled by rules relating to discharge of contaminants to the air.

- (8) Gas and oil pipelines.

Reason

Controlled by other legislation and industry codes.

- (9) Fuel in motor vehicles, boats and small engines such as weed eaters, lawnmowers, chainsaws etc.

Reason

The degree of hazard is generally below the scale of potential effects considered by the HFSP.

HS 8.0 HAZARDOUS FACILITIES SCREENING PROCEDURE (HFSP)

Hazardous Facilities Screening Procedure (HFSP) Consent Status Matrix

Zone	Activity Status	
	Permitted	Discretionary
Residential High Residential Medium Residential Low Protected Areas	≤ 0.05	> 0.05
Commercial Rural Urban Settlement	≤ 0.25	> 0.25
Industrial	≤ 0.5	> 0.5

HS 8.1 Using the HFSP: A Step-By-Step Guide

This section works through a step-by-step guide on how to use the *Hazardous Facility Screening Procedure*, following the steps shown in **Figure 2** and using a series of worksheets. These illustrate the HFSP's individual steps and longhand calculations. A computer package is being developed to speed up the calculations.

Note that Appendices are not listed in order of their first reference in the text, but in order of frequency of use. Thus, Appendices E and F are referred to first as they will be used most often. There is no **Appendix B**, as this is not referred to here. The appendices are located in Appendix One of this Plan.

HS 8.1.1 Step 1: Assemble Site-Specific Information

Site specific information is an essential component of the HFSP. Because it deals with effects, any sensitive land uses or environmental features on or near the site need to be noted. An example of a *Site Information Sheet* is shown in Appendix One (**Appendix E, Worksheet 1**).

HS 8.1.2 Step 2: Compile Hazardous Substances Inventory

To use the *Hazardous Facility Screening Procedure*, it is necessary to create a full inventory of hazardous substances held on a site, including substances that are only stored or used temporarily such as waste hazardous substances. The inventory should list:

- (1) the names (including proprietary names and suppliers where necessary);
- (2) quantities;
- (3) UN classifications of all the hazardous substances on the site; and
- (4) whether the substance is used or stored.

A form to assist with this task is provided in Appendix One (**Appendix E, Worksheet 2**).

It is noted that the HFSP uses the standard units of tonnes (for solids, liquids and liquefied gases) and m³ (for compressed gases). It is therefore sometimes necessary to convert substance quantities to these units. In the case of liquids, it is necessary to apply the specific gravity (or density) to convert litres to kilograms, or m³ to tonnes. The specific gravity is the specific weight of a liquid 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 800kg or 0.8 tonnes.

Conversions of quantities are also necessary where a substance is diluted, or mixed with another substance. 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 on **Worksheet 2** should be 3 tonnes. (Refer to Appendix F in Appendix One of this Plan).

An exception to this are corrosives (UN Class 8) and oxidising substances (UN Class 5), where the UN Class is sometimes directly applied to specific commercially available concentrations. In these instances, conversions are only applied when these commercially supplied 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, and their related Packaging Groups in Class 6.1 in terms of a human poison rating. The worked examples in Part VI, Chapter 9 of the "Land Use Planning for Hazardous Substances", June 1995, illustrates in more detail how this issue is addressed. (Refer also to **Appendix A** in Appendix One of this Plan).

If a substance is in a mixed form, proposed quantities for the percentage of pure substance in the mixture should be listed. In cases where synergistic effects result in a mixture that is more hazardous than its components, the mixture may need to be subjected to appropriate testing procedures to obtain the necessary information, unless relevant information is readily available.

It is also important to note that small packages are generally treated the same as bulk quantities. While small packages or containers reduce the risk of a major spill, they may still react like bulk quantities in some emergencies. For this reason, a conservative approach has been taken, especially as the HFSP generally does not apply to retail outlets.

In some cases, it may be difficult to decide whether a substance is in use or storage. Generally, the HFSP considers a substance in use when the full amount of the substance is used at any one time, for example as an acid bath. A substance that is taken from a container and used in small amounts while its bulk continues to be stored would be rated as being storage.

HS 8.1.3 Step 3: Select "Priority Status" Substances

Often, numerous hazardous substances are held on a site, and it is time-consuming to prepare a full classification of all of them. It is neither practical nor necessary to submit every substance to the HFSP; therefore the following "common sense" guide-lines apply for sites where multiple hazardous substances are held, to assist in defining those which have "priority status":

- (1) If there are ten or fewer substances on site, 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 proposal would require a consent application);

- (2) If there are more than ten substances on site, the HFSP is carried out on those substances which:
 - (i) are highly or extremely dangerous; and/or
 - (ii) are held in quantities exceeding 10% of the total stock of hazardous substances listed in the inventory are contained in Appendix One (**Appendix E, Worksheet 2**).

HS 8.1.4 Step 4: Collate Substance Specific Information

It is an essential component of the HFSP to assign a hazard level for each *Effects Group* to the hazardous substances held on the site. To do so, it is necessary to collect a range of information about the substances, including UN classifications.

The Hazardous Substance Worksheet in Appendix One (**Appendix E, Worksheet 3**) has been designed to help with the task of recording the information required to classify substances into *Effects Groups* and hazard levels.

This information can be extracted from the UN Recommendations on the Transport of Dangerous Goods (UNRTDG) 8th edition, Material Safety Data Sheets, national and international databases, and text/reference books such as those listed in Appendix One (**Appendix C**).

Occasionally, data on hazardous substances can only be found in units other than those required on **Worksheet 3**. To assist with the conversion of such units, some frequently used conversion factors are provided in Appendix One (**Appendix F**).

Where the necessary information to carry out this step is not readily available from public information sources, a precautionary approach should be taken, and the substance 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*.

These hazard levels are deemed appropriate because:

- (1) In general, assessment of hazardous substances focuses on health effects and explosive or flammable properties. If a substance rates highly in these categories, this information is usually readily available. Therefore, it is considered reasonable to assign a medium hazard level in the Fire/Explosion and Human Health *Effects Groups* for those substances where this information is not readily available;
- (2) In contrast, information on environmental effects is often lacking. The precautionary approach therefore dictates that a high hazard level should be chosen where no information is available.

As the collation of this information is one of the more time-consuming parts of the HFSP, relevant information for some commonly used hazardous substances is provided in Appendix One (**Appendix D**).

HS 8.1.5 Step 5: Identify Effects Groups and Hazard Levels

For the purposes of the HFSP, the effects of substances are categorised into three groups:

- (1) Fire/Explosion Effects:
concerned with damage to property, the built environment and safety of people;

- (2) Human Health Effects:
concerned with the well-being, health and safety of people;
- (3) Environmental Effects:
concerned with damage to ecosystems and natural resources.

Each Effects Group is divided into four hazard levels:

- (1) extreme;
- (2) high;
- (3) medium;
- (4) low.

The division into low, medium, high and extreme hazard levels in each of the *Effects Groups* (Fire/Explosion, Human Health and Environmental) is predominantly based on the UN (United Nations) classification system for hazardous substances as outlined in the UN Recommendations on the Transport of Dangerous Goods (UNRTDG), 8th edition, and the classification proposed by the Organisation for Economic Co-operation and Development (OECD) for health and environmental effects.¹

It is important to note that the above classification systems are inadequate for assigning *Effects Group* hazard levels to certain hazardous substances, particularly toxic substances (Class 6.1), toxic gases (Class 2.3) and environmentally toxic substances (Ecotoxic Class).

The following points should be noted:

- (1) For the purposes of the HFSP, the classification of these substances (Classes 6.1, 2.3, and Ecotoxic) has been refined to account for extremely hazardous substances;
 - (a) Environmentally damaging substances have been placed into the “Ecotoxic” class. Foodstuffs such as milk are an example of an environmentally damaging substance;
 - (b) Hazardous substances lists based on the UN Classification System often only list the primary hazard of a substance and sometimes one subsidiary hazard, although a substance may have different effects in each of the *Effects Groups*. For example, a single substance may present:
 - (i) a medium explosion effect;
 - (ii) an extreme human health effect; and
 - (iii) a high environmental effect.

Hence, the HFSP allows for the fact that many substances may fit into more than one *Effects Group*, which is similar to the approach taken in the proposed HSNO legislation.

European Community, 1993. Official Journal of the European Community, No. L110A/68

Hazardous substances (including raw materials, product and wastes) can be classified into *Effects Groups* and assigned a hazard level for each *Effects Group* with the help of Appendix One (**Appendix A**), which lists UN Classes, Packaging Groups and other relevant information.

It should be noted that the HFSP also accounts for combustible liquids such as cooking oils that are not usually assigned a UN Class rating.

¹ United Nations, 1993. Recommendations on the Transport of Dangerous Goods, Eight Revised Edition. New York, United Nations

The classification of substances or assignment of hazard levels is, in the first instance, carried out according to their UN classification. For example, a UN Class 8, Packaging Group II substance is always assigned a medium Human Health *Effects Group* hazard level and a high Environmental *Effects Group* hazard level. Only when the UN classification does not account for an *Effects Group*, or the substance does not have a UN rating, should other information be used to classify the substance.

The *Effects Groups* and corresponding hazard levels are then recorded in the column marked "Step 4" on the "Summary Sheet for Manual HFSP Calculations" in Appendix One (**Appendix E, Worksheet 4**).

HS 8.1.6 Step 6: Find Base Threshold Quantities

The *Base Threshold* (B) is a pre-calibrated quantity. It is the amount 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. These aspects are addressed through the application of Adjustment Factors. *Base Thresholds* corresponding to the hazard levels in each *Effects Group* are listed in **Table 1**.

For example, in the Fire/Explosion *Effects Group* Sub-category Flammables, non-significant off-site effects in a heavy industrial area would be represented by *Base Thresholds* of:

- (1) 100 tonnes of a combustible liquid, which has a low hazard level in the Fire/Explosion *Effects Group*.
- (2) 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*. The *Base Thresholds* for each substance used or stored on the site are found in **Table 1** and recorded in the column marked "Step 6" on the "Summary Sheet for Manual HFSP Calculations" in Appendix One (**Appendix E, Worksheet 4**).

HS 8.1.7 Step 7: Find Adjustment Factors

Pre-calibrated *Adjustment Factors* (FF, FH and FE) are used to multiply the *Base Threshold* quantities in order to take account of the substance properties and specific circumstances on each site which will influence the severity of any potential effect. This multiplication yields the *Adjusted Threshold* (T)(see Step 8).

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

- (1) the physical state of the substance;
- (2) the pressure and temperature required for storage and usage;
- (3) the type of storage;
- (4) the type of activity or use;
- (5) separation distances to the site boundary;
- (6) the environmental sensitivity of the site location.

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 *Effects Group*, proximity to a potable water resource is important.

Table 2 lists the pre-calibrated *Adjustment Factors* to be used for each *Effects Group*.

In some instances, more than one *Adjustment Factor* within each *Effects Group* will need to be applied to a substance. 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 that one Factor.

The *Adjustment Factors* for each substance are recorded in the column marked "Step 7" on the "Summary Sheet for Manual HFSP Calculations" in Appendix One (**Appendix E, Worksheet 4**).

HS 8.1.8 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:

T = B x FF provides the *Adjusted Threshold* for a substance in the Fire/Explosion *Effects Group*

T = B x FH provides the *Adjusted Threshold* for a substance in the Human Health *Effects Group*

T = B x FE provides the *Adjusted Threshold* for a substance in the Environmental *Effects Group*

The *Adjusted Thresholds* (T) for each substance should be recorded in the column marked "Step 8" on the "Summary sheet for manual HFSP calculations" in Appendix One (**Appendix E, Worksheet 4**).

HS 8.1.9 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 Appendix One (**Appendix E, Worksheet 4**).

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* instead of *Adjusted Threshold* itself, it is possible to aggregate the effects presented by multiple substances held on the same site. Hence, it becomes possible to assess the cumulative potential effects which may be created by several substances present on the same site and which have similar hazardous properties;

- (2) It forms the basis of defining the trigger levels in the Consent Status Matrix which are used to determine the consent status of a particular facility. Whether or not a proposed facility requires a resource consent is determined by assessing whether the calculated *Effects Ratios* exceed the trigger levels in the Consent Status Matrix.

HS 8.1.10 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. When carrying out a manual calculation, this is done with the use of **Appendix E, Worksheet 5**.

HS 8.1.11 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*. In most cases the same trigger value would cover all *Effects Groups*; in these situations, only the highest *Effects Ratio* in any of the three *Effects Groups* needs to be considered to identify the consent status, for example, whether a hazardous facility or activity is permitted, controlled or discretionary. However, there may be situations where a council chooses to differentiate between *Effects Groups* (see sections 5.7 and 6.3.2), in which case the *Effects Ratios* for the identified *Effects Groups* are relevant.

Principal Reasons for Adopting the Objectives, Policies and Methods

The Council is required to control any actual or potential effects of the use, development or protection of land, including the prevention or mitigation of any adverse effects of the storage, use, disposal or transportation of hazardous substances. The role is reinforced by the Proposed Regional Policy Statement for Manawatu-Wanganui as changed by decisions on Submissions (May 1995).

Hazardous Substances, by their very nature, present a number of complex issues. Auckland City Council in conjunction with the Auckland and Waikato Regional Councils have undertaken extensive research into the development of a system that gives a risk assessment of any hazardous facility in terms of the adverse effects that the facility may have on the environment. A Hazardous Facility Screening Procedure (HFSP) has been developed which forms the mechanism for assessing whether a proposed hazardous facility or activity requires a resource consent or can be carried out as a permitted activity.

The conditions required to be met by a permitted activity provide the second mechanism to determine whether or not a proposed hazardous facility or activity requires assessment through a resource consent process.

In summary, the HFSP seeks to provide a method (based on the potential adverse effects of the facility or activity) of determining whether or not the hazardous substance facility requires a land use resource consent, and the nature of that consent.

Activities involving radio-active substances are excluded from the HFSP assessment process because they are covered under the rules of the Radiation Protection Regulations 1982. These Regulations are administered by the Department of Health through the National Radiation Laboratory. An activity status for radio-active substances is included in the activity listings in HS 6.2-6.3 above.

HS 9.0 CROSS REFERENCES

As a guide only, any person referring to the above should also refer to the parts of the District Plan addressing the following issues:

- Information Requirements
- Rural Zone
- Residential High Zone
- Residential Medium Zone
- Residential Low Zone
- Commercial Zone
- Industrial Zone
- Urban Settlement Zone
- Protected Areas Zone
- Maori Land
- Subdivision
- Special Activities

Figure 2: A Step-by-Step Guide to the Hazardous Facility Screening Procedure

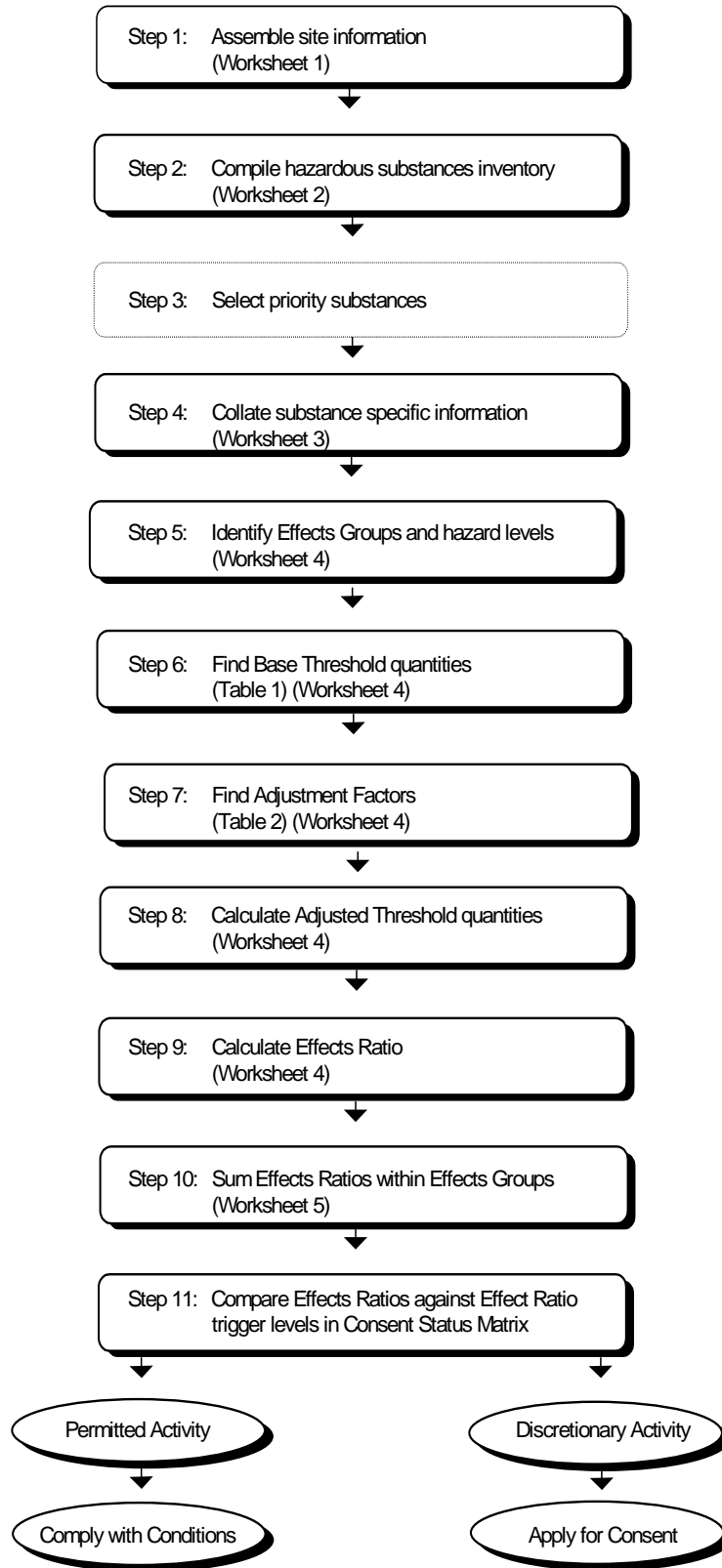


Table 1: Base Thresholds for All Effects Groups and Hazard Levels

FIRE/EXPLOSION EFFECTS GROUPS					
UN Class	Hazard	Hazard Levels			
		Low	Medium	High	Extreme
Sub-Category : Flammables					
	LPG		LPG		
2	Gases			2.1 (exclude LPG)	
3	Flammable Liquids	Combustible Liquids	3 PGIII	3 PGI 3 PGII	
4	Flammable Solids			4.1	4.2 4.3
5	Oxidisers			5.1	5.2
B (tonnes)		100	30	10	1
B (m ³) *				10,000	
Sub-Category : Explosives					
1	Explosives		1.3	1.2	1.1
B (tonnes)			3	1	0.1

HUMAN HEALTH EFFECTS GROUPS					
UN Class	Hazard	Hazard Levels			
		Low	Medium	High	Extreme
2.3	Toxic Gases			2.3 (b) - (d)	2.3 (a)
6	Poisons	6.1 PGIII	6.1 PGII	6.1 PGI (b)	6.1 PGI (a)
	Carcinogen			Carcinogen	
8	Corrosives		8 PGI 8 PGII		
B (tonnes)		30	10	1	0.1
B (m ³) *				500	50

ENVIRONMENTAL EFFECTS GROUPS					
UN Class	Hazard	Hazard Levels			
		Low	Medium	High	Extreme
3	Flammable		3 C		
8	Corrosives			8 PGI 8 PGII	
	Ecotoxic	Group 1 (d) Group 2 (d)	Group 1 (c) Group 2 (c)	Group 1 (b)	Group 1 (a)
	Pesticides				Pesticides
B (tonnes)		100	30	3	0.3

NOTE:* Base Threshold in m³ at 101.2 kPa and 20°C for permanent or compressed gases.

Table 2: Adjustment Factors for Each Effects Group

ADJUSTMENT FACTORS FOR FIRE/EXPLOSION EFFECTS GROUP	ADJUSTMENT FACTORS FOR HUMAN HEALTH EFFECTS GROUP	ADJUSTMENT FACTORS FOR ENVIRONMENTAL EFFECTS GROUP
F1: SUBSTANCE FORM	F1: SUBSTANCE FORM	F1: SUBSTANCE FORM
Solid = 1 Liquid Powder = 1 Gas (at 101.3 kPA and 20°C) = 0.1	Solid = 3 Liquid, Powder = 1 Gas (at 101.3 kPA and 20°C) = 0.1	Solid = 3 Liquid, Powder = 1
F2: HANDLING/STORAGE CONDITIONS ³	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	< 30 metres = 1 > 30 metres = 3	Normal = 1 Adjacent to 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	Normal = 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

¹ Waterbody includes streams, springs, lakes, wetlands, sea and estuaries, but does not include aquifers and entry points to the stormwater drainage network.

² Potable water resource as defined by the regional council.

³ Applicable to UN Class 3 substances (Flammable Liquids) and Combustible Liquids only.

