APPENDIX H4 : HAZARDOUS FACILITIES SCREENING PROCEDURE (HFSP)

1.0 Introduction

In order to assess the hazard posed by various substances and the risks they present, Council has adopted a Hazardous Facility Screening Procedure (HFSP) for use in assessing hazardous activities or facilities.

The HFSP will be applied to all proposed new facilities using or storing hazardous substances.

The HFSP will be used as a screening tool to assist in making decisions on:

i) Whether a proposed hazardous facility is permitted, subject to defined minimum conditions; or

ii) Whether it requires a consent and additional merit-based assessment of risks.

2.0 Activity Status Matrix

The Activity Status Matrix set out below shall be used to determine the activity status of a hazardous facility in the zone in which it is to be located.

Zone	Total Effects Ratio for Each Effects Group
All Residential Zones	0.02
Rural Residential, Rural Lifestyle Zones	0.1
All Commercial Zones	0.1
All Industrial	0.5
Rural P and Rural G zones	0.5
Reserves and Coastal Environment Zones	0.5 (Fire and Explosion) 0.02 (Human Health and Environment)

If the proposed hazardous facility is within 10 metres of the boundary of a zone with a more restrictive Effects Ratio this more restrictive ratio shall be used to determine the activity status.

2.1 Reasons for Effects Ratios

The rules regulate the use or storage of hazardous substances according to the risks posed, having regard to the tolerances acceptable in different zones. The technical and scientific basis for the risk analysis and procedures adopted is contained in the document "Land Use Planning for Hazardous Facilities" by the Hazardous Facility Screening Procedure Review Group (Auckland Regional Council, 1995). A copy may be viewed at the Gisborne District Council.

The site standards ensure protective measures are implemented to avoid the possibility of substances escaping into the environment. The Residential Zone permitted levels do not require these site standards because the quantities of substances allowed are very small, where substances are kept in the manufacture's packaging which provides adequate safeguards.

The exemptions relate to use or storage of hazardous substances that are regulated by other legislation (eg. the Hazardous Substances and New Organisms Act 1996) or by the general zoning's effect of separating incompatible activities, or (in the case of motor fuels) the existence of industry standards that mitigate the risks.

Residential Zones

The effects ratio for the Residential Zone is 0.02. This effects ratio is very low and reflects the need to provide maximum protection for local residents and facilities such as retirement homes, kindergartens, schools and halls, where people spend a major part of the day and night. It will permit the use of small hazardous substance quantities in residential areas, as is the case with home occupations.

Rural Residential and Rural Lifestyle Zones

The effects ratio for the Rural Residential Zone is 0.1. This is higher than for the residential zone so as to allow for the use of limited quantities of agrichemicals. Often these areas are less densely populated than major urban areas.

Rural Zones P and G Zones

The effects ratio is 0.5 in the Rural Zone. This reflects the fact that farming operations can be major users of hazardous substances, such as agri-chemicals. The proposed effects ratio will enable many farm related activities to proceed as a permitted activity, unless higher than normal quantities of hazardous substances are used or stored. Whilst a higher ratio (0.75) would encompass almost all farms it is not considered appropriate to permit a greater risk in the rural zone than in the Industrial zones.

Commercial Zones

The effects ratios for the commercial zones is 0.1. These areas encompass the major commercial areas, inner city and suburban areas of the District, and reflect the need for the minor to moderate use of hazardous substances by these activities. This effects ratio accounts for the fact that people in commercial areas accept a somewhat higher risk compared to residential areas and usually spend lesser time there.

Reserves and Coastal Environment Zones

The Open Space and Coastal Marine area has an effects ratio of 0.02 human health and environment and 0.5 fire and explosion. The latter is higher than residential areas because people spend proportionately less time there and the areas are generally less densely populated.

Industrial Zone

The industrial zone has the highest ratio of 0.5. This accounts for risk to neighbouring industries being less than commercial and residential.

3.0 Information Requirements

Where the HFSP has determined that a hazardous facility is a discretionary activity and will therefore require a resource consent, the consent application shall be accompanied by an assessment of environmental effects. This shall be provided in such detail as corresponds with the scale and significance of the actual or potential effects and risks of the proposed development.

3.1 Risk Assessment

The Assessment of Environmental effects should include a qualitative or quantitative risk assessment. As well as addressing more analytically the issues addressed in the HFSP, this assessment should place particular emphasis on those issues not addressed in detail by the HFSP, including:

a) Identification of potential hazards, failure modes and exposure pathways.

b) The separation distance to neighbouring activities, with emphasis on people-sensitive activities such as child care facilities, schools, rest homes, hospitals, shopping centres and residential area.

c) The location of the facility in relation to the nearest aquifer, waterway, coast or other sensitive environments.

d) The nature of the sub-soil and the site geology.

e) The distance to environmentally sensitive areas such as wildlife habitats or water catchments.

f) Assessment of the probability and potential consequences of an accident leading to a release of a hazardous substance or loss of control.

g) Identification of cumulative and/or synergistic effects.

h) Fire safety and fire water management.

i) Adherence to health and safety and/or environmental management systems.

j) Spill contingency and emergency planning, monitoring and maintenance schedules.

k) Site drainage and off-site infrastructure, *eg* stormwater drainage system, sewer type and capacity.

l) The transport of hazardous substances.

m) The disposal of wastes containing hazardous substances.

3.2 Risk Mitigation and Management

Consideration should be given to the adoption of specific spill contingency plans, emergency procedures, stormwater management and treatment, treatment and disposal procedures for wastes containing hazardous substances, fire safety, monitoring and maintenance procedures and appropriate site management systems.

3.3 Alternatives

Where it is likely that an activity may result in significant adverse effects on the environment, a description of alternative locations or methods for undertaking the activity shall be submitted.

3.4 Traffic Safety

It should be demonstrated that the proposal will generate no significant adverse effects on the safety of the operation of the adjoining road network and that vehicles transporting hazardous substances will not utilise local roads in residential areas as a regular means of transport. Conditions may be imposed that require access along specified routes.

4.0 Hazardous Facility Screening Procedure - Overview

4.1 The system of regulation of hazardous substances use and storage in this Appendix follows the Hazardous Facility Screening Procedure (HFSP). The technical background to the HFSP is provided in the Document "Land Use Planning for Hazardous Facilities" by the Hazardous Facility Screening Procedure Review Group (Auckland Regional Council, 1995). A copy may be viewed at Gisborne District Council.

Adverse Effects

4.2 To plan for facilities using or storing hazardous substances, the HFSP focuses on assessing three groups of potential adverse effects:

a) effects caused by fire or explosion

b) effects on human health

c) environmental effects

4.3 Possible adverse effects of hazardous substances can be predicted by the hazard of the substance and the anticipated consequences of its release to the environment. Adverse effects include:

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

e) damage to the environment, human health and property through fire and explosion events

Hazard & Risk

4.4 It is important to distinguish between the hazard of a substance and the risk it poses:

a) hazard is principally defines by the intrinsic properties of the substance, such as its flammability or toxicity the risk presented by a substance is defined by the probability of its release, combined with the potential effects of that release

4.5 The HFSP focuses on the potential effects of a hazardous release, and thus brings the essential dimension into the Council evaluations of hazardous substances proposals. It works by assessing the quantities and hazard posed by substances on a proposed site in relation to the levels of acceptable risk in different localities, as stated in an "effects ratio".

Calculation of Effects Ratios

4.6 Generally, each substance to be used or stored on the site should be assessed for its effects in each of the three groups. For each substance and in each Effects Group, the HFSP has assigned the following:

a) A base threshold (B) which is mainly dependent on the substance's intrinsic hazardous properties. The base Threshold 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. It is expressed as the weight, or volume for compressed gases, of classes of substances.

b) Adjustment Factors (FF, FH, FE) which have been developed specifically for use with the HFSP. These adjust the Base Thresholds of substances on the site to reflect the risk posed by factors which increase or decrease the likelihood and consequences of release, such as the physical state of the substance, the type of storage and activity, site separation distances and the environmental sensitivity of the location.

4.7 Users of the HFSP then calculate the following:

a) An adjusted threshold, by multiplying the Base Thresholds by the Adjustment Factors. This generates an Adjusted Threshold for each substance in each of the Effects Groups, so as to more realistically reflect the potential effects of the substances on the site.

b) the Effects Ratio for each substance in each effects group, by dividing the proposed quantity of the substance to be used or stored with the Adjusted Threshold quantity. Where multiple substances are used or stored, the Effects Ratios for each Effects Group are added up, to indicate the cumulative potential effects of the proposed facility.

4.8 The Total Effects Ratio (ie. the sum of all effects ratios of individual substances within an effects group) is used to determine whether of not the activity needs a resource consent. Clause 2 indicates the Total Effects Ratio values at which an activity or facility is permitted, or discretionary in different zones and areas. The effects ratio figure is the same for each effects group in Figure 2.

4.9 If the HFSP indicates that a proposed facility is discretionary, a more detailed, merit-based assessment of risks will be needed. This risk assessment should take account of:

a) the probability and effects of potential hazardous substances accidents

b) the proposed measures to mitigate and manage that risk, and

c) location and characteristics of the proposed site

4.10 The granting of a resource consent would then be considered in terms of whether the off-site risks presented by a hazardous facility are adequately contained and managed. The HFSP does not determine the outcome of the resource consent application.

4.11 A conceptual overview of the HFSP is shown in Figure 1.

Where the HFSP fits into the range of controls on hazardous facilities

4.12 Because the HFSP is simply a tool for determining whether or not an activity needs a resource consent, it forms only one component of a management strategy containing other essential and complementary elements.

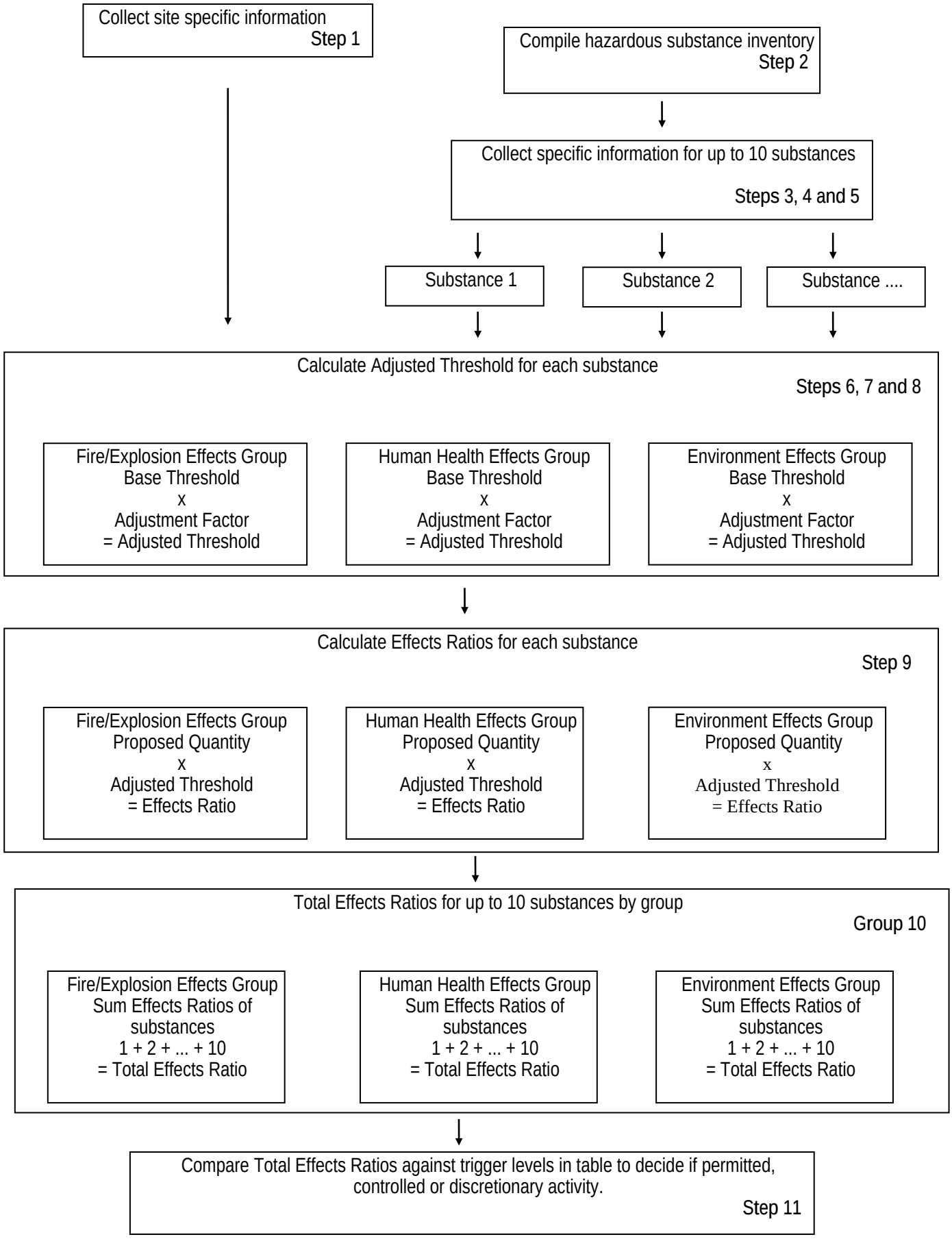
4.13 The tools available to regulatory bodies for controlling hazardous facilities are as follows:

a) location controls such as zoning determine generally where they may locate

b) management and design controls such as performance standards or rules control how they go about their activities

c) land use controls imposed by way of a land use resource consent may also be required when the HFSP and Table screen out facilities which require more specific controls.

FIGURE 1 - HAZARDOUS FACILITY SCREENING PROCEDURE - OVERVIEW



5.0 HAZARDOUS FACILITY SCREENING PROCEDURE -

Steps for Calculation Total Effects Ratios

This section is a step-by-step guide on how to calculate the Total Effects ratios, for comparison with the numbers in Clause 5.4. The Council will make available packages of Working Materials, and advise on the procedures, but people using or storing hazardous substances must make their own calculations.

Step 1 - Assemble Site-Specific Information

Site specific information is an essential component of the Adjustment Factors required at Step 7. Any sensitive land uses or environment features on of near the site, that are relevant to the adjustment factors in Figure 3, need to be noted. Use Worksheet 1.

Step 2 - Compile Hazardous Substances Inventory

a) Create a full inventory of hazards substances held on a site, including substances that are only stored or used temporarily such as waste hazardous substances., Worksheet 2. The inventory should list:

   i) the names (including proprietary names and suppliers where necessary)
   ii) UN classification of all the hazardous substances on the site
   iii) quantities

b) The United Nations Recommendations on the Transport of Dangerous Goods (UNRTDG), 8th edition (1993) is the primary source of information on UN classification. See further comment at Steps 4 and 5 about sources of information. The general characteristics of each class are stated in Figure 4.

c) Use the standards units of tonnes (for solids, liquids and liquefied gases) and m3 (for Compressed gases).. It is necessary to express all 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.

d) Conversions of quantities are also necessary where a substance is diluted, or mixed with another substance. Only the percentage of the pure substance in the dilution of mixture is accounted for. For example, it is proposed to store 10 tonnes of substance that has a concentration of 30%, the proposed quantity on Worksheet 2 should be 3 tonnes.

e) An exemption 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. UNRTDG lists a range of pesticide and their dilutions, and their related Packaging Groups in Class 6.1 in terms of a human poison rating.

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

g) Small packaged are 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.

Step 3 - Select "Priority Status" Substances

a) If there are less than 10 hazardous substances used or stored on a site, all are included in the total effects ratio calculation. Where there are more than 10 substances on a site, the 10 substances with the highest individual effects ratios within each effects group make up the Total Effects Ratio. In order to save calculating effects ratios for all substances to identify the 10 highest, a "common sense" approach is recommended, whereby the calculation is first carried out on those substances which:

   i) are highly or extremely dangerous, or
   ii) are held in quantities exceeding 10% of the total stock hazardous substance listed in the inventory (Worksheet 2).

b) It is suggested that all of the steps in this section should be completed in respect of just these substances, before considering any other substances. The effects ratios of these substances by themselves may dictate that a resource consent is required.

Step 4 -Collate Substance Specific Information

a) Assign a hazard level of each Effects Group to the hazardous substances held on the site. This requires the collection of a range of information about the substances, including UN classifications. This information can be extracted from the UN Recommendations on the Transport of Dangerous Goods (UNRTG) 8th edition, Material Safety Data Sheets, national and international databases, text and reference books. The Council has available a list of other reference sources, if required, and relevant information for some commonly used hazardous substances.

b) Worksheet 3 has been designed to help with the task of recording the information required to classify substances into Effects Groups and hazard levels. Where data on hazardous substances can only be found in units other than those required on Worksheet 3, appropriate conversions need to be carried out.

c) Where the necessary information to carry out this step is not readily available form public information sources, a precautionary approach should be taken, and the substance should be assigned a medium hazard level for the Fire/Explosion and Human Health Effects Group, and a high level for the Environmental Effects Group.

These default hazard levels are adopted because:

i) in general, assessment of hazardous substances focused 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 substance where this information is not readily available

ii) 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

Step 5 - Identify Effects Groups and Hazard Levels

The effects of substances are categorised into three groups:

i) Fire/Explosion Effects -concerned with damage to property, the built environment and safety of people
ii) Human Health Effects - concerned with the well-being, health and safety of people
iii) Environmental Effects - concerned with damage to ecosystems and natural resources

Each Effects Group is divided into four hazard levels:

i) extreme
ii) high
iii) medium
iv) low

b) 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 United Nations Recommendations on the Transport of Dangerous Goods (UNRTDG), 8th edition, and the classification proposed by the Organisation for Economic Cooperation and Development (OECD) for health and environmental effects. (United Nations, 1993. Recommendations on the Transport of Dangerous Goods, Eighth Revised Edition. New York, United Nations. European Community, 1993. Official Journal of the European Community, No. L110A/68.)

The following point should be noted:

i) the above classification systems are inadequate for assigning Effects Group hazard levels to certain hazardous substances (Class 6.1), toxic gassed (Class 2.3) and environmentally toxic substances (Ecotoxic Class)

ii) the classification of these substances in Classes 6.1, 2.3, and Ecotoxic has been refined to account for extremely hazardous substances. This has been done by creating an additional "extreme" hazard level, which is not part of the UN Classification system, (see Figures 2 and 4).

iii) environmentally damaging substances have been placed into the "Ecotoxic" class. (see Figure 4) Foodstuffs such as milk are an example of an environmentally damaging substance

iv) 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:

- a medium explosion effect
- an extreme human health effect, and
- a high environmental effect

c) Hazardous substance (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 Figure 4, which lists UN Classes, Packaging Groups and other relevant information.

d) 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.

e) The classification of substances or assignment of hazard levels, 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. 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.

f) 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 Worksheet 4.

Step 6 - Find Base Threshold Quantities

a) 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 in Step 7 below). Base Thresholds (B) corresponding to hazard levels in each Effects Group are listed in table. There are only 18 possible values of B, as given in Figure 2.

b) 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:

i) 100 tonnes of combustible liquid, which has a low hazard level in the Fire/Explosion Effects Group

ii) 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

c) The Base Thresholds for each substance used or stored on the site are found in Figure 2 and recorded in the column marked "Step 6" on the "Summary Sheet for Manual HFSP Calculation" in Worksheet 4.

Step 7 - Find Adjustment Factors

a) Figure 3 lists the pre-calibrated Adjustment Factors to be used for each Effects Group. Pre-calibrated Adjustment Factors (FF, FH and FE) are used to adjust 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. Adjustment Factors differ for each of the Effects Groups, and take into account the following considerations:

i) the physical state of the substance

ii) the pressure and temperature required for storage and usage

iii) the type of storage

iv) the type of activity to use

iv) separation distances to the site boundary

v) the environmental sensitivity of the site location

b) 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.

c) All Adjustment Factors within each Effects Group are applied to all substances. The Adjustment Factors are multiplied to generate one combined Adjustment Factor (FF, FH or FE) for each Effects Group, which is used in Step 8. The Adjustment Factors for each substance are recorded in the column marked "Step 7" on the "Summary Sheet for Manual HFSP Calculation" in Worksheet 4.

Step 8 - Calculate Adjusted Threshold Quantities

a) 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:

i) T = B x FF provides the Adjusted Threshold for a substance in the Fire/Explosion Effects Group
ii) T = B x FH provides the Adjusted Threshold for a substance in the Human Health Effects Group
iii) T = B x FE provides the Adjusted Threshold for a substance in the Environmental Effects Group

b) 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 Worksheet 4.

Step 9 - Calculate Effects Ratios For Each Substance

a) The Effects Ratio ® is a dimension number. It is calculated for each substance as follows:

i) R = Q/T

Where:

i) R is the effects ratio for one substance in one effects group
ii) Q is the proposed quantity of the substance to be used or stored on the site
iii) T is the adjusted threshold for the relevant effects group calculated at step 8

b) The Effects Ratio ® for each substance and effects group is recorded in the column marked "Step 9" on the "Summary Sheet for Manuka HFSP Calculations" in Worksheet 4.

Step 10 - Sum the Effects Rations to Find the Total Effects Ratio for Each Effects Group

a) Add the effects Ratios ® for each substance (up to 10 substance) within each Effects Group together, to produce the Total Effects Ratio for each effects group for all hazardous substances on a site. Use Worksheet 5.

b) The Total Effects Ratio represents the aggregate effects presented by multiple substances held on the same site. It makes it possible to assess the cumulative potential effects of several substances present on the same site within each effects group.

Step 11 Determine Consent Status Against Clause 2

a) The Total Effects Ratio within each Effects Group (from Step 10) determines whether or not resource consent is required for the proposed activity. The figure from, Step 10 is compared with the Total Effects Ratios in Clause 2.

b) The Effects ratio figures stated in Clause 5.4 apply to all Effects Groups; that is, the maximum level is the same for all effects groups. The highest Total Effects Ratio in any of the three Effects Groups determines whether the activity is permitted or discretionary.

c) For example, in the Residential Zones, the level for a permitted activity is 0.02. Everything above that level is a discretionary activity. Assume a particular activity produced the following Total Effects Ratio figures at Step 10:

i) Fire/Explosion Effects Group - 0.01
ii) Human Health Effects Group - 0.01
iii) Environmental Effects Group - 0.5

d) In this example, a resource consent application would be required for a discretionary activity, because the effects ratio for the Environment Effects Group is exceeded.

FIGURE 2 - BASE THRESHOLDS (B) FOR ALL EFFECTS GROUPS AND HAZARD LEVELS

Fire/Explosion Effects Group					
		Hazard Levels			
UN Class	Hazard	Low	Medium	High	Extreme
Sub-Category : Flammables					
	LPG		LPG		
2	Gases			2.1 (exclude LPG)	
3	Flammable Liquids	Combustible Liquids	3 PGIII	3 PGI 3PGII	
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 Group					
		Hazard Levels			
UN Class	Hazard	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 Group					
		Hazard Levels			
UN Class	Hazard	Low	Medium	High	Extreme
3	Flammable Liquids		3C		
8	Corrosives			8 PGI 8 PGII 8 PGIII	
	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

* Base Threshold in m^3 at 101.3 kPA and 20°C for permanent or compressed gases.

FIGURE 3 - 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 from	F1: Substance from
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	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	Normal = 1 Adjacent to a waterbody or coastal water[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] Within 50 metres of a waterbody. This includes streams, springs, lakes, wetlands, seas 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.

FIGURE 4 - 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 :	Fire/Explosion	Medium
			i) give rise to considerable radiant heat, or		
			ii) burn one after another, producing minor blast and/or projection effects		
		1.4, 1.5, 1.6	Not applicable.		

UN Class	Hazard	Division	Description	Effects Group	Hazard Level
2	Gases	LPG	LPG	Fire/Explosion	Medium
		2.1	Flammable gases: gases which at 20°C and a standard pressure of 101.3 kPA: i) are ignitable when in a mixture of 13% or less by volume with air, or ii) 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 post a hazard to health. This division is divided into the following categories:		

			a) Inhalation toxicity vapours LC_{50}: < 200 ppm (= ml/m³)	Human Health	Extreme
			b) Inhalation toxicity vapours LC_{50}: ≥ 200 ppm - 5,000 ppm (= ml/m³)	Human Health	High

UN Class	Hazard	Division	Description	Effects Group	Hazard Level
3	Flammable Liquids		Flammable liquids comprising liquids, mixtures of liquids, or liquids containing solids in suspension which given 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: ≥ 23°C; ≤ 60.5°C Initial boiling point: > 35°C	Fire/Explosion	Medium
		Combustible Liquids	Flash point: > 60.5°C	Fire Explosion	Low
				Environment	Medium

UN Class	Hazard	Division	Description	Effects Group	Hazard Level
4	Flammable Solids	4.1	i) Flammable solids that are readily combustible or may cause fire easily through an ignition source or friction. ii) Self-reacting substances that a re thermally unstable and are liable to undergo a strongly exothermic decomposition even without the participation of oxygen. iii) 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: i) pyrophoric substances: liquid or solid substances which, even in small quantities, ignite within 5 minutes of coming in contact with air	Fire/Explosion	Extreme

			ii) self-heating substances: solid substances which generate heat when in contact with air without additional energy supply.		
		4.3	Substances, which in contact with water, become spontaneously flammable, or emit flammable gases.	Fire/Explosion	Extreme

UN Class	Hazard	Division	Description	Effects Group	Hazard Level
5	Oxidising substances and	5.1	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: i) be liable to explosive decomposition ii) burn rapidly iii) be sensitive to impact or friction iv) 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	Human Health	Extreme
			b) Oral toxicity LD_{50} (mg/kg): > 1 - 5 Dermal toxicity L_{50} (mg/kg): > 10 - 40 Inhalation toxicity dust/mist LC_{50} (mg/l): ≤ 0.5	Human Health	High
		6.1 PGII	Oral toxicity LD_{50} (mg/kg): > 5 - 50 Dermal toxicity LD_{50} (mg/kg): > 40 - 200 Inhalation toxicity LD_{50} (mg/kg): > 0.5 - 2	Human Health	Medium
		6.1 PGIII	Oral toxicity LD_{50} (mg/kg): > 50 - 500 (liquids) > 50 - 200 (solids) Dermal toxicity LD_{50} (mg/kg): > 200 - 1,000 Inhalation toxicity dust/mist LC_{50} (mg/l): > 2 -10	Human Health	Low

			Carcinogen	Human Health	High
		6.2	Not applicable		

KEY : EC_{50} means the effective toxicant concentration resulting in a 50% response of a given parameter (for example, reproduction rate, mobility) in a given period.
LC_{50} means the lethal concentration of a substance at which 50% of the test organisms die in a given period.
LD_{50} means the lethal dose of a substance at which 50% of the test organisms die in a given period.

UN Class	Hazard	Division	Description	Effects Group	Hazard Level
8	Corrosives		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).		
		8 PGI	Very dangerous substances and preparations	Human Health	Medium
				Environment	High
		8 PGII	Substances and preparations presenting medium hazard.	Human Health	Medium
				Environment	High
		8 PGIII	Substances and preparations presenting minor hazards.	Environment	High

UN Class	Hazard	Division	Description	Effects Group	Hazard Level
	Ecotoxic	Group 1*	Ecotoxic substances: any substance exhibiting a toxic effect ton 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): ≥ 0.1 - 1.0 48 hr EC_{50} daphnia (mg/l): ≥ 0.1 - 1.0 72 hr EC_{50} algae (mg/l): ≥ 0.1 - 1.0	Environment	High
			c) 96 hr LC_{50} salmonid fish (mg/l): ≥ 1.0 - 10.0 48 hr EC_{50} daphnia (mg/l): ≥ 1.0 - 10.0 72 hr EC_{50} algae (mg/l): ≥ 1.0 - 10.0	Environment	Medium
			d) 96 hr LC_{50} salmonid fish (mg/l): ≥ 10.0 - 100.0 48 hr EC_{50} daphnia (mg/l): ≥ 10.0 - 100.0 72 hr EC_{50} algae (mg/l): ≥ 10.0 - 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) BOD5 (mg/l): > 10,000	Environment	Medium
			d) BOD5 (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 1 - III) have a high Environmental Effects hazard level.	Environment	High

KEY : see previous pages. * Group 1 and 2 and (a), (b) etc in this context refer to divisions of the Ecotoxic category. (Also used in Table 20F.1)

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 20 metres of a waterbody [2] or coastal water	

Sketch map of site (show adjoining land uses and location of waterbodies).

1 Groundwater reservoir/aquifer as identified by the regional council.

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

WORKSHEET 2 - HAZARDOUS SUBSTANCES INVENTORY SHEET

Facility Name : _____

Address : _____

Date : _____

Substance Name	Substance Form	Conc. [1] (%)	Specific Gravity	Proposed Quantity (in known units)	Proposed Quantity (converted to tonnes or m^3)[2]	UN No.	UN Class	Storage or Use	Type and Number of Storage Containers[3]	Location of Storage Containers	Distance from Site Boundary (m)

1 Concentration
2 Convert to tonnes for solids, liquids and powders, and to m^3 for gases.
3 Identify type of container (eg drums, bulk storage), typical size (eg 209 litre drum) and number of containers

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, UNRTDG)	
UN Number	
UN Primary Class	
UN Subsidiary Class	
Packaging Group(s)	

3 ADDITIONAL INFORMATION REQUIREMENTS			DATA SOURCE
Physical	Initial boiling point (°C)		
Parameters	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] (yes/no)		
Ecotoxicity Data[3]	LC_{50} (Salmonid fish)(mg/l)		
	EC_{50} (Daphnia (mg/l)		
	EC_{50} (Algae) (mg/l)		
	BOD_5 (mg/kg)		
	Pesticide (yes/no)		
Other			

4 ASSESSMENT (Extract from information in categories 2 and 3 above and Attachment 20B)

Hazard	UN Class	Division/ Packaging Group	Does hazardous property apply?	Effects Groups and Hazard Level[4]		
			(yes/no)	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 Materials	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 LC50 and EC50 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 levels.

WORKSHEET 4 - SUMMARY SHEET FOR MANUAL HFSP CALCULATION

	Step 4		Step 6	Step 7					Step 8		Step 9
Substance	Effects Group	Hazard Level	Base Threshold	Adjustment Factors				Product of Adjustment Factors	Adjusted Threshold	Proposed Quantity	Effects Ratio R = Q/T
			B (t/m^3)	F1	F2	F3	F4	FF, FH, FE	T (t/m^3)	Q (t/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

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

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.