Appendix 12: Hazardous Facilities

12-1 Hazardous Facilities Screening Procedure

12-1.1 Background

The Hazardous Facilities Screening Procedure (HFSP) is used to determine the activity status of hazardous facilities in the City. There may be additional controls that apply to the activity within the District Plan. The HFSP is applied to new hazardous facilities, in accordance with Volume 1, Rules 25.4.3 (a), (b) and (c) and Rule 25.4.5.1. The HFSP should also be applied to existing facilities if there is significant change to the character, intensity and scale of effects (i.e. where 'existing use rights' provided for under the Act cease to apply).

12-1.2 Terminology

The HFSP uses a number of terms. Key terms are listed and explained below.

Term	Explanation
Hazard Rating	The level of hazard (high, medium or low) applied to a hazardous substance for the purpose of an HFSP calculation, based on its Hazardous Substances and New Organisms Act 1996 (HSNO) and regulations classification
Proposed Quantity (P)	The quantity of hazardous substances proposed to be used or stored on site
Base Quantity (B)	Pre-calibrated quantity of a hazardous substance that is deemed to be acceptable on a heavy industrial site without causing any significant off-site effects
Adjustment Factor	Pre-calibrated factors that take into account substance, storage and site-specific circumstances
Adjusted Quantity (A)	Equivalent to the Base Quantity that has been adjusted using Adjustment Factors
Effect Type	Three Effect Types are used by the HFSP: • Fire/explosion • Effects on human health • Effects on the environment
Quantity Ratio (Q)	The ratio of the proposed quantity of a substance over the applicable Base Quantity
Consent Status Index	Numerical values in the District Plan that are used to determine the consent status of a facility

Note

1. Other technical terms relating to hazardous facilities and the HFSP are contained in the glossary of "Land-Use Planning Guide for Hazardous Facilities" by the Hazardous Facilities Screening Procedure Review Group in conjunction with the Ministry for the Environment, February 2002.

2. Hazardous facilities and hazardous substances are specifically defined in Appendix 1.7: District Plan Administration – Definitions.

12-1.3 Overview

The HFSP is a method to determine the activity status of hazardous facilities. The method is based on a formula used to measure environmental effects of hazardous substances proposed to be stored or used on a site, taking into account their quantities, characteristics, location, type of activity and local environmental conditions. This procedure is carried out for three defined Effect Types.

i. Fire/explosion.
ii. Human health.
iii. Environment.

The HFSP compares proposed quantities of hazardous substances with maximum allowable quantities (Adjusted Quantities) which depend on the type of substances, how they are used and stored, and the location of the facility.

A Quantity Ratio is calculated by dividing the proposed quantity of each hazardous substance with the Adjusted Quantity. The Quantity Ratios of individual substances are added up for each of the Effect Types.

Cumulative Quantity Ratios are then compared with defined limits, called Consent Status Indices which are listed in Volume 1, Rule 25.4.5.1. If any of the Quantity Ratios exceed the specified Consent Status Indices, the hazardous facility in question requires resource consent.

Information needs to be assembled at the outset about the hazards of the substances concerned. This includes site layout and location, and types of activities, as well as the sensitivity of the surrounding environment. In most cases, only a limited number of substances will need to be assessed to determine the resource consent status of an activity. This applies in particular if one, two or three substances are either very hazardous or stored or used in large quantities.

A limitation of the HFSP is that it does not include (and therefore only allows for the control of) some substances classified under Hazardous Substances and New Organisms Act 1996 (HSNO) as Toxic (Class 6), Corrosive (Class 8) and Eco-toxic (Class 9). Some substances have multiple classifications. While a particular classification might not be included within the HFSP that substance may be captured by another classification (e.g. Corrosive Class 8.1 and 8.3 are not included but those substances may also fall under Class 8.2).

12-1.4 Rating Hazardous Substances for the HFSP

To be able to assess hazardous substances under the HFSP, they must be rated first. These rating criteria are based on the classification system specified by regulations under HSNO and are summarised in Table 12-1c.

For the purposes of the HFSP, each substance is rated based on three Effect Types.

i. Fire/Explosion Effects: concerned with damage to property, the built environment and safety of people.
ii. Human Health Effects: concerned with the wellbeing, health and safety of people.

iii. Environmental Effects: concerned with damage to ecosystems and natural resources.

Each Effect Type is divided into a maximum of three hazard ratings:

- High
- Medium
- Low

The rating of a hazardous substance for the HFSP requires each substance to be assessed in terms of every hazard category listed in Table 12-1c. Hazard ratings may be obtained as follows.

a) Some commonly used hazardous substances in New Zealand have already been assessed and pre-rated for the HFSP. This information is available from the Council or from the Ministry for the Environment website.

b) All legal hazardous substances are classified using HSNO classification criteria. This enables these substances to be easily rated for the HFSP based on Table 12-1c. Information on the classification of hazardous substances under HSNO is available from EPA (the Environmental Protection Authority) and accessible through its website.

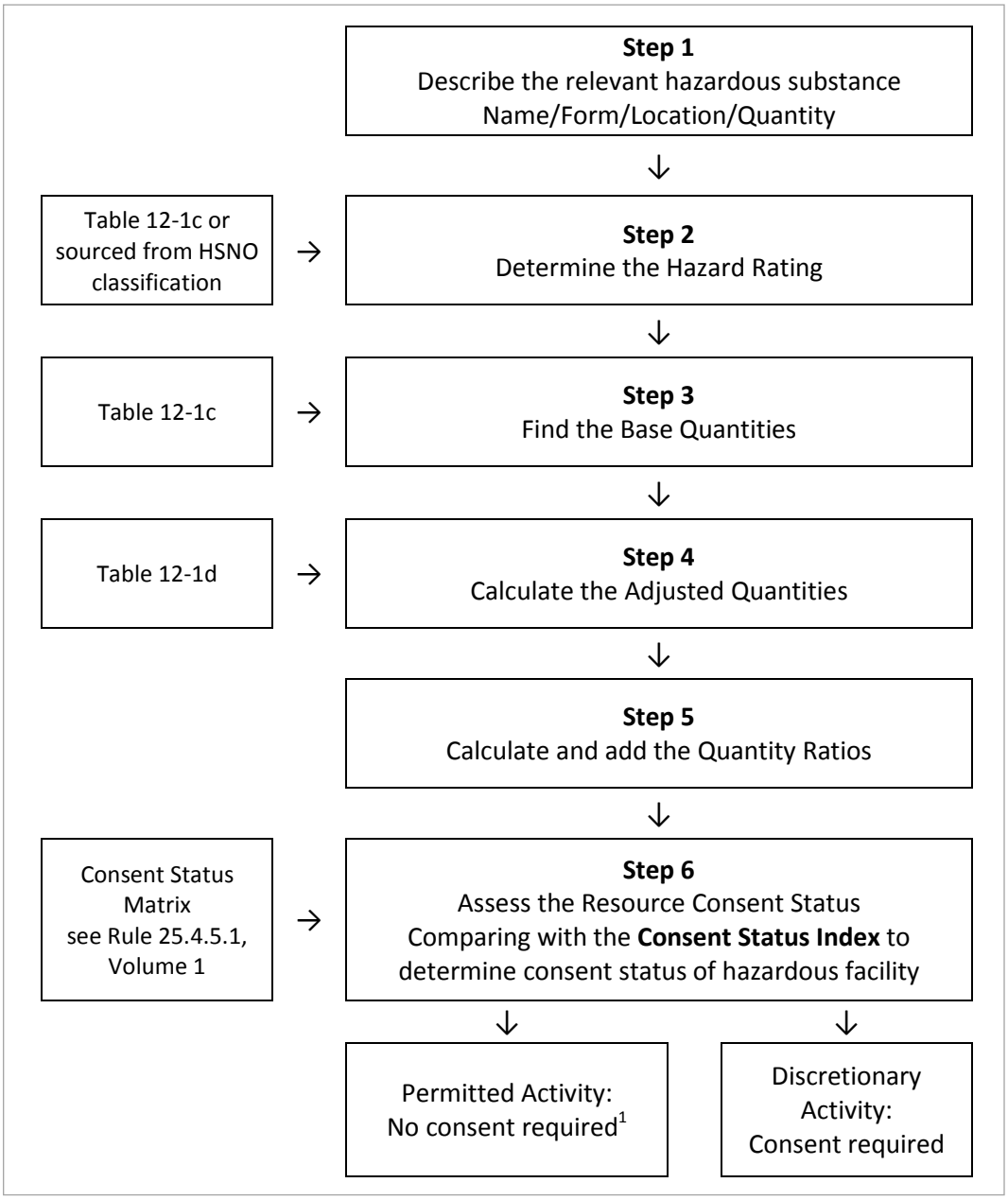
12-1.5 Step-by-Step Guide to the HFSP

This section provides a step-by-step guide on how to use the HFSP. Figure 12-1a provides an overview of the process and Table 12-1b provides a detailed step by step process and examples for completing the HFSP.

Note

1. Before doing any calculations please check that the HFSP substance ratings and technical data are up to date by checking:
   - The Ministry for the Environment's website: www.mfe.govt.nz
   - The Environmental Protection Agency's website: www.epa.govt.nz
2. An electronic copy of a HFSP calculation spreadsheet is also available from the Ministry for the Environment's website.
3. A spreadsheet for manual calculations is available from Council's website: www.hamilton.co.nz

Figure 12-1a: Overview of the HFSP Procedure



[1] Compliance with minimum performance standards in the District Plan is always required.

Table 12-1b: HFSP – Step-by-Step Guide

<table>
<tr><th>Steps</th><th colspan="4">HFSP calculations</th></tr>
<tr><td rowspan="4">1) Describe the hazardous facility
Before using the HFSP, it is necessary to compile a full description of the facility in question. This includes the creation of an inventory of hazardous substances held on site, including:
• Names of the substances
• Quantities of the substances
• The physical form of the substances at 20°C and 101.3 kPa
• The location of use or storage on the site, including separation distances from the site boundary and neighbouring hazardous facilities (on-site and off-site)
The description should also include site-specific details, including neighbouring land uses and the surrounding environment, with a focus on sensitive land uses and receptors (e.g. retirement accommodation, aquifers or wetlands).</td><td>Substance name</td><td>Substance form</td><td>Location of substances on site</td><td>Proposed quantity (P)</td></tr>
<tr><td>Substance 1
Substance 2
...
Substance 10</td><td>(liquid, solid, or gas)</td><td></td><td>(tonnes or m³)</td></tr>
<tr><td colspan="4">Example</td></tr>
<tr><td>Petrol</td><td>Liquid</td><td><30 m from the site boundary</td><td>50t</td></tr>
<tr><td colspan="5">Explanation</td></tr>
<tr><td colspan="5">The HFSP uses standard units of tonnes (t) for solids, liquids and liquefied gases and cubic metres (m³) for compressed gases. In some cases, it may be necessary to convert substance quantities to these units. In the case of liquids, specific gravity (or density) must be taken into consideration when converting litres or m³ to tonnes, i.e. (volume of liquid (in litres) x specific gravity)/1000 = tonnes.
Adjustments to quantities are also necessary where a substance is diluted with water or mixed with another substance. In this instance, only the percentage quantity of the hazardous substance or product in the dilution or mixture is assessed for the purposes of HFSP calculations (unless a mixture is more hazardous than its components, in which case data on the mixture needs to be used).
An exception to this are products or brands that already constitute dilutions or mixtures of hazardous substances and which have been classified in terms of their hazardous properties as the "whole" dilution or mixture for life-cycle management purposes. Examples are corrosives, oxidising substances and pesticides, which are often sold commercially as standard solutions or strengths. In these cases, quantity adjustments are applied only when these commercially supplied concentrations are further diluted or mixed.</td></tr>
</table>

<table>
<tr><th>Steps</th><th colspan="4">HFSP calculations</th></tr>
<tr><td rowspan="4">2) Determine hazard rating
For the purposes of the HFSP, the effects of substances are categorised into three Effect Types.
i. Fire/Explosion Effect Type: Addressing damage to the built environment and safety of people.
ii. Human Health Effect Type: Addressing adverse effects on the wellbeing, health and safety of people.
iii. Environmental Effect Type: Addressing adverse effects on ecosystems and natural resources.
Each Effect Type is divided into three Hazard Rating Levels:
• High
• Medium
• Low
The rating levels are based predominantly on the HSNO classification system.</td><td rowspan="2">Substance name</td><td colspan="3">Hazard rating</td></tr>
<tr><td>Fire/ explosion</td><td>Human health</td><td>Environment</td></tr>
<tr><td>Substance 1
Substance 2
...
Substance 10</td><td>High,
Medium,
or
Low</td><td>High,
Medium,
or
Low</td><td>High,
Medium,
or
Low</td></tr>
<tr><td colspan="4">Example</td></tr>
<tr><td>Petrol</td><td>High</td><td>Low</td><td>Medium</td></tr>
</table>

Explanation

The HFSP rates hazardous substances in terms of each of the three Effect Types as having a high, medium or low hazard. The Hazard Rating of a substance is derived from:

i. The list of HFSP-rated hazardous substances in Appendix B[1].

ii. The HSNO classifications. Once a substance has been classified under HSNO, Hazard Ratings can be assigned for each Effect Type as shown in Table 12-1c.

[1] Refers to Appendix B Hazardous Substance Hazard Ratings of the "Land-Use Planning Guide for Hazardous Facilities" by the Hazardous Facilities Screening Procedure Review Group in conjunction with the Ministry for the Environment, February 2002.

Steps	HFSP calculations			
3) Find base quantities The Base Quantity (B) is pre-calibrated. 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 (refer Step 4). Base Quantities for different hazardous properties and hazard ratings in each Effect Type are listed in Table 12-1c.	**Substance name**	**Base quantities (B)**		
		Fire/ explosion	**Human health**	**Environment**
	Substance 1	B_1	B_1	B_1
	Substance 2	B_2	B_2	B_2
	...	....	....	....
	Substance 10	B_{10}	B_{10}	B_{10}
	Example			
	Petrol	*10 t*	*30 t*	*30 t*

Explanation

For example, in the Fire/Explosion Effect Type (Sub-category Flammables), non-significant off-site effects in a heavy industrial area are represented by a Base Quantity of:

- *100 tonnes of a HSNO Category D flammable liquid which has a low hazard level for the Fire/Explosion Effect Type.*
- *30 tonnes of a HSNO Category C flammable liquid which has a medium hazard level for the Fire/Explosion Effect Type.*

Steps	HFSP calculations			
4) Calculate Adjusted Quantity (A) The pre-calibrated Adjustment Factors (FF, HF, EF) are multiplied with the Base Quantities (B) to account for substance properties and site-specific environmental circumstances. This multiplication yields the Adjusted Quantity (A). Adjustment Factors differ for each of the Effect Types, and take into account: i. The physical state of the substance. ii. The type of storage. iii. The type of activity or use. iv. Separation distances to the site boundary. v. The environmental sensitivity of the site location. The Adjustment Factors are listed in Table 12-1d.	**Substance name**	**Adjusted quantities (A)**		
		Fire/ explosion	**Human health**	**Environment**
	Substance 1	A_1	A_1	A_1
	Substance 2	A_2	A_2	A_2
	...	....	....	....
	Substance 10	A_{10}	A_{10}	A_{10}
	Example			
	Petrol	*100 t* *(10 tonnes x 10)*	*300 t* *(30 tonnes x 10)*	*90 t* *(30 tonnes x 3)*

Explanation
Different Adjustment Factors are applied for each Effect Type. For example, for the Fire/Explosion Effect Type, the temperature is relevant, while for the Human Health Effect Type, proximity to a potable water resource is important. *In some instances, more than one Adjustment Factor within each Effect Type must be applied. When this is the case, they need to be multiplied with each other to yield the total Adjustment Factor for the Effect Type.* *When the Adjustment Factors for each Effect Type have been calculated, they in turn are multiplied with the Base Quantity to yield the Adjusted Quantity.* *In the example given, the following parameters have been assumed.* *i. <30m to site boundary.* *ii. Not adjacent to water body.* *iii. Underground storage.*

Steps	HFSP calculations			
5) Calculate and add Quantity Ratios (FQ, HQ, EQ) This step requires the calculation of the Quantity Ratio for each hazardous substance in question. It is obtained by dividing the quantity of a substance that is proposed to be used or stored on a site, i.e. the Proposed Quantity (P) by the Adjusted Quantity (A). If several hazardous substances are used or stored on a site, the Quantity Ratios calculated for each of these substances are added up for each Effect Type. Note that FQ/HQ/EQ Total stands for the total sum of Quantity Ratio values from all assessed hazardous substances, within each Effect Type.	**Substance name**	**Quantity ratios (FQ, HQ, EQ)**		
		Fire/ explosion	**Human health**	**Environment**
	Substance 1	FQ_1	FQ_1	FQ_1
	Substance 2	FQ_2	FQ_2	FQ_2
	...	....	....	....
	Substance 10	FQ_{10}	FQ_{10}	FQ_{10}
		FQ_{Total}	HQ_{Total}	EQ_{Total}
	Example			
	Petrol	*0.50* *(50 tonnes / 100 tonnes)*	*0.1667* *(50 tonnes / 300 tonnes)*	*0.5556* *(50 tonnes / 90 tonnes)*

Explanation
By using the dimensionless ratio of the Proposed Quantity of a hazardous substance over the Adjusted Quantity, 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.

<table>
<tr><th>Steps</th><th colspan="4">HFSP calculations</th></tr>
<tr><td rowspan="5">6) Assess resource consent status of hazardous facility
When determining the resource consent status of a particular hazardous facility, the added Quantity Ratios for each Effect Type are compared with relevant Consent Status Indices in the Consent Status Matrix in Volume 1, Rule 25.4.5.1. If they are exceeded then Discretionary resource consent is required.</td><td rowspan="2">Substance name</td><td colspan="3">Does quantity ratio exceed consent status index?</td></tr>
<tr><td>Fire/ explosion</td><td>Human health</td><td>Environment</td></tr>
<tr><td>Substance 1
Substance 2
...
Substance 10</td><td>Yes/ No</td><td>Yes/ No</td><td>Yes/ No</td></tr>
<tr><td colspan="4">Example
In a typical industrial zone</td></tr>
<tr><td>Petrol</td><td>No</td><td>No</td><td>No</td></tr>
<tr><td colspan="5">Explanation</td></tr>
<tr><td colspan="5">When examining total Quantity Ratios against applicable Consent Status Indices, one or several substances may trigger a resource consent. This highlights the fact that when determining an activity status for hazardous facilities using the HFSP, it is often sufficient to assess just a few hazardous substances to start with, mainly those that are either highly hazardous or are present in large quantities.</td></tr>
</table>

Table 12-1c: Base Quantities (B) for all Effect Types and Hazard Ratings[1]

HSNO category	UN class equivalent	Hazard rating	Unit tonnes or m^3	Base quantity (B)		
				Effect type		
				Fire/ explosion	Human health	Environment
Explosive substances						
1.1	1.1	High	Tonnes	0.1	-	-
1.2	1.2	Medium	Tonnes	1	-	-
1.3	1.3	Low	Tonnes	3	-	-
1.5	1.5	Low	Tonnes	3	-	-
Flammable gases						
2.1.1A	2.1	High	m^3 tonnes	10,000[2] 10	-	-
2.1.2A	2.1	High	m^3 tonnes	10,000[2] 10	-	-
	LPG	Medium	tonnes	30	-	-
Flammable liquids						
3.1A	3PGI	High	tonnes	10	-	-
3.1B	3PGII	High	tonnes	10	-	-
3.1C	3PGIII	Medium	tonnes	30	-	-
3.1D	Combustible liquids	Low	tonnes	100	-	-
Liquid desensitised explosives						
3.2A	3PGI	High	tonnes	1	-	-
3.2B	3PGII					
3.2C	3PGIII					
Flammable solids						
4.1.1A	4.1(a) PGII	Medium	tonnes	10	-	-
4.1.1B	4.1(a) PGIII	Low	tonnes	30		
4.1.2 A 4.1.2 B	4.1 (b) PGII	High	tonnes	1		
4.1.2 C 4.1.2 D	4.1 (b) PGII	Medium	tonnes	10		
4.1.2 E 4.1.2 F 4.1.2 G	4.1 (b) PGII	Low	tonnes	30		
4.1.3 A	4.1 (c) PGI	High	tonnes	1		
4.1.3 B	4.1 (c) PGII	High	tonnes	1		

HSNO category	UN class equivalent	Hazard rating	Unit tonnes or m^3	Base quantity (B)		
				Effect type		
				Fire/ explosion	Human health	Environment
4.1.3 C	4.1 (c) PGIII	High	tonnes	1		
4.2 A	4.2 PGI	High	tonnes	1		
4.2 B	4.2 PGII	High	tonnes	1		
4.2 C	4.2 PGIII	Medium	tonnes	10		
4.3 A	4.3 PGI	High	tonnes	1		
4.3 B	4.3 PGII	High	tonnes	1		
4.3 C	4.3 PGIII	Medium	tonnes	10		
Oxidising substances						
5.1.1 A	5.1 PGI	High	tonnes	1		
5.1.1 B	5.1 PGII	High	tonnes	1		
5.1.1 C	5.1 PGIII	Medium	tonnes	10		
5.1.2 A	2.2	High	m^3 tonnes	10,000 10		
5.2A	5.2	High	tonnes	1		
5.2B	Types A and B					
5.2C	5.2	Medium	tonnes	10		
5.2D	Types C and D					
5.2 E 5.2 F 5.2 G	5.2 Types E, F and G	Low	tonnes	30		
Toxic substances						
6.1A	6.1 PGI 2.3	High	tonnes m^3	-	1 50	-
6.1B	6.1 PGII 2.3	High	tonnes m^3	-	1 50	-
6.1C	6.1 PGIII 2.3	Medium	tonnes m^3	-	10 150	-
6.1D	Standard poison	Low	tonnes m^3	-	30 500	-
Corrosive substances						
8.2A	8 PGI	High	tonnes	-	1	-
8.2B	8 PGII	Medium	tonnes	-	10	-
8.2C	8 PGIII	Low	tonnes	-	30	-

HSNO category	UN class equivalent	Hazard rating	Unit tonnes or m^3	Base quantity (B)		
				Effect type		
				Fire/ explosion	Human health	Environment
Ecotoxic substances						
9.1A	GHS	High	tonnes	-	-	3
9.1B	GHS	Medium	tonnes	-	-	30
9.1C	GHS	Low	tonnes	-	-	100
9.1D	GHS	Low	tonnes	-	-	100

[1] The full description of hazardous substance classes, sub-classes and categories, as well as explanations of terms, is contained in the regulations under the Hazardous Substances and New Organisms Act 1996.
Further details on their use may also be found in the Environmental Protection Authority "User Guide to the Thresholds and Classifications under the Hazardous Substances and New Organisms Act 1996" (Version 2, March 2008).
It is important to note that:

- Hazardous substance classes and categories do not always correspond exactly with the United Nations Classification. The list provided above should only be used for HFSP purposes.
- A number of hazardous substance classes or sub-classes do not have a HFSP rating in the land-use planning context, as the potential for off-site effect of these substances is low.
- Where there is an inconsistency between the content of Table 12-1c and HSNO or its Regulations then HSNO and its Regulations should prevail.

[2] Base threshold in m^3 at 101.3 kPA and 20^{o}C for permanent or compressed gases.

Table 12-1d: Adjustment Factors for All Effect Types

Fire/explosion	Human health	Environment
FF1: Substance form	***FH1: Substance form***	***FE1: Substance form***
Solid = 1 Liquid, powder = 1 Gas (101.3kPA & 20°C) = 0.1	Solid = 3 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
FF2: Separation distance from site boundary	***FH2: Separation distance from site boundary*** *(gases only)*	***FE2: Environmental sensitivity***
< 30 m = 1 > 30 m = 3	< 30 m = 1 > 30 m = 3	Normal = 1 Adjacent to water resource[1] = 0.3
FF3: Type of activity	***FH3: Type of activity***	***FE3: Type of activity***
Use = 0.3 Above ground storage = 1 Underground storage[2] = 10	Use = 0.3 Above ground storage = 1 Underground storage[2] = 10	Use = 0.3 Above ground storage = 1 Underground storage[2] = 3
Final fire/explosion adjustment factor **FF = FF1 x FF2 x FF3**	Final human health adjustment factor **FH = FH1 x FH2 x FH3**	Final environment adjustment factor **FE = FE1 x FE2 x FE3**

[1] Adjacent to water resource: Water resources include aquifers and water supplies, streams, springs, lakes, wetlands, estuaries and the sea, but do not include entry points to the stormwater drainage network.

[2] Underground storage: Applicable to HSNO and UN Class 3 substances (flammable liquids) only.