Appendix 8b – Use, Storage and On Site Movements of Hazardous Substances – Procedures

STEPS	HFSP CALCULATIONS				EXPLANATION
1. Describe the hazardous facility Prior to using the HFSP, it is necessary to compile a full description of the hazardous facility in question. This includes the creation of an inventory of hazardous substances held on the site, including: • Names of the hazardous substances; • Quantities of the hazardous 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 indigenous wetlands).	**Substance Name** Substance 1 Substance 2 … Substance 10	**Substance Form** (liquid, solid, gas)	**Location of substances on site**	**Proposed Quantity (P)** (tonnes or m³)	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 therefore 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 (litres) x specific gravity = tonnes). 1000 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 is 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 of this are corrosives, oxidising substances and pesticides, which are often sold commercially as standard solutions or strengths. In these cases, quantity adjustments are only applied when these commercially supplied concentrations are further diluted or mixed.
	EXAMPLE				
	Petrol	**Liquid**	**<30.0m**	**50 t**	

Appendix 8b – Use, Storage and On Site Movements of Hazardous Substances – Procedures

<table>
<tr><th>STEPS</th><th colspan="4">HFSP CALCULATIONS</th><th>EXPLANATION</th></tr>
<tr>
<td rowspan="2">2. Determine Hazard Rating

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

• Fire/Explosion Effect Type: addressing damage to the built environment and safety of people;

• Human Health Effect Type: addressing adverse effects on the well-being, health and safety of people;

• 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>Substance Name

Substance 1

Substance 2

Substance 10</td>
<td colspan="3">Hazard Rating</td>
<td rowspan="2">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:

1. The list of HFSP-rated hazardous substances in Appendix 8c.

2. The HSNO classification (refer Appendix A). Once a substance has been classified under HSNO, Hazard Ratings can be assigned for each Effect Type, as shown in Appendix A.

3. Where a substance is neither found in Appendix B nor the HSNO databases on the MfE/ERMA websites, default ratings should be used (Fire/Explosion Effect Type: Medium, Human Health Effect Type: Medium and Environment Effect Type: High).</td>
</tr>
<tr>
<td>Fire/ Explosion

High (H)

or

Medium (M)

Or

Low (L)</td>
<td>Human Health

High (H)

or

Medium (M)

Or

Low (L)</td>
<td>Environment

High (H)

or

Medium (M)

Or

Low (L)</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Petrol</td>
<td>High</td>
<td>-</td>
<td>High</td>
<td></td>
</tr>
</table>

Appendix 8b – Use, Storage and On Site Movements of Hazardous Substances – Procedures

STEPS	HFSP CALCULATIONS				EXPLANATION
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 8.1.	**Substance Name**	**Base Quantities (B)**			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.
		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**	**-**	**1 t**	

Appendix 8b – Use, Storage and On Site Movements of Hazardous Substances – Procedures

STEPS	HFSP CALCULATIONS				EXPLANATION
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 the following considerations: • The physical state of the substance; • The type of storage; • The type of activity or use; • Separation distances to the site boundary; • The environmental sensitivity of the site location. The Adjustment Factors are listed in Table 4.	**Substance Name** Substance 1 Substance 2 ……. Substance 10 **Petrol**	**Adjusted Quantities (A)** Fire/ Explosion A_1 A_2 ……. A_{10} **EXAMPLE** **100 t** (10 tonnes x 10)	 Human Health A_1 A_2 ……. A_{10} **-**	 Environment A_1 A_2 ……. A_{10} **3 t** (1 tonne x 3)	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, which then 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: • <30m to site boundary; • Not adjacent to water body; • Underground storage.

Appendix 8b – Use, Storage and On Site Movements of Hazardous Substances – Procedures

STEPS	HFSP CALCULATIONS				EXPLANATION
5. Calculate and add Quantity Ratios (FQ, HQ, EQ) This step requires the calculation of the Quantity Ratio for each hazardous substance in question. The Quantity Ratio is a dimensionless number. 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)**			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.
		Fire/ Explosion	Human Health	Environment	
	Substance 1	FQ_1	HQ_1	EQ_1	
	Substance 2	FQ_2	HQ_2	EQ_2	
	…….	…….	…….	…….	
	Substance 10	FQ_{10}	HQ_{10}	EQ_{10}	
		FQ_{Total}	**HQ_{Total}**	**EQ_{Total}**	
		EXAMPLE			
	Petrol	**0.50** **(50 tonnes / 100 tonnes)**	**-**	**16.67** **(50 tonnes / 3 tonnes)**	

Appendix 8b – Use, Storage and On Site Movements of Hazardous Substances – Procedures

STEPS	HFSP CALCULATIONS				EXPLANATION
6. Assess resource consent status of hazardous facility When assessing 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 Resource Consent Matrix in the District Plan. If they are exceeded, a resource consent is required.	**Substance Name** Substance 1 Substance 2 ……. Substance 10	**Does Quantity Ratio exceed Consent Status Index?** Fire/ Explosion **YES/NO**	 Human Health **YES/NO**	 Environment **YES/NO**	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 assessing hazardous facilities, it is often sufficient to assess just a few hazardous substances to start off with, mainly those that are either highly hazardous or are used/stored in high quantities.
	EXAMPLE				
	In a typical industrial zone: **Petrol**	**NO**		**YES**	

Appendix 8b – Use, Storage and On Site Movements of Hazardous Substances – Procedures

STEPS	HFSP CALCULATIONS				EXPLANATION