

ATTACHMENT F CONTROL AND MONITORING

Attachment F.1 – Treatment, Abatement and Control Systems

There are no emissions from the proposed reclaim plant or other waste activities at the site. All waste gas refrigerants will be contained within the plant (under negative pressure) or within drums/cylinders.

Therefore, there are no treatment, abatement or control systems for emissions required.

It is not proposed to carry out any scheduled monitoring or sampling at the facility as there are no emissions from the proposed activity.

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ATTACHMENT G RESOURCES USE AND ENERGY EFFICIENCY

Attachment G.1 – Raw Materials, Substances, Preparations and Energy

There are no raw materials used in the processing or storing of the waste materials on site.

The reclaim plant equipment, weighing machine and office equipment consume electricity provided from the national grid. The reclaim plant requires three-phase power supply. All other equipment is run on single phase power supply.

There is no water consumed in the reclamation process or in the temporary storage of waste.

The forklift used on site will consume a small volume of diesel which will be supplied from two 20 litre jerry cans which are stored on a spill pallet and are refilled off-site as required. Attached is a typical Material Safety Data Sheet for diesel.

The reclamation process will produce a refrigerant gas product with an equivalent specification grade to that of a virgin gas. The SDSs for R22, R134A, R404A, R407C and R410A are attached.

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1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Commercial Product Name : DERV
 Chemical name of the substance : DERV
 Specific use(s) : Fuel
 Company : Topaz Energy
 Topaz House Beech Hill Clonskeagh
 -Dublin 4, Ireland
 Tel.:+353 1 202 8888
 Fax:+353 1 203 9888
 E-mail:safetydatasheets@topazenergy.ie
 Emergency telephone number : +353 1 808 8232

2. HAZARDS IDENTIFICATION

Classification : The product is classified as dangerous in accordance with Directive 67/548/EEC.



Xn : Harmful



N : Dangerous for the environment

Most important hazards

: R20 - Harmful by inhalation.
 R38 - Irritating to skin.
 R65 - Harmful: may cause lung damage if swallowed.
 R51/53 - Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

CLP-Classification

: The product is classified as dangerous in accordance with Directive 1272/2008/EEC.



Signal word

: Danger

CLP Hazard statements

: H226 - Flammable liquid and vapour.
 H304 - May be fatal if swallowed and enters airways.
 H315 - Causes skin irritation.
 H332 - Harmful if inhaled.
 H411 - Toxic to aquatic life with long lasting effects.

Main symptoms
 Inhalation

: May cause irritation of respiratory tract.
 Effects of breathing high concentrations of vapour may include: headache, nausea, dizziness
 Inhalation of high vapour concentrations can cause CNS-depression and

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	narcosis.
Skin contact	: Irritating to skin. Redness Repeated exposure may cause skin dryness or cracking.
Eye contact	: May cause eye irritation.
Ingestion	: Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea. Smallest quantities reaching the lungs through swallowing or subsequent vomiting may result in lung oedema or pneumonia.
Environmental properties	: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name	Values (%)	CAS no	EC No	EC Index	Symbol(s):	R-phrases(s)
Distillates (petroleum), hydrotreated middle		64742-46-7	265-148-2	649-221-00-X	Xn	R20, R38, R65

Full text of R-phrases: See section 16.

Substance name	Values (%)	CAS no	EC No	EC Index	CLP pictograms	CLP Hazard statements
Distillates (petroleum), hydrotreated middle		64742-46-7	265-148-2	649-221-00-X	GHS08,GHS07,GHS09	H304,H315, H332,H411

Full text of the H-statements: See section 16.

4. FIRST AID MEASURES

First aid measures

Inhalation	: <i>May cause irritation of respiratory tract. - Effects of breathing high concentrations of vapour may include: headache, nausea, dizziness- Inhalation of high vapour concentrations can cause CNS-depression and narcosis.</i> Remove person to fresh air. If signs/symptoms continue, get medical attention. Keep at rest.
Skin contact	: <i>Irritating to skin.- Redness- Repeated exposure may cause skin dryness or cracking.</i> Take off contaminated clothing and shoes immediately. Wash immediately with lots of water (15 minutes)/shower Wash off with soap and water. If a person feels unwell or symptoms of skin irritation appear, consult a physician.
Eye contact	: <i>May cause eye irritation.</i> Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If pain persists, call a physician.
Ingestion	: <i>Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.- Smallest quantities reaching the lungs through swallowing or subsequent vomiting may result in lung oedema or pneumonia.</i>

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Additional advice : Call a physician immediately.
Do NOT induce vomiting.
Rinse mouth.
Drink plenty of water.
: Never give anything by mouth to an unconscious person.
Show this safety data sheet to the doctor in attendance.
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Fire Hazard : Combustible material

Suitable extinguishing media : Dry chemical
Carbon dioxide (CO₂)
Water spray
Foam
Use water spray to cool unopened containers.

Extinguishing media which shall not be used for safety reasons : High volume water jet

Specific hazards : Temperature above flashpoint: higher fire/explosion hazard
Vapours may form explosive mixtures with air.
Burning produces noxious and toxic fumes.
In case of fire hazardous decomposition products may be produced such as:
Carbon oxides
Sulphur oxides

Special protective equipment for fire-fighters : In the event of fire, wear self-contained breathing apparatus.
Wear personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Avoid contact with skin and eyes.
Do not breathe vapours or spray mist.
Wear personal protective equipment.
See also section 8.

Environmental precautions : Prevent product from entering drains.

Methods for cleaning up : Remove all sources of ignition.
Take precautionary measures against static discharges.
Ensure adequate ventilation.
Prevent further leakage or spillage if safe to do so.
Dam up.
Soak up with inert absorbent material.
Sweep up and shovel into suitable containers for disposal.
Collect and dispose of waste product at an authorised disposal facility.
Dispose of in accordance with local regulations.
Local authorities should be advised if significant spillages cannot be contained.

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7. HANDLING AND STORAGE

Storage	: Keep containers tightly closed in a dry, cool and well-ventilated place. Store in original container. Keep in a banded area. Keep away from open flames, hot surfaces and sources of ignition. Do not store near or with any of the incompatible materials listed in section 10. Keep away from food, drink and animal feedingstuffs.
Handling	: Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Ensure all equipment is electrically grounded before beginning transfer operations. Do not use pressure to empty drums. Do not smoke. Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Wear personal protective equipment. See also section 8. Ensure adequate ventilation. When using do not eat or drink. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not burn, or use a cutting torch on, the empty drum.
Packaging material	: metal containers, glass, Plastic jerrican
Specific use(s)	: Fuel

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal protective equipment	
Respiratory protection	: In case of insufficient ventilation wear suitable respiratory equipment. respirator with A filter (type A1/A2/A3 Wear a positive-pressure supplied-air respirator. (in case of higher concentration)
Hand protection	: Protective gloves Nitrile rubber Viton (R) EN374 The selection of specific gloves for a specific application and time of use in a working area, should also take into account other factors on the working space, such as (but not limited to): other chemicals that are possibly used, physical requirements (protection against cutting/drilling, skill, thermal protection), and the instructions/specification of the supplier of gloves.
Eye protection	: Safety glasses with side-shields conforming to EN166 Goggles
Skin and body protection	: Overalls, apron and boots recommended.
Hygiene measures	: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and immediately after handling the product. When using, do not eat, drink or smoke. Remove and wash contaminated clothing before re-use. Keep working clothes separately.
Engineering measures	: Provide sufficient air exchange and/or exhaust in work rooms.
Environmental exposure controls	: Do not flush into surface water or sanitary sewer system.

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Exposure limit(s)

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: liquid
Colour	: red
Odour	: petroleum hydrocarbon odour
pH	: not applicable
Boiling point/boiling range	: 180 - 390 °C
Melting point/range	: no data available
Flash point	: > 61°C
Decomposition temperature	: no data available
Autoignition temperature	: 250 °C
Explosive properties	: LEL 0,5 vol% - UEL 7 vol %
Oxidizing properties	: no data available
Evaporation rate	: no data available
Vapour pressure	: < 1 hPa @ 20°C
Vapour density	: > 1
Water solubility	: insoluble
Viscosity	: 1,5 - 5 mm ² /s @ 40°C
Density	: 0,82 - 0,88 g/cm ³ @ 15°C
Partition coefficient: n-octanol/water	: > 3

10. STABILITY AND REACTIVITY

Stability	: Stable under normal conditions.
Hazardous decomposition products	: No decomposition if stored and applied as directed. Burning produces noxious and toxic fumes. Possible decomposition products are: Carbon oxides Sulphur oxides
Incompatible materials	: Strong acids and oxidizing agents
Conditions to avoid	: Heat, flames and sparks. Exposure to sunlight.

11. TOXICOLOGICAL INFORMATION

General Information

Acute toxicity

Inhalation	: May cause irritation of respiratory tract. Effects of breathing high concentrations of vapour may include: headache, nausea, dizziness Inhalation of high vapour concentrations can cause CNS-depression and narcosis.
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Skin contact

	: Irritating to skin. Redness Repeated exposure may cause skin dryness or cracking.
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Eye contact : May cause eye irritation.
Ingestion : Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.
Smallest quantities reaching the lungs through swallowing or subsequent vomiting may result in lung oedema or pneumonia.

Chronic toxicity : Repeated exposure may cause skin dryness or cracking.
Chronic toxicity : No sensitization responses were observed.
Sensitisation : No adverse effects are expected.
carcinogenic effects : No adverse effects are expected.
Reproductive toxicity : No adverse effects are expected.



12. ECOLOGICAL INFORMATION

Ecotoxicity effects : Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Mobility : partly soluble
Persistence and degradability : Inherently biodegradable.
Bioaccumulation : May cause bioaccumulation.
Partition coefficient: n-octanol/water : > 3

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : Where possible recycling is preferred to disposal or incineration.
Do not burn, or use a cutting torch on, the empty drum.
Dispose of in accordance with local regulations.
Empty containers should be transported/delivered using a registered waste carrier to local recyclers for disposal.
Contaminated packaging : Dispose of in accordance with local regulations.
Additional ecological information : Do not flush into surface water or sanitary sewer system.
Codes of waste (2001/573/EC, 75/442/EEC, 91/689/EEC) : The following Waste Codes are only suggestions:
13 07 01* - fuel oil and diesel
15 01 10* - packaging containing residues of or contaminated by dangerous substances
Waste codes should be assigned by the user based on the application for which the product was used.

14. TRANSPORT INFORMATION

ADR danger labels :  
ADR/RID :
Proper shipping name : GAS OIL / DIESEL FUEL / HEATING OIL, LIGHT
UN-No : 1202
Class : 3
Packing group : III

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ADNR

ADNR class : 3 - Flammable liquids
 ADNR classification code : F1
 ADNR UN number : 1202

IMDG

Proper shipping name : GAS OIL / DIESEL FUEL / HEATING OIL, LIGHT
 UN-No : 1202
 Class : 3
 Packing group : III
 EmS : F-E; S-E
 IMDG Limited Quantities : 5 L

ICAO/IATA

Proper shipping name : GAS OIL / DIESEL FUEL / HEATING OIL, LIGHT
 UN-No : 1202
 Class : 3
 UN packing group : III

Other information (transport) : Tunnel restriction code D/E

15. REGULATORY INFORMATION

Classification : The product is classified as dangerous in accordance with Directive 67/548/EEC.
 Commercial Product Name : DERV
 Chemical name of the substance : DERV
 EC No : 265-148-2
 CAS no : 64742-46-7

Symbol(s): : 
 Xn N

Xn - Harmful
 N - Dangerous for the environment

R-phrase(s) : R20 - Harmful by inhalation.
 R38 - Irritating to skin.
 R65 - Harmful: may cause lung damage if swallowed.
 R51/53 - Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S-phrases : S36/37 - Wear suitable protective clothing and gloves
 S61 - Avoid release to the environment. Refer to special instructions/Safety data sheets.
 S62 - If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

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CLP-Classification : The product is classified as dangerous in accordance with Directive 1272/2008/EEC.

CLP pictograms :



Signal word : Danger

CLP Hazard statements : H226 - Flammable liquid and vapour.
H304 - May be fatal if swallowed and enters airways.
H315 - Causes skin irritation.
H332 - Harmful if inhaled.
H411 - Toxic to aquatic life with long lasting effects.

CLP Precautionary statements : P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P261 - Avoid breathing dust/fume/gas/mist/vapours/spray.
P331 - Do NOT induce vomiting
P301+P310 - If swallowed, immediately call a doctor.
P273 - Avoid release to the environment
P405 - Store locked up

Contains : Distillates (petroleum), hydrotreated middle

WGK : 2

16. OTHER INFORMATION

Text of R phrases mentioned in Section 3 : R20 -Harmful by inhalation.
R38 -Irritating to skin.
R65 -Harmful: may cause lung damage if swallowed.

H-statements components : H304 -May be fatal if swallowed and enters airways.
H315 -Causes skin irritation.
H332 -Harmful if inhaled.
H411 -Toxic to aquatic life with long lasting effects.

Sources of key data used to compile the datasheet : <http://ecb.jrc.it>
20100720 CONCAWE C&L update

The contents and format of this SDS are in accordance with EEC Commission Directive 1999/45/EC, 67/548/EC, 1272/2008/EC and EEC Commission Regulation 1907/2006/EC (REACH) Annex II.

DISCLAIMER OF LIABILITY The information in this SDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. This SDS was prepared and is to be used only for this product. If the product is used as a component in another product, this SDS information may not be applicable.

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HARP® R22 (Reclaimed)

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1. Identification of the substance / preparation and company / undertaking

Product name R22
REACH registration number 01-2119517587-31
Company Harp International Ltd
Gellihirion Industrial Estate
Pontypridd
Rhondda Cynon Taff
CF37 5SX
Tel: +44 (0) 1443 842255
Fax: +44 (0) 1443 841805
Email: harp@harpintl.com
Emergency phone number +44 (0) 1270 502891 (24 hour)
Use Refrigerant

2. Hazards identification

Classification according to Directives 67/548/EEC (DSD) and 1999/45/EC (DPD):



N Dangerous for the environment
R-phrases: R59 Dangerous for the ozone layer
S-phrases: S57 Use appropriate container to avoid environmental contamination
S59 Refer to manufacturer/supplier for information on recovery/recycling
S60 This material and its container must be disposed of as hazardous waste
S61 Avoid release to the environment. Refer to special instructions/safety data sheets

This classification complies with the requirement on classification and labelling according to the Directives 67/548/EEC (DSD) and 1999/45/EC (DPD).

Classification according to Regulation (EC) No. 1272/2008 (CLP):



Signal word: Warning
H-statement: H280 Contains gas under pressure; may explode if heated.
H420 Harms public health and the environment by destroying ozone in the upper atmosphere
P-statement: P234 Keep only in original container
P273 Avoid release to the environment
P410+ Protect from sunlight. Store in a well-ventilated place
P403
P502 Refer to manufacturer/supplier information on recovery/recycling

This classification complies with the requirement on classification and labelling according to the Regulation (EC) No. 1272/2008 (CLP).

Other hazards:

Asphyxiation on inhalation of high concentration by oxygen deficiency, narcotic effects on inhalation of low concentration, frostbites or cryogenic burns on contact with liquefied gas.

Additional human and environmental hazard information:

Potential adverse physiochemical effects:

On heating release of toxic and corrosive pyrolysis products: hydrogen chloride HCl, hydrogen fluoride HF, carbon monoxide CO, carbonyl chloride COCl₂, carbonyl fluoride COF₂, chlorine Cl₂.

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Potential adverse effects on humans and possible symptoms:

Exposure to liquid or concentrated vapour may cause skin, mucosa and eye irritation. Inhalations of high vapour concentrations may cause light-headedness, giddiness, disorientation, nausea, vomiting, narcosis, cardiac dysrhythmia, hypotension and death.

Potential adverse effects on the environment:


Ozone depleting potential (OPD): 0,055; global warming potential (GWP): 1900.



3. Composition / information on ingredients

Chemical characterisation:

Description: Pressurised gas, organic halide

Ingredient(s)

EC Name	EC no.	CAS no.	Amount	EC classification
Chlorodifluoromethane*	200-871-9	75-45-6	>99%	 N; R59

EC Name	EC no.	CAS no.	Amount	GHS classification
Chlorodifluoromethane*	200-871-9	75-45-6	>99%	 Compr. Gas; H280  Ozone 1; H420

*Other names:

R22, HCFC-22, monochlorodifluoromethane, Algeon 22, Algofrene 22, Frigen 22, Solkane 22.

Molecular formula:

CHClF₂

Molecular mass:

86,47 g/mol

SMILES notation:

C(F)(F)Cl

InChI:

InChI=1/CHClF2/c2-1(3)4/h1H

For wordings of the R-phrases and H-statements see chapter 16.

4. First aid measures



Inhalation

Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. Obtain immediate medical attention.

Skin contact

Thaw affected areas with water. Remove contaminated clothing. Caution: clothing may adhere to the skin in the case of freeze burns. After contact with skin, wash immediately with plenty of warm water. If irritation or blistering occur obtain medical attention.

Eye contact

Immediately irrigate with eyewash solution or clean water, holding the eyelids apart for at least 10 minutes. Obtain immediate medical attention.

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Ingestion

Ingestion is not considered a potential route of exposure.

Medical advice

Symptomatic treatment and supportive therapy as indicated. Adrenaline and similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest.

5. Fire-fighting measures



Suitable extinguishing agents

No restriction. All known extinguishing means can be used: water spray, carbon dioxide, extinguishing foam or powder. Product itself doesn't burn but packaging may be flammable. Extinguishing agents should be oriented to the fire surroundings.

For safety reasons unsuitable extinguishing agents

Water jet

Specific hazards by-product, combustion products or formed gases

Exposure to fire may cause containers to rupture/explode. Non flammable, but on heating release of toxic and corrosive fumes possible: hydrogen chloride HCl, hydrogen fluoride HF, carbon monoxide CO, carbonyl chloride COCl₂, carbonyl fluoride COF₂, chlorine Cl₂.



Specific protective equipment on fire-fighting

Use pressure air respirator at low aeration and in closed rooms. In extreme conditions a chemical protection suit might be necessary.

6. Accidental release measures

Personal protection

Evacuate area, wear protective equipment, especially self-contained breathing apparatus when entering area unless atmosphere has been proved to be safe (also see section 8). Ensure adequate air ventilation.

Environmental protection

Try to stop release. Prevent from entering sewers, basements and workpits, or any place where accumulation can be dangerous.

Clean-up methods

Ventilate area.

7. Handling and storage

Information for safe handling

Avoid release, inhalation of gas, contact with eyes, skin and clothes, long term or repeated exposure.

Technical protection measures

Ensure very good ventilation of the work room to maintain exposures within occupational exposure limits.

Rules on handling

Prevent suck-back of water and don't allow back feed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt and refer to suppliers container handling instructions.

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Fire and explosion protection

Product is not inflammable and explosive. Avoid naked flames and hot surfaces (pressurised gas bottle).

Storage group according to the VCI (Association of Chemical Industries) cumulative storage concept

2A: pressurised, liquefied and pressure dissolved gases

Storage conditions

Prevent containers / gas bottles from falling down. Keep container below 50°C in a well-ventilated place.

Packing materials

Packing materials are to be proved on resistance before use.

Storage requirements

Don't store in gateways, passages, stairways, hallways open to the public, roofs, attics and workrooms. Label receptacles clearly and durably. Preferably store in original receptacles.

Cumulative storage

Only substances of similar properties should be cumulatively stored. Cumulative storage with the following substances is prohibited.

- Medicinal products, food and feeding stuffs including additives
- Infective, radioactive and explosive substances
- High reactive organic peroxides and other oxidising substances

Cumulative storage with the following substances may be allowed under special conditions.

- Flammable and non-flammable solids and liquids
- Low reactive organic peroxides and other substances of low reactivity
- Other pressurised, liquefied and pressure dissolved gases and aerosol packages

The substance should not be cumulatively stored with substances where dangerous chemical reactions are possible e.g. alkali metals.

8. Exposure controls / personal protection

Occupational exposure limits

EC name	EC No.	CAS No.	Type of limit value	8 hr TWA	15 min short term exposure
Chlorodifluoromethane	200-871-9	75-45-6	OEL (European Union)	1000 ppm 3600 mg/m ³	Not available
			AGW – TRGS 900 (Germany)	3600 mg/m ³	Not available
			MAK - OEL (Austria)	500 ppm 1800 mg/m ³	1000 ppm 3600 mg/m ³
			TWA (USA / NIOSH)	1000 ppm 3500 mg/m ³	1250 ppm 4375 mg/m ³

Measurement methods: Analytical Methods for Proof on health Hazardous Occupational Substances, Part 1 – Air Analysis, German Research Community (DFG), Method: Analysis on Fluorohydrocarbons; VCH Wiley, Weinheim, 1996.

PNEC values:

PNEC (water):	250 ug/l	PNEC (sediment):	416 ug/kg	PNEC (soil)	239 ug/kg
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Calculated values for information only cited from the European Union Risk assessment Report (RAR) on Chlorodifluoromethane (2007) calculated on base of the toxicities in chapter 12.

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Technical measures to avoid exposure

Preferably handle in closed containers. Provide very good ventilation of the workroom, local exhaust necessary to maintain exposures within occupational exposure limits.

Personal protection



Body protection

Regular work clothing is generally sufficient.



Respiratory protection

Required on release of the gaseous substance. Use half mask to EN 140 or full mask to EN 136 fitted with filter to EN 143-P1. Be aware of time limits. If concentrations are above limitations of filter devices, if oxygen concentrations are below 17% or if conditions are ambiguous, use self-contained respiratory protective devices.



Eye Protection

Sideward closed goggles to EN 166 are required.



Hand protection

Gloves should comply with specifications of EU directive 89/686/EEC and EN 374. For example, on full contact 0.3mm thick butyl rubber gloves should be worn.



Foot protection

Foot protection is required when handling gas containers

Skin protection

Skin protection products are not as effective as gloves. If gloves cannot be worn, apply a water insoluble skin protection substance to clean skin before the start of work and after each break. Before breaks and at the end of shift, clean skin with soap and water.

Occupational hygiene

Avoid breathing the gaseous substance. Remove contaminated clothing. Don't smoke, eat and drink in the workplace.

9. Physical and chemical properties

Form	Liquefied gas
Colour	Colourless
Odour	Ethereal; poor warning properties at low concentrations
pH value at 20°C	n/a
Melting point / range	-160°C
Boiling point / range	-40.8°C
Critical temperature	96.18°C
Flash point	Not applicable
Flammability	Not applicable (Not flammable)
Auto ignition temperature	632-635°C
Explosive properties	Not explosive
Oxidising properties	Not oxidising
Vapour pressure at 20°C	9081 hPa
Gas density at 1 atm / 20°C	0.0036 kg/dm ³
Fluid density at 9 atm / 20°C	1.210 kg/dm ³
Water solubility at 20°C	3625 mg/l
Solubility	Soluble in ether, acetone, chloroform
Distribution coefficient n-octanol/water $_{10} \log P_{ow}$	1.13 (CSCL Japan 1992)
Dynamic viscosity at 10°C	0.22 mPa*s
Explosion limits (upper & lower)	Not determined

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10. Stability and reactivity

Reactivity

Not reactive under normal conditions of use and storage.

Conditions to be avoided

Stable under normal conditions. Avoid open flames, high temperatures, direct sun light.

Substances to be avoided

Alkali and earth alkali metals.

Dangerous decomposition products

Hydrogen chloride HCl, hydrogen fluoride HF, carbon monoxide CO, carbonyl chloride COCl₂, carbonyl fluoride COF₂, chlorine Cl₂.

Dangerous chemical reactions

Reacts violently with alkali and alkali earth metals. Catalytic decomposition in presence of powdery aluminium and zinc.

11. Toxicological information

Toxico-kinetics, metabolism and distribution

Main exposure path by inhalation, only small <2.7% but rapidly absorbed amounts. On 4 hour inhalation by volunteers of 320 resp. 1810 mg.m³ a blood concentration proportional equilibrium is adjusted within one hour. The blood concentrations approached plateaus of 0.25 ug/l and 1.36 ug/ml. The absorbed amount was relatively rapid elimination by exhalation in a three phase kinetic with half-lives of 18 sec, 12 min and 2.6 h. A small amount was excreted unchanged by the kidneys. Based on fluoride measurements in urine only very low or no metabolism was deduced (0.1-1.06%). No bioaccumulation at all was observed by any study.

Acute effects (toxicological tests)

Acute toxicity:

Parameter	Value	Species	Method	Remarks
LC ₅₀ inhal. / 4 h	220,000 ppm	rat	-	-
LC ₅₀ inhal. / 2 h	390,540 ppm	mouse	-	-

As chlorodifluoromethane is a gas, skin and eye administrations are not feasible.

Corrosive and irritative effects

Intake path	Result	Species	Method	Remarks
Belly skin	Redness/swelling	Rat	-	10-sec-spray application
Eye	Slight irritant	Rabbit (albino)	-	5-10-sec exposure to liquefied gas
Skin	Slight irritant	Rabbit	-	Polypropylene capsule of the liquefied gas
Respiratory tract	No effects	Animal/human	-	No indication or case study available

As chlorodifluoromethane is a gas, skin and eye administrations are not feasible. The information above is based on the liquefied gas.

Sensitisation

No evidence for skin and respiratory tract sensitising potential.

Subacute to chronic toxicity

On 5h/day-5d/week-83/94 weeks-exposure of mice to 1, 1000, 10000 and 50000ppm no effects on mortality, body weight gain, haematology, biochemistry or histopathology were found. On 5h/day-5d/week-117/131 week exposure of rats to 0, 1000, 10000 and 50000 ppm no clinical effects, and no effects on mortality, haematology or biochemistry were found. At the 50000 ppm level decrease in body weight gain in males, and increased liver, kidney, adrenal and pituitary weights in females were found. Histologically non-neoplastic lesions were observed. In this study the No Observed Effect Concentration (NOAEC) was ascertained to 10000ppm.

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Carcinogenicity, mutagenicity and reproductive toxicity

Mutagenicity

Bacterial mutagenicity:	<i>Salmonella typhimurium</i>	positive
Bacterial mutagenicity:	<i>Scgizosaccharomyces pombe/cerevisiae</i>	negative
HGPRT mutation induction:	<i>Chinese hamster cells</i>	negative
Unscheduled DNA synthesis	<i>Human EUE cell line</i>	negative

In-vivo studies on rats and mice showed no evidence of genotoxic activity.

Carcinogenicity

On 5h/day-5d/week-117/131 week-exposure of rats to 0, 1000, 10000 and 50000ppm, a slight increase was found in the incidence of fibrosarcomas in male rats to 50000 ppm. The same exposures of mice to 50000 ppm showed no significant increase in the incidence of benign or malignant tumours. The studies with male rats demonstrated a No Observed Adverse Effect Concentration (NOAEC) of 1000 ppm.

Reproductive toxicity

Repeated dose studies showed no significant changes in gonadal organ weights and on histopathological examinations no effects in male and female reproductive organs were observed. Also determination of follicle stimulating hormone (FSH) and luteinising hormone (LH) in blood exhibited no significant difference between exposed and control animals.

In a rabbit terogenicity assay no significant effects on dams and litters were seen in the low (100 ppm) and high (5000 ppm) exposure level groups. Three rat teratogenicity studies on 100 ppm to 20000 ppm exposures showed no evidence of maternal or foetal toxicity. The No Observed Adverse Effect Concentration (NOAEC) for maternal and development toxicity were determined 10000 ppm (two of three studies) and 20000 ppm (third study).

In litters from rat dams exposed to 50000 ppm a significant increase of anophtalmia and combined anophtalmia/microphtalmia was observed. By this study the No Observed Adverse Effect Concentration (NOAEC) for rat development toxicity was considered 1000 ppm.

Experience from practice

Exposures were evaluated only for workers using chlorodifluoromethane as a refrigerant and as a chemical intermediate. In over 50 years of use only a few reports on adverse health effects due to accidental exposure to extremely high inhaled levels are known.

12. Ecological information

Aquatic toxicity

No durably damaging effects expected as chlorodifluoromethane rapidly partitions from water into air.

Effects on sewage plants

Concentrations in water or in sludge considered negligible and no effect on microorganisms expected. No inhibition effects observed at 180 and 400 mg/l on 24 hr exposure.

Water damaging effects

Fish toxicity	96h-LC ₅₀	<i>Brachydanio rerio</i>	777 mg/l
Crustacean toxicity	48h-EC ₅₀	<i>Daphnia magna</i>	433 mg/l
Algae toxicity	96h-EC ₅₀	Calculation*	250 mg/l

*Predicted with the ECOSAR v0.99g program by read-across.

Mobility

Distribution on environmental compartments; $_{10}\log P_{o/w} = 1.13$

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Persistence and degradability

Biotic degradation:

Not rapidly biodegradable / 0% BOD after 28 days

Abiotic degradation:

Degradation initiated by reaction with hydroxyl radicals OH in troposphere, atmospheric lifetime 12 years / half-life 8.3 years.

Bioaccumulative potential

No experimental Bioconcentration Factor (BCF) available. Estimation from the correlation equation

$${}_{10}\log BCF_{\text{fish}} = 0.85 * {}_{10}\log P_{\text{o/w}} - 0.70$$

using the distribution coefficient ${}_{10}\log P_{\text{o/w}} = 1.3$ leads to $BCF = 1.8$ indicating that chlorodifluoromethane does not concentrate significantly in aquatic organisms.

Result of the PBT and vPvB evaluation

Not classified PBT or vPvB acc. the criteria of REACH Annex XIII.

Other adverse effects

Ozone depleting potential: 0.055 (CFCl₃ = 1)

Global warming potential: 1900 (CO₂ = 1)

13. Disposal considerations

Disposal of residues and wastes of the product

Do not discharge into any place where accumulation could be dangerous. Contact supplier if guidance is required. Preferably return unused product to vendor for recycling or destruction.

EWC code 14 06 01* Chlorofluorocarbons, HCFC, HFC

Disposal of contaminated packaging

Return cylinders to vendor, disposable cylinder is to be disposed according to local regulations

EWC code 15 01 10* Packaging containing residues of or contaminated by dangerous substances

Disposal of completely empty packaging

Return cylinders to vendor.

EWC code 15 01 04 Metallic packaging

14. Transport information

Transport by road / rail (ADR/RID) and by inner water ways (AND/ADNR)



UN number:	1018	Packing group:	-
Class:	2.2	Hazard number:	20
Label:	2.2	Packing instructions:	P200
Proper shipping name:	Chlorodifluoromethane (R22)	Special prescriptions:	-
Limited quantities:	LQ1 (120ml per inner package)		

Transport by sea (IMDG)

UN number:	1018	Packing group:	-
Class:	2.2	EmS:	FC-SV
Proper shipping name:	Chlorodifluoromethane (R22)	Marine pollutant:	No

Transport by air

UN number:	1018	Packing group:	-
Class:	2.2		
Proper shipping name:	Chlorodifluoromethane (R22)		

Remarks

Transport regulations are cited according to the international guidelines and to the form applied in Europe. Differences to other countries are not considered.

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15. Regulatory information

EU Guidelines

Chemical safety assessment according to EU Regulation No.1907/2006.

A chemical safety assessment (CSA) according to part 14, par.1 of Regulation (EC) No.1907/2006 (REACH) on chlorodifluoromethane is not available.

Classification and labelling according to Directive 67/548/EEC (DSD) & 1999/45/EC (DPD)

See section 2.

Classification and labelling according to Regulation (EC) No.1272/2008 (CLP)

See section 2.

Authorisation and/or use restrictions

Controlled substance according to Regulation (EC) No.1005/2009 on substances depleting the ozone layer (ODS). Manufacture, placing on the market and use is prohibited as of 01.01.2010, e.g. as cooling liquids and foaming agents. On maintenance and servicing of existing equipment recycled chlorodifluoromethane may be used until 31.12.2014. Exceptions from prohibition are manufacture, placing on the market and use as feedstock for chemical synthesis and R&D purposes.

Further EU provisions

None

Information on Directive 1999/13/EC (VOC Directive) for limitation of VOC emissions

Chlorodifluoromethane as a volatile organic compound comes under the provision of this Directive.

National Regulations

Classification and labelling

The product may be due to classification and labelling according to national regulations in each case.

Other regulation and guidances

The provisions of occupational, health, environment and consumer protection shall apply to the country where the chemical substance or mixture is placed on the market.

16. Other information

Wording of the R-phrases and H-statements from chapter 3

R59	Dangerous for the ozone layer
H280	Contains gas under pressure; may explode if heated
H420	Harms public health and the environment by destroying ozone in the upper atmosphere

Recommended restriction(s) of use

Not for private uses. Not for uses except as feedstock for chemical synthesis and for R&D purposes. Not for recycling purpose except for use in maintenance and servicing of existing cooling and refrigeration equipment as of 31.12.2010.

Amendment information

This data sheet contains changes from the previous version, CLP01 dated May 2011. Sections 2, 3, 8, 10 & 15 were updated.

Remarks

This datasheet was prepared in accordance with Regulation (EC) No. 1907/2006.

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1. Identification of the substance / preparation and company / undertaking

Product name R134a

REACH registration number 01-2119459374-33

Company Harp International Ltd
Gellihirion Industrial Estate
Pontypridd
Rhondda Cynon Taff
CF37 5SX
Tel: +44 (0) 1443 842255
Fax: +44 (0) 1443 841805
Email: harp@harpintl.com

Emergency phone number +44 (0) 1270 502891 (24 hour)

Use Subject to Member State regulations, applicable uses are refrigerant, blowing agent, propellant, solvent

2. Hazards identification

Low acute toxicity. High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation. Liquid splashes or spray may cause freeze burns to skin and eyes.

EC Classification

EC Directive 67/548/EEC: Not classified
Regulation (EC) No. 1272/2008 (CLP): Gases under pressure – Liquefied gas

Label Elements

Hazard statement(s): H280: Contains gas under pressure; may explode if heated

Signal word(s): Warning

Hazard pictogram(s):



GHS04

Precautionary statement(s): P410 + P403: Protect from sunlight. Store in a well-ventilated place.

3. Composition / information on ingredients

Alternative names: 1,1,1,2-tetrafluoroethane (HFC 134a), R134a

Hazardous ingredient(s)

Hazardous ingredient	% (w/w)	CAS No.	EC No.	Hazard symbol(s) and hazard statement(s)
1,1,1,2-tetrafluoroethane (HFC 134a)	100	000811-97-2	212-377-0	GHS04, H280

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4. First aid measures



The first aid advice given for skin contact, eye contact and ingestion is applicable following exposures to the liquid or spray. Also see section 11.

Inhalation

Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. In the event of cardiac arrest apply external cardiac massage. Obtain immediate medical attention.

Skin contact

Thaw affected areas with water. Remove contaminated clothing. Caution: clothing may adhere to the skin in the case of freeze burns. After contact with skin, wash immediately with plenty of warm water. If irritation or blistering occur, obtain medical attention.

Eye contact

Immediately irrigate with eyewash solution or clean water, holding the eyelids apart for at least 10 minutes. Obtain immediate medical attention.

Ingestion

Unlikely route of exposure. Do not induce vomiting. Provided the patient is conscious, wash out mouth with water and give 200-300ml (half a pint) of water to drink. Obtain immediate medical attention.

Further medical treatment

Symptomatic treatment and supportive therapy as indicated. Adrenaline and similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest.

5. Fire-fighting measures

General

HFC 134a is not flammable in air under ambient conditions of temperature and pressure. Certain mixtures of HFC 134a and air when under pressure may be flammable. Mixtures of HFC 134a and air under pressure should be avoided. Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions. Thermal decomposition will evolve very toxic and corrosive vapours (hydrogen fluoride). Containers may burst if overheated.

Extinguishing media

As appropriate for surrounding fire. Keep fire exposed containers cool by spraying with water.

Fire Fighting Protective Equipment

A self contained breathing apparatus and full protective clothing must be worn in fire conditions. Also see section 8.

6. Accidental release measures

Personal protection

Ensure suitable personal protection (including respiratory protection) during removal of spillages. Also see section 8.

General

Provided it is safe to do so, isolate the source of the leak. Allow small spillages to evaporate provided there is adequate ventilation. Large spillages: Ventilate area. Contain spillages with sand, earth or any suitable adsorbant material. Prevent liquid from entering drains, sewers, basements and workpits since the vapour may create a suffocating atmosphere.

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7. Handling and storage

Handling

Avoid inhalation of high concentrations of vapours. Atmospheric levels should be controlled in compliance with the occupational exposure limit. Atmospheric concentrations well below the occupational exposure limit can be achieved by good occupational hygiene practice. The vapour is heavier than air, high concentrations may be produced at low levels where general ventilation is poor. In such cases, provide adequate ventilation or wear suitable respiratory protective equipment with positive air supply. Avoid contact with naked flames and hot surfaces as corrosive and very toxic decomposition products can be formed. Avoid contact between the liquid and skin and eyes.

Avoid venting to atmosphere.

The fluorinated greenhouse gas R134a may be supplied in returnable containers (drums/cylinders). The container contains fluorinated greenhouse gases covered by the Kyoto Protocol. Fluorinated greenhouse gases in containers may not be vented to the atmosphere. (Regulation (EC) No. 842/2006 of the European Parliament and the Council on certain fluorinated greenhouse gases).

Process Hazards

Liquid refrigerant transfers between refrigerant containers and to and from systems can result in static generation. Ensure adequate earthing. Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions. Care must be taken to mitigate the risk of developing high pressures in systems caused by a temperature rise when liquid is trapped between closed valves or in cases where containers have been overfilled.

Storage

Keep in a well ventilated place away from fire risk and avoid sources of heat such as electric or steam radiators. Avoid storing near to the intake of air conditioning units, boiler units and open drains.

Specific use

Subject to Member State regulations, applicable uses are: refrigerant, blowing agent, propellant, solvent.

8. Exposure controls / personal protection

General

Wear suitable protective clothing, gloves and eye/face protection. Wear thermal insulating gloves when handling liquefied gases. In cases of insufficient ventilation, where exposure to high concentrations of vapour is possible, suitable respiratory protective equipment with positive air supply should be used.



Eye Protection

Gloves: Protective gloves complying with EN 374. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other.

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Occupational exposure limits

OEL	CAS No.	LTEL (8hr TWA ppm)	LTEL (8hr TWA mg/m ³)	STEL (ppm)	STEL (mg/m ³)	Note
1,1,1,2-Tetrafluoroethane	000811-97-2	1000	4240	-	-	WEL

9. Physical and chemical properties

Form	Liquefied gas
Colour	Colourless
Odour	Slight ethereal
Solubility (water)	Slightly soluble
Solubility (other)	Soluble in: alcohols, chlorinated solvents, polyethylene glycol
Boiling point (°C)	-26.2
Melting point (°C)	-101
Vapour density (air=1)	3.66 at normal boiling point
Vapour pressure (mm Hg)	4270 at 20°C
Specific gravity	1.22 at 20°C

10. Stability and reactivity

Hazardous reactions	Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions. Incompatible materials: finely divided metals, magnesium and alloys containing more than 2% magnesium. Can react violently if in contact with alkali metals and alkaline earth metals – sodium, potassium, barium.
Hazardous decomposition product(s)	Hydrogen Fluoride by thermal decomposition and hydrolysis

11. Toxicological information

Inhalation	LC50 (rat) (4 hrs) > 500,000 pm (2,080,000 mg/m ³). High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.
Skin contact	Liquid splashes or spray may cause freeze burns. Unlikely to be hazardous by skin absorption.
Eye contact	Liquid splashes or spray may cause freeze burns.
Ingestion	Highly unlikely – but should this occur freeze burns will result
Long term exposure	A lifetime inhalation study in rats has shown that exposure to 50,000 ppm resulted in benign tumours of the testis. The increased tumour incidence was observed only after prolonged exposure to high levels and is considered not to be of relevance to humans occupationally exposed to HFC 134a at or below the occupational exposure limit.

12. Ecological information

Environmental fate and distribution	High tonnage material produced in wholly contained systems. High tonnage material used in open systems. Gas.
Persistence and degradation	Decomposes comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 14 years. Products of

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decomposition will be highly dispersed and hence will have a very low concentration. Does not influence photochemical smog (i.e. is not a VOC under the terms of the UNECE agreement). Does not deplete ozone. Has a Global warming Potential (GWP) of 1430 (relative to a value of 1 for carbon dioxide at 100 years) according to Annex I of Regulation 517/2014 on certain fluorinated greenhouse gases. Values in Annex I are taken from the fourth assessment report of the Intergovernmental Panel on Climate Change.

Effect on effluent treatment

Discharges of the product will enter the atmosphere and will not result in long term aqueous contamination.

13. Disposal considerations

Recommended

Best to recover and recycle. If this is not possible, destruction is to be in an approved facility which is equipped to absorb and neutralise acid gases and other toxic processing products.

14. Transport information

Hazard label



Road/rail

UN No.

3159

ADR/RID Class

2.2

ADR/RID Proper Shipping Name

1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R134a)

Sea

IMDG Class

2.2

Marine Pollutant

Not classified as a marine pollutant

Air

ICAO/IATA

2.2

15. Regulatory information

European Regulations

Special restrictions

The fluorinated greenhouse gas R134a may be supplied in returnable containers (drums/cylinders). The container contains fluorinated greenhouse gases covered by the Koyoto Protocol. The fluorinated greenhouse gases in containers may not be vented to the atmosphere.

Regulation (EC) No. 517/2014 of the European Parliament and the Council on certain fluorinated greenhouse gases.

Directive 2006/40/EC of the European Parliament and the Council relating to emissions from air-conditioning systems in motor vehicles and amending Council Directive 70/156/EC.

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16. Other information

This datasheet was prepared in accordance with Regulation (EC) No. 1907/2006.

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Glossary

WEL	Workplace Exposure Limit (UK HSE EH40)
COM	The company aims to control exposure in its workplace to this limit
TLV	The company aims to control exposure in its workplace to the ACGIH limit
TLV-C	The company aims to control exposure in its workplace to the ACGIH Ceiling limit
MAK:	The company aims to control exposure in its workplace to the German limit
Sk:	Can be absorbed through the skin
Sen:	Capable of causing respiratory sensitisation
Bmgv:	Biological monitoring guidance value (UK HSE EH40)

Hazard statement(s)

H280: Contains gas under pressure; may explode if heated.

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1. Identification of the substance / preparation and company / undertaking


Product name	R404A	
REACH registration numbers	1,1,1-Trifluoroethane	01-2119492869-13
	Pentafluoroethane	01-2119485636-25
	1,1,1,2-Tetrafluoroethane	01-2119459374-33
Company	Harp International Ltd Gellihirion Industrial Estate Pontypridd Rhondda Cynon Taff CF37 5SX Tel: +44 (0) 1443 842255 Fax: +44 (0) 1443 841805 Email: harp@harpintl.com	
Emergency phone number	+44 (0) 1270 502891 (24 hour)	
Use	Refrigeration	

2. Hazards identification

EC Classification

EC Directive 67/548/EEC	Not classified as hazardous
Regulation (EC) No. 1272/2008 (CLP)	Gases under pressure – Liquefied gas

Label Elements

Name on label	
Hazardous components	1,1,1-Trifluoroethane (143a) Pentafluoroethane (R125) 1,1,1,2-Tetrafluoroethane (R134a)
Hazard statement(s)	H280: Contains gas under pressure; may explode if heated
Signal word(s)	Warning
Hazard pictogram(s)	

Precautionary statement(s) Storage	P410 + P403: Protect from sunlight. Store in a well-ventilated place.
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3. Composition / information on ingredients

Concentration

Substance name	CAS No.	EC No.	Concentration
1,1,1-Trifluoroethane (143a)	420-46-2	206-996-5	ca. 52%
Pentafluoroethane (R125)	354-33-6	206-557-8	ca. 44%
1,1,1,2-Tetrafluoroethane (R134a)	811-97-2	212-377-0	ca. 4%

Hazardous components according to Regulation (EC) 1272/2008 as amended

Substance name	Hazard class	Hazard category	H Phrases
1,1,1-Trifluoroethane (143a)	Flammable gases	Category 1	H220
	Gases under pressure	Liquefied gas	H280
Pentafluoroethane (R125)	Gases under pressure	Liquefied gas	H280
1,1,1,2-Tetrafluoroethane (R134a)	Gases under pressure	Liquefied gas	H280

Hazardous components according to European Directive 67/548/EEC or 1999/45/EC as amended

Substance name	Classification	Hazard category	R-phrase(s)
1,1,1-Trifluoroethane (143a)	F+	Extremely flammable	R12

4. First aid measures

Inhalation	Remove to fresh air. Oxygen or artificial respiration if needed. If symptoms persist, call a physician.
Skin contact	Allow to evaporate. Wash off with warm water. If symptoms persist, call a physician.
Eye contact	Immediately irrigate with eyewash solution or clean water, holding the eyelids apart for at least 10 minutes. Obtain immediate medical attention.
Ingestion	Unlikely route of exposure.
Most important symptoms/effects, acute and delayed	
Inhalation	In case of higher concentrations: narcosis, asphyxia, may cause cardiac arrhythmia.
Skin contact	Contact with liquid or refrigerated gas can cause cold burns and frostbite. Prolonged skin contact may defat the skin and produce dermatitis.
Eye contact	Causes frostbite burns to eyes. Symptoms: Lachrymation, redness, swelling of tissue, frostbite, burn.
Ingestion	Gas. Not applicable.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media

As appropriate for surrounding fire. Keep fire exposed containers cool by spraying with water.

Unsuitable extinguishing media

None.

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Specific hazards arising from the Chemical

The product is not flammable.
Hazardous decomposition products formed under fire conditions.

Special protective actions for Fire-Fighters

Wear self-contained breathing apparatus and protective suit
Wear chemical resistant oversuit
Special protective actions for fire-fighters
In case of fire, use water spray
Keep product and empty container away from heat and sources of ignition

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel

Prevent further leakage or spillage if safe to do so
Keep away from incompatible products

Advice for emergency responders

Immediately evacuate personnel to safe areas
Keep people away from and upwind of spill/leak
Wear self-contained breathing apparatus and protective suit
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing
Suppress (knock down) gases/vapours/mists with a water spray jet
Avoid spraying the leak source
Ventilate area

Environmental precautions

Discharge into the environment must be avoided
Inform the responsible authorities in case of gas leakage or of entry into waterways, soil or drains

Methods and materials for containment and cleaning up

Allow to evaporate
Prevent product from entering drains

Reference to other sections

Refer to protective measures listed in sections 7 and 8.

7. Handling and storage

Precautions for safe handling

Use only in well-ventilated areas
Use only clean and dry utensils
Keep away from water
Preferably transfer by pump or gravity
Keep away from incompatible products

Conditions for storage, including incompatibilities

Storage

Keep only in the original container
Store in a receptacle equipped with a vent
Keep containers tightly closed in a cool, well-ventilated place
Keep in properly labelled containers
Keep in a banded area
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep away from incompatible products

Packing material

Suitable material – steel cylinder

Specific use(s)

For further information, please contact supplier.

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8. Exposure controls / personal protection

Control parameters

Exposure limit values

Substance	Harp acceptable exposure limit	EH40 workplace exposure limits
Pentafluoroethane	TWA = 1000 ppm	Not listed
1,1,1-Trifluoroethane	TWA = 1000 ppm	Not listed
1,1,1,2-Tetrafluoroethane	TWA = 1000 ppm	TWA = 1000 ppm / 4240 mg/m ³

Exposure controls

Appropriate engineering controls	Ensure adequate ventilation Apply technical measures to comply with the occupational exposure limits
Respiratory protection	Self-contained breathing apparatus (EN 133) Wear self-contained breathing apparatus in confined spaces, in cases where the oxygen level is depleted, or in case of significant emissions Use only respiratory protection that conforms to international / national standards
Hand protection	Take note of the information given by the producer concerning permeability and break through times and of special workplace conditions (mechanical strain, duration of contact). Protective gloves Suitable material: Fluoroelastomer
Eye protection	Tightly fitted safety goggles
Skin and body protection	Wear suitable protective clothing If splashes are likely to occur, wear: apron, boots, Neoprene
Hygiene measures	Eye wash bottles or eye wash stations in compliance with applicable standards When using do not eat, drink or smoke Gloves, overalls and boots have to be double layered (protection against cold temperature). Handle in accordance with good industrial hygiene and safety practice
Environmental exposure controls	Dispose of rinse water in accordance with local and national regulations.

9. Physical and chemical properties

Form	Compressed liquefied gas
Colour	Colourless
Odour	Ether-like
pH	Neutral
pKa	Not applicable
Melting point/freezing point	-103°C (Pentafluoroethane)
Boiling point/boiling range	-46.7°C
Flash point	Not applicable
Evaporation rate	No data
Flammability (solid, gas)	The product is not flammable
Flammability	Not applicable

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Explosive properties	Not explosive
Vapour pressure	10.98 bar at 20°C 20.03 bar at 50°C
Vapour density	>3
Density	Not applicable
Bulk density	Not applicable
Solubility	430 mg/l at 25°C, water (pentafluoroethane)
Solubility/qualitative	No data available
Partition coefficient: n-octanol/water	log Pow: 1.48, 20°C (pentafluoroethane)
Auto-ignition temperature	728°C
Decomposition temperature	>700°C
Viscosity	Not applicable
Oxidizing properties	Non oxidizer

10. Stability and reactivity

Reactivity	Risk of violent reaction
Chemical stability	Stable under recommended storage conditions
Possibility of hazardous reactions	Strong oxidizers, alkali metals and alkaline earth metals may cause fires or explosions. Vapours are heavier than air and may spread along floors
Conditions to avoid	Heat
Materials to avoid	Light and/or alkaline metals, powdered metals, alkaline earth metals, oxidising agents
Hazardous decomposition products	Gaseous hydrogen fluoride (HF), Fluorophosgene The release of other hazardous decomposition products is possible

11. Toxicological information

Acute toxicity	
Acute oral toxicity	Not applicable
Acute inhalation toxicity	LC50, 4 h, >2,030,000 mg/m ³ (1,1,1-Trifluoroethane) LC0, 4 h, rat, >800000 ppm (Pentafluoroethane)
Acute dermal toxicity	Not relevant
Skin corrosion	Not applicable
Serious eye damage/eye irritation	Not applicable
Respiratory or skin sensitization	Not applicable
Mutagenicity	In vitro tests did not show mutagenic effects (Pentafluoroethane) In vivo tests did not show mutagenic effects (Pentafluoroethane)
Carcinogenicity	No data available
Toxicity for reproduction	No toxicity to reproduction (Pentafluoroethane)
Repeated dose toxicity	Inhalation, after a single exposure, dog, 10% w/w, risk of cardiac sensitization at high dose (Pentafluoroethane) Inhalation, repeated exposure, rat, >=50000ppm, NOAEL (Pentafluoroethane)
Other information	No data available

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12. Ecological information

Toxicity

Fishes	Brachydanio rerio	LC50	96 h	>200 mg/l	1,1,1,3,3-pentafluorobutane
Fishes	Brachydanio rerio	LC50	96 h	Ca. 200 mg/l	1,1,1,3,3-pentafluorobutane
Fishes	Various species	LC50	96 h	109mg/l	1,1,1-Trifluoroethane
Crustaceans	Daphnia magna	EC50	48 h	>200 mg/l	1,1,1,3,3-pentafluorobutane
Crustaceans	Daphnia magna	NOEC	48 h	200 mg/l	1,1,1,3,3-pentafluorobutane
Crustaceans	Daphnia magna	EC50	48 h	300 mg/l	1,1,1-Trifluoroethane
Crustaceans	Various species	EC50	Calculated value	115 mg/l	1,1,1-Trifluoroethane
Algae	Selenastrum capricornutum	NOEC	72 h	13.2 mg/l	1,1,1,3,3-pentafluorobutane
Algae	Selenastrum capricornutum	EC50	72 h	>114 mg/l	1,1,1,3,3-pentafluorobutane
Algae	Various species	EC50	72 h	71 mg/l	1,1,1-Trifluoroethane
Terrestrial plants		NOEC	growth	$\geq 6 \text{ g/m}^3$	1,1,1,3,3-pentafluorobutane

Persistence and degradability

Abiotic degradation

Air, indirect photo-oxidation. Conditions: sensitizer: OH radicals.
Degradation products: carbon dioxide (CO₂) / hydrofluoric acid
Water. Result: non-significant hydrolysis

Biodegradation

Aerobic, tested according to closed bottle test, degradation, 5% after 28 d. Result: not readily biodegradable (Pentafluoroethane)

Bioaccumulative potential

Bioaccumulative potential: log Pow 1.48. Result: does not bioaccumulate (Pentafluoroethane)

Mobility

Soil/sediments, adsorption, log KOC: from 1.3 – 2.3. Conditions: calculated value

Air, Henry's law constant (H), from 65 – 185 kPa.m³/mol, 20°C. Conditions: calculated value, considerable volatility

Other adverse effects

Ozone depletion potential = 0

Result = no effect on stratospheric ozone

Ozone depletion potential; ODP; (R11 = 1) (Pentafluoroethane)

Global Warming Potential = 0.94

Halocarbon global warming potential; HGWP; (R11 = 1)

13. Disposal considerations

Waste disposal methods

In accordance with local and national regulations
Refer to manufacturer/supplier for information on recovery/recycling

Contaminated packaging

To avoid treatments, as far as possible, use dedicated containers

14. Transport information

International transport regulations

IATA-DGR

UN number

UN 3337

Class

2.2

ICAO-Labels

2.2 - Non-flammable, non-toxic gas

Proper shipping name

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IMDG

UN number UN 3337
Class 2.2
IMDG-Labels 2.2 - Non-flammable, non-toxic gas
HI/UN No. 3337
EmS F-C, S-V
Proper shipping name REFRIGERANT GAS R404A

ADR

UN number UN 3337
Class 2
ADR/RID Labels 2.2 - Non-flammable, non-toxic gas
HI/UN No. 20 / 3337
Proper shipping name REFRIGERANT GAS R404A

RID

UN number UN 3337
Class 2
ADR/RID Labels 2.2 - Non-flammable, non-toxic gas
HI/UN No. 20 / 3337
Proper shipping name REFRIGERANT GAS R404A

ADN

UN number UN 3337
Class 2
ADR/RID Labels 2.2 - Non-flammable, non-toxic gas
Proper shipping name REFRIGERANT GAS R404A

15. Regulatory information

Applicable Laws or Regulations

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as amended
- Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, as amended
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, as amended
- Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste
- EH40/2005 Workplace Exposure Limits, as amended through 1, 10, 2007 (WEL's) published by the Health and Safety Executive (HSE). Issued under the Control of Substances Hazardous to Health Regulations, as amended

Notification status

Inventory information	Status
Australian Inventory of Chemical Substances (AICS)	In compliance with inventory
Canadian Domestic Substances List (DSL)	In compliance with inventory
Inventory of Existing Chemical Substances (China) (IECS)	In compliance with inventory
Japanese Existing and New Chemical Substances (MITI List) (ENCS)	In compliance with inventory
New Zealand Inventory of Chemicals (NZIOC)	In compliance with inventory
Toxic Substance Control Act List (TSCA)	In compliance with inventory
EU List of Existing Chemical Substances (EINECS)	In compliance with inventory
Korean Existing Chemicals Inventory (KECI (KR))	In compliance with inventory
Philippine Inventory of Chemicals and Chemical Substances (PICCS)	In compliance with inventory

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16. Other information

Full text of H-Statements referred to under section 3

H220 Extremely flammable gas
H280 Contains gas under pressure; may explode if heated

Full text of R-phrases referred to under sections 2 and 3

R12 Extremely flammable

This datasheet was prepared in accordance with Regulation (EC) No. 1907/2006.

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SAFETY DATA SHEET

According to Regulation (EC) No.1907/2006

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1. Identification of the substance / preparation and company / undertaking


Product name	R407C	
REACH registration numbers	1,1,1,2-Tetrafluoroethane Pentafluoroethane Difluoromethane	01-2119459374-33 01-2119485636-25 Deadline not yet expired
Company	Harp International Ltd Gellihirion Industrial Estate Pontypridd Rhondda Cynon Taff CF37 5SX Tel: +44 (0) 1443 842255 Fax: +44 (0) 1443 841805 Email: harp@harpintl.com	
Emergency phone number	+44 (0) 1270 502891 (24 hour)	
Use	Refrigeration	

2. Hazards identification

EC Classification

EC Directive 67/548/EEC or 1999/45/EC Not classified as hazardous
Regulation (EC) No. 1272/2008 (CLP) Gases under pressure – Liquefied gas

Label Elements

Name on label	
Hazardous components	1,1,1,2-Tetrafluoroethane (R134a) Pentafluoroethane (R125) Difluoromethane (R32)
Hazard statement(s)	H280: Contains gas under pressure; may explode if heated
Signal word(s)	Warning
Hazard pictogram(s)	

Precautionary statement(s)
Storage P410 + P403: Protect from sunlight. Store in a well-ventilated place.

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3. Composition / information on ingredients

Concentration

Substance name	CAS No.	EC No.	Concentration
1,1,1,2-Tetrafluoroethane (R134a)	811-97-2	212-377-0	ca. 52%
Pentafluoroethane (R125)	354-33-6	206-557-8	ca. 25%
Difluoromethane (R32)	75-10-5	200-839-4	ca. 23%

Hazardous components according to Regulation (EC) 1272/2008 as amended

Substance name	Hazard class	Hazard category	H Phrases
1,1,1,2-Tetrafluoroethane (R134a)	Gases under pressure	Liquefied gas	H280
Pentafluoroethane (R125)	Gases under pressure	Liquefied gas	H280
Difluoromethane (R32)	Flammable gases	Category 1	H220
	Gases under pressure	Liquefied gas	H280

Hazardous components according to European Directive 67/548/EEC or 1999/45/EC as amended

Substance name	Classification	Hazard category	R-phrases(s)
Difluoromethane (R32)	F+	Extremely flammable	R12

4. First aid measures

Inhalation	Remove to fresh air. Oxygen or artificial respiration if needed. If symptoms persist, call a physician.
Skin contact	Allow to evaporate. Wash off with warm water. If symptoms persist, call a physician.
Eye contact	Immediately irrigate with eyewash solution or clean water, holding the eyelids apart for at least 10 minutes. Obtain immediate medical attention.
Ingestion	Unlikely route of exposure.
Most important symptoms/effects, acute and delayed	
Inhalation	In case of higher concentrations: narcosis, asphyxia, may cause cardiac arrhythmia.
Skin contact	Contact with liquid or refrigerated gas can cause cold burns and frostbite. Prolonged skin contact may defat the skin and produce dermatitis.
Eye contact	Causes frostbite burns to eyes. Symptoms: Lachrymation, redness, swelling of tissue, frostbite, burn.
Ingestion	Gas. Not applicable.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media

As appropriate for surrounding fire. Keep fire exposed containers cool by spraying with water.

Unsuitable extinguishing media

None.

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Specific hazards arising from the Chemical

The product is not flammable.
Hazardous decomposition products formed under fire conditions.

Special protective actions for Fire-Fighters

Wear self-contained breathing apparatus and protective suit
Wear chemical resistant oversuit
Special protective actions for fire-fighters
In case of fire, use water spray
Keep product and empty container away from heat and sources of ignition

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel

Prevent further leakage or spillage if safe to do so
Keep away from incompatible products

Advice for emergency responders

Immediately evacuate personnel to safe areas
Keep people away from and upwind of spill/leak
Wear self-contained breathing apparatus and protective suit
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing
Suppress (knock down) gases/vapours/mists with a water spray jet
Avoid spraying the leak source
Ventilate area

Environmental precautions

Discharge into the environment must be avoided
Inform the responsible authorities in case of gas leakage or of entry into waterways, soil or drains

Methods and materials for containment and cleaning up

Allow to evaporate
Prevent product from entering drains

Reference to other sections

Refer to protective measures listed in sections 7 and 8.

7. Handling and storage

Precautions for safe handling

Use only in well-ventilated areas
Use only clean and dry utensils
Keep away from water
Preferably transfer by pump or gravity
Keep away from incompatible products

Conditions for storage, including incompatibilities

Storage

Keep only in the original container
Store in a receptacle equipped with a vent
Keep containers tightly closed in a cool, well-ventilated place
Keep in properly labelled containers
Keep in a bunded area
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep away from incompatible products

Packing material

Suitable material – steel cylinder

Specific use(s)

For further information, please contact supplier.

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8. Exposure controls / personal protection

Control parameters

Exposure limit values

Substance	Harp acceptable exposure limit	EH40 workplace exposure limits
1,1,1,2-Tetrafluoroethane	TWA = 1000 ppm	TWA = 1000 ppm / 4240 mg/m ³
Pentafluoroethane	TWA = 1000 ppm	Not listed
Difluoromethane	TWA = 1000 ppm	Not listed

Exposure controls

Appropriate engineering controls	Ensure adequate ventilation Apply technical measures to comply with the occupational exposure limits
Respiratory protection	Self-contained breathing apparatus (EN 133) Wear self-contained breathing apparatus in confined spaces, in cases where the oxygen level is depleted, or in case of significant emissions Use only respiratory protection that conforms to international / national standards
Hand protection	Take note of the information given by the producer concerning permeability and break through times and of special workplace conditions (mechanical strain, duration of contact). Protective gloves Suitable material: Fluoroelastomer
Eye protection	Tightly fitted safety goggles
Skin and body protection	Wear suitable protective clothing If splashes are likely to occur, wear: apron, boots, Neoprene
Hygiene measures	Eye wash bottles or eye wash stations in compliance with applicable standards When using do not eat, drink or smoke Gloves, overalls and boots have to be double layered (protection against cold temperature). Handle in accordance with good industrial hygiene and safety practice
Environmental exposure controls	Dispose of rinse water in accordance with local and national regulations.

9. Physical and chemical properties

Form	Compressed liquefied gas
Colour	Colourless
Odour	Ether-like
pH	Neutral
pKa	Not applicable
Melting point/freezing point	-103°C (Pentafluoroethane)
Boiling point/boiling range	-44 to -37°C
Flash point	Not applicable
Evaporation rate	No data
Flammability (solid, gas)	The product is not flammable
Flammability	Not applicable

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Explosive properties	Not explosive
Vapour pressure	10.35 bar at 20°C 21.94 bar at 50°C (Pentafluoroethane)
Vapour density	3.45
Density	Not applicable
Relative density	1.17 at 20°C
Bulk density	Not applicable
Solubility	430 mg/l at 25°C, water (Pentafluoroethane)
Solubility/qualitative	No data available
Partition coefficient: n-octanol/water	log Pow: 1.48, 20°C (pentafluoroethane)
Auto-ignition temperature	No data available
Decomposition temperature	No data
Viscosity	Not applicable
Oxidizing properties	Non oxidizer

10. Stability and reactivity

Reactivity	Risk of violent reaction
Chemical stability	Stable under recommended storage conditions
Possibility of hazardous reactions	Strong oxidizers, alkali metals and alkaline earth metals may cause fires or explosions.
Conditions to avoid	Heat
Materials to avoid	Light and/or alkaline metals, powdered metals, alkaline earth metals, oxidising agents
Hazardous decomposition products	Gaseous hydrogen fluoride (HF), Fluorophosgene The release of other hazardous decomposition products is possible

11. Toxicological information

Acute toxicity	
Acute oral toxicity	Not applicable
Acute inhalation toxicity	LC50, 4 h, >2,080,000 mg/m ³ (1,1,1,2-Tetrafluoroethane)
Acute dermal toxicity	Not applicable
Skin corrosion/irritation	Not applicable
Serious eye damage/eye irritation	Not applicable
Respiratory or skin sensitization	Guinea pig, did not cause sensitization on laboratory animals
Mutagenicity	In vitro tests did not show mutagenic effects (Pentafluoroethane) In vivo tests did not show mutagenic effects (Pentafluoroethane)
Carcinogenicity	Negative (1,1,1,2-Tetrafluoroethane)
Toxicity for reproduction	Developmental toxicity, rat, no observed effect (1,1,1,2-Tetrafluoroethane)
Repeated dose toxicity	Inhalation, after a single exposure, dog, cardiac sensitization following adrenergic stimulation Inhalation, rat, >=50000ppm, NOAEL (1,1,1,2-Tetrafluoroethane) Inhalation, repeated exposure, rat, >=50000ppm, NOAEL (Pentafluoroethane) Inhalation, 90-day, rat, 108 mg/m ³ , NOAEL (Difluoromethane)
Other information	No data available

12. Ecological information

Toxicity

Fishes	Brachydanio rerio	LC50	96 h	>200 mg/l	1,1,1,3,3-pentafluorobutane
Fishes	Brachydanio rerio	LC50	96 h	Ca. 200 mg/l	1,1,1,3,3-pentafluorobutane
Crustaceans	Daphnia magna	EC50	48 h	>200 mg/l	1,1,1,3,3-pentafluorobutane
Crustaceans	Daphnia magna	NOEC	48 h	200 mg/l	1,1,1,3,3-pentafluorobutane
Algae	Selenastrum capricornutum	NOEC	72 h	13.2 mg/l	1,1,1,3,3-pentafluorobutane
Algae	Selenastrum capricornutum	EC50	72 h	>114 mg/l	1,1,1,3,3-pentafluorobutane
Terrestrial plants		NOEC	growth	>=6 g/m ³	

Persistence and degradability

Abiotic degradation

Air, indirect photo-oxidation. T_{1/2} from 4.16 – 28.2 y

Conditions: sensitizer: OH radicals.

Degradation products: carbon dioxide (CO₂) / hydrofluoric acid / TFA

Biodegradation

Aerobic, tested according to closed bottle test, chemical degradation, 2-5% after 28 d. Result: not readily biodegradable

Aerobic, tested according to biodegradation by methane oxidation. Result: not readily biodegradable (1,1,1,2-Tetrafluoroethane)

Bioaccumulative potential

Bioaccumulative potential: log Pow 0.21-1.48. Result: does not bioaccumulate

Mobility

Soil/sediments, adsorption, log KOC: from 1.05 – 1.7. Conditions: calculated value

Air, Henry's law constant (H), from 19.7 – 150 hPa.m³/mol, 20°C. Conditions: calculated value, considerable volatility

Other adverse effects

Ozone depletion potential = 0

Result = no effect on stratospheric ozone

Ozone depletion potential; ODP; (R11 = 1)

Global Warming Potential = 0.25

Halocarbon global warming potential; HGWP; (R11 = 1) (1,1,1,2-Tetrafluoroethane)

13. Disposal considerations

Waste disposal methods

In accordance with local and national regulations

Refer to manufacturer/supplier for information on recovery/recycling

Contaminated packaging

To avoid treatments, as far as possible, use dedicated containers

Where possible recycling is preferred to disposal or incineration

14. Transport information

International transport regulations

IATA-DGR

UN number

UN 3340

Class

2.2

ICAO-Labels

2.2 - Non-flammable, non-toxic gas

Proper shipping name

REFRIGERANT GAS R407C

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IMDG

UN number UN 3340
Class 2.2
IMDG-Labels 2.2 - Non-flammable, non-toxic gas
HI/UN No. 3340
EmS F-C, S-V
Proper shipping name REFRIGERANT GAS R407C

ADR

UN number UN 3340
Class 2
ADR/RID Labels 2.2 - Non-flammable, non-toxic gas
HI/UN No. 20 / 3340
Proper shipping name REFRIGERANT GAS R407C

RID

UN number UN 3340
Class 2
ADR/RID Labels 2.2 - Non-flammable, non-toxic gas
HI/UN No. 20 / 3340
Proper shipping name REFRIGERANT GAS R407C

ADN

UN number UN 3340
Class 2
ADR/RID Labels 2.2 - Non-flammable, non-toxic gas
Proper shipping name REFRIGERANT GAS R407C

15. Regulatory information

Applicable Laws or Regulations

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as amended
- Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, as amended
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, as amended
- Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste
- EH40/2005 Workplace Exposure Limits, as amended through 1, 10, 2007 (WEL's) published by the Health and Safety Executive (HSE). Issued under the Control of Substances Hazardous to Health Regulations, as amended

Notification status

Inventory information	Status
Australian Inventory of Chemical Substances (AICS)	In compliance with inventory
Canadian Domestic Substances List (DSL)	In compliance with inventory
Inventory of Existing Chemical Substances (China) (IECS)	In compliance with inventory
Japanese Existing and New Chemical Substances (MITI List) (ENCS)	In compliance with inventory
New Zealand Inventory of Chemicals (NZIOC)	In compliance with inventory
Toxic Substance Control Act List (TSCA)	In compliance with inventory
EU List of Existing Chemical Substances (EINECS)	In compliance with inventory
Korean Existing Chemicals Inventory (KECI (KR))	In compliance with inventory
Philippine Inventory of Chemicals and Chemical Substances (PICCS)	In compliance with inventory

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16. Other information

Full text of H-Statements referred to under section 3

H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated

This datasheet was prepared in accordance with Regulation (EC) No. 1907/2006.

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SAFETY DATA SHEET

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HARP® 410A

Version: CLP04

Date: March 2017

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1. Identification of the substance / preparation and company / undertaking


Product name	R410A	
REACH registration numbers	Pentafluoroethane	01-2119485636-25
	Difluoromethane	01-2119471312-47
Company	Harp International Ltd Gellihirion Industrial Estate Pontypridd Rhondda Cynon Taff CF37 5SX Tel: +44 (0) 1443 842255 Fax: +44 (0) 1443 841805 Email: harp@harpintl.com	
Emergency phone number	+44 (0) 1270 502891 (24 hour)	
Use	Refrigerant	

2. Hazards identification

EC Classification

Regulation (EC) No. 1272/2008 (CLP) Gases under pressure – Liquefied gas

Label Elements

Name on label	
Hazardous components	Pentafluoroethane (R125) Difluoromethane (R32)
Hazard statement(s)	H280: Contains gas under pressure; may explode if heated
Signal word(s)	Warning
Hazard pictogram(s)	

Precautionary statement(s)
Storage

P410 + P403: Protect from sunlight. Store in a well-ventilated place.

HARP® 410A

Version: CLP04

Date: March 2017

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3. Composition / information on ingredients

Concentration

Substance name	CAS No.	EC No.	Concentration
Pentafluoroethane (R125)	354-33-6	206-557-8	ca. 50%
Difluoromethane (R32)	75-10-5	200-839-4	ca. 50%

Hazardous components according to Regulation (EC) 1272/2008 as amended

Substance name	Hazard class	Hazard category	H Phrases
Pentafluoroethane (R125)	Gases under pressure	Liquefied gas	H280
Difluoromethane (R32)	Flammable gases	Category 1	H220
	Gases under pressure	Liquefied gas	H280

4. First aid measures

Inhalation Remove to fresh air. Oxygen or artificial respiration if needed. If symptoms persist, call a physician.

Skin contact Allow to evaporate. Wash off with warm water. If symptoms persist, call a physician.

Eye contact Allow to evaporate. Rinse thoroughly with plenty of water, also under the eyelids. If eye irritation persists, consult a specialist.

Ingestion Unlikely route of exposure.

Most important symptoms/effects, acute and delayed

Inhalation In case of higher concentrations: narcosis, asphyxia, may cause cardiac arrhythmia.

Skin contact Contact with liquid or refrigerated gas can cause cold burns and frostbite. Prolonged skin contact may defat the skin and produce dermatitis.

Eye contact Causes frostbite burns to eyes. Symptoms: Lachrymation, redness, swelling of tissue, frostbite, burn.

Ingestion Gas. Not applicable.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media None.

Specific hazards arising from the chemical

The product is not flammable.
Hazardous decomposition products formed under fire conditions.

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HARP® 410A

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Special protective actions for Fire-Fighters

Wear self-contained breathing apparatus and protective suit
Wear chemical resistant oversuit
Special protective actions for fire-fighters
In case of fire, use water spray
Keep product and empty container away from heat and sources of ignition

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel

Prevent further leakage or spillage if safe to do so
Keep away from incompatible products

Advice for emergency responders

Immediately evacuate personnel to safe areas
Keep people away from and upwind of spill/leak
Wear self-contained breathing apparatus and protective suit
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Suppress (knock down) gases/vapours/mists with a water spray jet
Avoid spraying the leak source
Ventilate area

Environmental precautions

Discharge into the environment must be avoided
Inform the responsible authorities in case of gas leakage or of entry into waterways, soil or drains

Methods and materials for containment and cleaning up

Allow to evaporate
Prevent product from entering drains

Reference to other sections

Refer to protective measures listed in sections 7 and 8.

7. Handling and storage

Precautions for safe handling

Use only in well-ventilated areas
Use only clean and dry utensils
Keep away from water
Preferably transfer by pump or gravity
Keep away from incompatible products

Conditions for storage, including incompatibilities

Storage

Keep only in the original container
Store in a receptacle equipped with a vent
Keep containers tightly closed in a cool, well-ventilated place
Keep in properly labelled containers
Keep in a bunded area
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep away from incompatible products

Packing material

Suitable material – steel cylinder

Specific use(s)

For further information, please contact supplier.

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8. Exposure controls / personal protection

Control parameters

Exposure limit values

Substance	Harp acceptable exposure limit	EH40 workplace exposure limits
Pentafluoroethane	TWA = 1000 ppm	Not listed
Difluoromethane	TWA = 1000 ppm	Not listed

Exposure controls

Appropriate engineering controls	Ensure adequate ventilation Apply technical measures to comply with the occupational exposure limits
Respiratory protection	Self-contained breathing apparatus (EN 133) Wear self-contained breathing apparatus in confined spaces, in cases where the oxygen level is depleted, or in case of significant emissions Use only respiratory protection that conforms to international / national standards
Hand protection	Take note of the information given by the producer concerning permeability and break through times and of special workplace conditions (mechanical strain, duration of contact). Protective gloves Suitable material: Fluoroelastomer
Eye protection	Tightly fitted safety goggles
Skin and body protection	Wear suitable protective clothing If splashes are likely to occur, wear: apron, boots, Neoprene
Hygiene measures	Eye wash bottles or eye wash stations in compliance with applicable standards When using do not eat, drink or smoke Gloves, overalls and boots have to be double layered (protection against cold temperature). Handle in accordance with good industrial hygiene and safety practice
Environmental exposure controls	Dispose of rinse water in accordance with local and national regulations.

9. Physical and chemical properties

Form	Compressed liquefied gas
Colour	Colourless
Odour	Ether-like
pH	Neutral
pKa	Not applicable
Melting point/freezing point	-103°C (Pentafluoroethane)
Boiling point/boiling range	-52.7°C
Flash point	Not applicable
Evaporation rate	No data
Flammability (solid, gas)	The product is not flammable
Flammability	Not applicable
Explosive properties	Not explosive

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Vapour pressure	12.46 bar at 15°C
Vapour density	2.3
Density	Not applicable
Relative density	1.11 at 15°C
Bulk density	Not applicable
Solubility	430 mg/l at 25°C, water (pentafluoroethane)
Solubility/qualitative	No data available
Partition coefficient: n-octanol/water	log Pow: 1.48, 20°C (pentafluoroethane)
Auto-ignition temperature	Not applicable
Decomposition temperature	No data
Viscosity	0.15 mPa.s, liquid, at 25°C
Oxidizing properties	Non oxidizer

10. Stability and reactivity

Reactivity	Risk of violent reaction
Chemical stability	Stable under recommended storage conditions
Possibility of hazardous reactions	Strong oxidizers, alkali metals and alkaline earth metals may cause fires or explosions.
Conditions to avoid	Heat
Materials to avoid	Light and/or alkaline metals, powdered metals, alkaline earth metals, oxidising agents
Hazardous decomposition products	Gaseous hydrogen fluoride (HF), Fluorophosgene The release of other hazardous decomposition products is possible

11. Toxicological information

Acute toxicity	
Acute oral toxicity	Not applicable
Acute inhalation toxicity	LC50, 4 h, >1,107,000 mg/m ³ (Difluoromethane) LC0, 4 h, rat, >800000 ppm (Pentafluoroethane)
Acute dermal toxicity	Not relevant
Skin corrosion	Not applicable
Serious eye damage/eye irritation	Not applicable
Respiratory or skin sensitization	Not applicable
Mutagenicity	In vitro tests did not show mutagenic effects (Pentafluoroethane) In vivo tests did not show mutagenic effects (Pentafluoroethane)
Carcinogenicity	No data available
Toxicity for reproduction	No toxicity to reproduction (Pentafluoroethane) Inhalation, mouse, 208,000 mg/m ³ , effect on fertility, NOAEC, (Difluoromethane) Foetotoxic effect, (Difluoromethane)
Repeated dose toxicity	Inhalation, after a single exposure, dog, >= 10%, cardiac sensitization following adrenergic stimulation, (1,1,1,3,3-Pentafluorobutane) Inhalation, repeated exposure, rat, 5%, no observed effect (1,1,1,3,3-Pentafluorobutane) Inhalation, 90-day, rat, 105g/m ³ , NOAEC, (Difluoromethane)

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Other information

No data available

12. Ecological information

Toxicity

Fishes	Brachydanio rerio	LC50	96 h	>200 mg/l	1,1,1,3,3-pentafluorobutane
Fishes	Brachydanio rerio	LC0	96 h	ca. 200 mg/l	1,1,1,3,3-pentafluorobutane
Crustaceans	Daphnia magna	EC50	48 h	>200 mg/l	1,1,1,3,3-pentafluorobutane
Crustaceans	Daphnia magna	NOEC	48 h	200 mg/l	1,1,1,3,3-pentafluorobutane
Algae	Selenastrum capricornutum	NOEC	72 h	13.2 mg/l	1,1,1,3,3-pentafluorobutane
Algae	Selenastrum capricornutum	EC50	72 h	>114 mg/l	1,1,1,3,3-pentafluorobutane
Terrestrial plants		NOEC	growth	$\geq 6 \text{ g/m}^3$	1,1,1,3,3-pentafluorobutane

Persistence and degradability

Abiotic degradation

Air, indirect photo-oxidation. $T_{1/2}$ from 4.16 – 28.2 y

Conditions: sensitizer: OH radicals.

Degradation products: carbon dioxide (CO₂) / hydrofluoric acid / TFA

Biodegradation

Aerobic, tested according to closed bottle test, chemical degradation, = 4-5% after 28 d. Result: not readily biodegradable (Pentafluoroethane)

Bioaccumulative potential

Bioaccumulative potential: log Pow 1.48. Result: Does not bioaccumulate (Pentafluoroethane)

Mobility

Soil/sediments, adsorption, log KOC: from 1.05 – 1.7

Conditions: calculated value

Air, Henry's law constant (H), from 19.7–150 hPa.m³/mol, 20°C

Conditions: calculated value, considerable volatility

Other adverse effects

Ozone depletion potential = 0

Result = no effect on stratospheric ozone

Ozone depletion potential; ODP; (R11 = 1)

Global Warming Potential = 2088

13. Disposal considerations

Waste disposal methods

In accordance with local and national regulations

Refer to manufacturer/supplier for information on recovery/recycling

Contaminated packaging

To avoid treatments, as far as possible, use dedicated containers

Where possible recycling is preferred to disposal or incineration

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14. Transport information

Road/Rail

UN number 3163
ADR/RID Class 2.2
ADR/RID Proper Shipping Name LIQUEFIED GAS, N.O.S. (DIFLUOROMETHANE, PENTAFLUOROETHANE)

SEA

IMDG Class 2.2
Marine Pollutant Not classified as a marine pollutant

AIR

ICAO/IATA Class 2.2

15. Regulatory information

Applicable Laws or Regulations

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as amended
- Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, as amended
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, as amended
- Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste
- EH40/2005 Workplace Exposure Limits, as amended through 1, 10, 2007 (WEL's) published by the Health and Safety Executive (HSE). Issued under the Control of Substances Hazardous to Health Regulations, as amended

Notification status

Inventory information	Status
Australian Inventory of Chemical Substances (AICS)	In compliance with inventory
Canadian Domestic Substances List (DSL)	In compliance with inventory
Inventory of Existing Chemical Substances (China) (IECS)	In compliance with inventory
Japanese Existing and New Chemical Substances (MITI List) (ENCS)	In compliance with inventory
New Zealand Inventory of Chemicals (NZIOC)	In compliance with inventory
Toxic Substance Control Act List (TSCA)	In compliance with inventory
EU List of Existing Chemical Substances (EINECS)	In compliance with inventory
Korean Existing Chemicals Inventory (KECI (KR))	In compliance with inventory
Philippine Inventory of Chemicals and Chemical Substances (PICCS)	In compliance with inventory

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16. Other information

Full text of H-Statements referred to under section 3

H280 Contains gas under pressure; may explode if heated

This data sheet contains changes from the previous version, CLP03 dated April 2016. Section 14 was updated.

This datasheet was prepared in accordance with Regulation (EC) No. 1907/2006.

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Attachment G.2 – Energy Efficiency

The reclamation equipment and office area will consume electricity supplied from the national grid. Lights and power for the building are also provided from the national grid.

The reclaim plant will be regularly maintained and serviced to ensure it is operating as efficiently as possible. The equipment was developed by Harp and the proposed stand-alone model, which will be installed at the facility in Tallaght, has evolved from previous versions of the equipment installed at Harp International Ltd.'s facility in the UK. Where possible, improvements to the equipment to make it operate in a more efficient manner have been put in place. The reclaim plant uses 3-phase electrical power.

Office IT equipment will be managed and operated so that there is no unnecessary energy consumption. Computers and printers will be turned off when there is no-one at the site. Heaters used in the office area are run on electricity.

The diesel forklift used for loading, off-loading and movement of waste gas cages and cylinders is regularly maintained and serviced to ensure it is operating as efficiently as possible. The forklift will be turned off, where appropriate, when not in use to minimise fuel consumption and combustion emissions.

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ATTACHMENT H MATERIALS HANDLING

Attachment H.1 – Waste Types and Quantities – Existing & Proposed

The current facility in Tallaght has only been operational as a licensed facility (COR-DS-15-0003-04 issued by South Dublin County Council) since April 2016. The facility operations are new in Ireland so it has taken some time to implement the necessary procedures and customers base for the operations. To date there has been approx. 20 tonnes of waste refrigerant gas received at the facility and approx. 18 tonnes has been sent for recovery in the UK.

In the coming months and by the time the Waste Licence has been granted, it is anticipated that the waste intake quantity will increase significantly. At maximum operations over the life of the facility (projected as year 2020), it is estimated that there will be 500 tonnes of waste refrigerant gas received. The maximum annual intake quantity of waste oil anticipated is 8 tonnes and cooling fluid is also 8 tonnes.

The quantity of waste gas accepted which is likely to be suitable for reclamation at the facility in Tallaght is unknown. Conservatively, an estimate of 80% of waste gas accepted has been applied (400 tonnes). The actual quantity will likely be less in the early years of operation increasing as the limits on import of virgin fluorinated gases become stricter.

On this basis, the quantities in Table H.1(a) of the application form have been applied:

R3 – 400 tonnes

R12 – 416 tonnes (400 tonnes of waste gas required to be pooled prior to reclamation and 16 tonnes of waste oil/cooling fluid combined into a storage tank prior to collection by a hazardous waste contractor for recovery off-site).

R13 – 516 tonnes (total maximum waste quantity accepted which will require temporary storage prior to collection by a hazardous waste contractor (waste oil/cooling fluid), export to the UK for recovery in suitable quantities (untreated waste gas) or pooling together for reclamation.

The following table illustrates Harp's estimated waste throughput for the next five years, starting from 2017 and is used to populate Table H.1(B) in the Waste Licence Application form.

Year	Waste Type	LoW (EWC) Code	Estimated Annual Quantity (tonnes)	
			Hazardous	Non-Hazardous
2018	Chlorofluorocarbons, HCFC, HFC	14 06 01*	300	-
	Gases in pressure containers (including halons) containing dangerous substances	16 05 04*	Note 1	-
	Gases in pressure containers other than those mentioned in 16 05 04*	16 05 05	-	Note 1
	Discarded organic chemicals consisting of or containing dangerous substances	16 05 08*	Note 1	-
	Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	16 05 09	-	Note 1
	Mineral based non-chlorinated engine, gear and lubricating oils OR Other engine, gear and lubricating oils	13 02 05* OR 13 02 08*	4	-

	Discarded organic chemicals consisting of or containing hazardous substances	16 05 08*	4	-
	TOTAL		308	0
2019	Chlorofluorocarbons, HCFC, HFC	14 06 01*	400	-
	Gases in pressure containers (including halons) containing dangerous substances	16 05 04*	Note 1	-
	Gases in pressure containers other than those mentioned in 16 05 04*	16 05 05	-	Note 1
	Discarded organic chemicals consisting of or containing dangerous substances	16 05 08*	Note 1	-
	Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	16 05 09	-	Note 1
	Mineral based non-chlorinated engine, gear and lubricating oils OR Other engine, gear and lubricating oils	13 02 05* OR 13 02 08*	6	-
	Discarded organic chemicals consisting of or containing hazardous substances	16 05 08*	6	-
	TOTAL		412	0
2020	Chlorofluorocarbons, HCFC, HFC	14 06 01*	500	-
	Gases in pressure containers (including halons) containing dangerous substances	16 05 04*	Note 1	-
	Gases in pressure containers other than those mentioned in 16 05 04*	16 05 05	-	Note 1
	Discarded organic chemicals consisting of or containing dangerous substances	16 05 08*	Note 1	-
	Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	16 05 09	-	Note 1
	Mineral based non-chlorinated engine, gear and lubricating oils OR Other engine, gear and lubricating oils	13 02 05* OR 13 02 08*	8	-
	Discarded organic chemicals consisting of or containing hazardous substances	16 05 08*	8	-
	TOTAL		516	0
2021	Chlorofluorocarbons, HCFC, HFC	14 06 01*	500	-
	Gases in pressure containers (including halons) containing dangerous substances	16 05 04*	Note 1	-
	Gases in pressure containers other than those mentioned in 16 05 04*	16 05 05	-	Note 1
	Discarded organic chemicals consisting of or containing dangerous substances	16 05 08*	Note 1	-
	Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	16 05 09	-	Note 1
	Mineral based non-chlorinated engine, gear and lubricating oils OR Other engine, gear and lubricating oils	13 02 05* OR 13 02 08*	8	-
	Discarded organic chemicals consisting of or containing hazardous substances	16 05 08*	8	-
	TOTAL		516	0

2022	Chlorofluorocarbons, HCFC, HFC	14 06 01*	500	-
	Gases in pressure containers (including halons) containing dangerous substances	16 05 04*	Note 1	-
	Gases in pressure containers other than those mentioned in 16 05 04*	16 05 05	-	Note 1
	Discarded organic chemicals consisting of or containing dangerous substances	16 05 08*	Note 1	-
	Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	16 05 09	-	Note 1
	Mineral based non-chlorinated engine, gear and lubricating oils OR Other engine, gear and lubricating oils	13 02 05* OR 13 02 08*	8	-
	Discarded organic chemicals consisting of or containing hazardous substances	16 05 08*	8	-
	TOTAL		516	0

Note 1: It is anticipated based on the current knowledge of the market that the vast majority of waste gas received at the facility will be classified as 14 06 01*. Small quantities of 16 05 04*, 16 05 05, 16 05 08* and 16 05 09 may be received over the life of the facility.

Industrial Emission Directive Threshold Compliance

In accordance with the activities listed in the First Schedule (new) of the *Environmental Protection Agency Act 1992* (as amended), the activities to be carried out at the facility will not exceed the following thresholds:

- 11.2 – Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities.
- 11.6 – Temporary storage of hazardous waste, (other than waste referred to in paragraph 11.5) pending any of the activities referred to in paragraph 11.2, 11.3m 11.5 or 11.7 with a total capacity exceeding 50 tonnes, other than temporary storage, pending collection, on the site where the waste is generated.

This is to ensure that the activities at the facility do not fall under the list of activities to which Part IV (Industrial Emissions Directive) applies.

Attachment H.2 – Waste Acceptance Procedures

See *Work Instruction No. 001* (Acceptance, Recording, Handling & Storage of Cylinders or Drums containing Waste Refrigerant Gas Refrigerants) included in Attachment D.2.

Waste deliveries to the facility will be supervised at all times by the Deputy Facility Manager or relevant site operative to ensure that any unsuitable gas cylinders/drums or non-permitted waste types are not offloaded from the delivery vehicle. All deliveries of waste will be pre-arranged with approved customers/contractors.

Waste oil and cooling fluid received at the site will only be accepted from approved refrigerant and air conditioning (RAC) contractors who are listed on the EPA PAN system. This will ensure that any waste oils and cooling fluids delivered will come from refrigeration systems and will be similar in composition. The Deputy Facility Manager and site operatives will be knowledgeable in the appearance and consistency of oils from refrigeration systems and they will reject any oils which are not recovered from refrigeration systems. Unsuitable waste oils will be temporarily stored in the Quarantine Area pending collection by an authorised waste contractor or return to the customer.

All waste gas and liquid deliveries will come into the warehouse via the main delivery door and will be offloaded to the Waste Holding Area as shown on Figure B6.1. Waste will be transferred to the Inspection Area for further inspection, sampling (of gas), logging and recording on the allocated worksheets.

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Attachment H.3 – Waste Handling

See *Work Instruction No. 001* (Acceptance, Recording, Handling & Storage of Cylinders or Drums containing Waste Refrigerant Gas Refrigerants) included in Attachment D.2.

Waste oil and cooling fluid received at the site will be in small drums (typically 205 litre drums) which can be handled by the site operatives. Alternatively, a suitable trolley may be used. The drums will be decanted into the storage tanks on site following inspection and logging as per Attachment H.2 previous.

Suitable PPE including, but not limited to, gloves and safety glasses will be worn during decanting. A spill kit will be located adjacent to the storage tanks in case of any spills during decanting.

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Attachment H.4 – Waste Arisings

The waste gas reclamation process will generate one liquid waste stream (waste refrigerant oil) and one solid waste stream (molecular sieve). Both materials will be temporarily stored on site pending removal by an authorised waste contractor to appropriate waste facilities.

Waste Refrigerant Oil

Waste refrigerant oil will be suitable for acceptance at waste oil recovery facilities where it is typically blended to provide a fuel source suitable for replacing fossil fuels in industries such as cement manufacture. Collection would typically be use of a vacuum tanker truck where the waste oil is drained from the site storage container.

It is estimated that there will be about 1 tonne of waste refrigerant oil generated per year (c. 0.08 tonne per month).

Molecular Sieve Waste

Molecular sieve waste is a non-hazardous drying agent which is suitable for acceptance in the mixed non-recyclable waste stream. Mixed non-recyclable waste treatment varies depending on waste contractor but in most cases the waste can be recovered for use as fuel in cement manufacture or incineration at waste-to-energy plants.

It is estimated that there will be about 0.29 tonne of molecular sieve waste generated per year (c. 0.02 tonne per month)

The estimated quantity of each waste type is presented in Tables H.1 (i) and H.1 (ii) of the Application Form.

Office Waste

Typical commercial office type waste will be generated from the office area. This will include organic (food) waste, dry mixed recyclables and mixed non-recyclables which will be segregated on-site and collected by a suitably permitted waste contractor.

Attachment H.5 – Waste Recycling and Recovery

The proposed activities at the facility and the management of waste generated at the facility will contribute to the requirements of Regulation 31 (1) and (2) of the *European Communities (Waste Directive) Regulations 2011* as follows:

The waste activity at the facility will allow the temporary storage of waste refrigerant gas pending recovery (by means of reclamation either on-site or off-site), where possible. This proposed activity will permit the recovery of waste refrigerant gas in Ireland as there are currently no facilities to do so in the country. This activity will also promote the Proximity Principle of the Waste Framework Directive by reducing the quantity of waste gas which needs to be transferred abroad for recovery. Some waste refrigerant gases are not suitable for recovery and will require disposal.

Correct management and treatment of waste refrigerant gas will prevent the release of ozone depleting compounds that are harmful to the atmosphere and contribute to global warming.

As well as waste refrigerant gases, Harp will accept waste refrigerant oils and cooling fluids for temporary storage pending transfer off-site for recovery in suitable blending facilities. Waste oil generated from the gas reclamation process will also be suitable for recovery off-site.

Molecular sieve waste will be generated in very small quantities. Attempts to regenerate molecular sieve for re-use on-site have been unsuccessful at the Harp facility in the UK so the material must be disposed of as mixed non-recyclable waste. In most cases, waste contractors will process this waste type for off-site recovery in incineration facilities.

The significant majority of waste gas received at the facility, as well as the waste oil and cooling fluids are designated as hazardous waste. Any potential changes in this classification will be discussed with the Agency in accordance with the requirements of Regulation 29 (2A).

ATTACHMENT I EXISTING ENVIRONMENT AND IMPACT OF THE FACILITY

Attachment I.1 – Assessment of Atmospheric Emissions

The existing air quality in the vicinity of the facility is typical of an industrial estate. There is no emissions to atmosphere from the proposed activity and there is no dispersion modelling required.

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Attachment I.2 – Assessment of Impact on Receiving Surface Water

The Whitestown Stream runs from west to east about 60m to the south of the site but there is no hydrological connection between the site and the river. The river quality (as reported on the EPA's ENVision mapping tool) for the Whitestown Stream has not been classified but the stream discharges into the River Dodder about 3km to the east of the site and the River Dodder has been assigned a 'Good Status' in terms of water quality for the period 2004 - 2015 (at Old Bawn Bridge station point c. 2km upstream of the Whitestown Stream discharge point). The River Dodder has been assigned 'Moderate Status' at the next downstream station point (Springfield Avenue).

There will be no process emissions to surface water from the proposed activity. Any surface water collection from roof areas or the external paved areas will be directed to the storm water drainage network which is currently in place at the facility. The surface water run-off will comprise rainfall run-off only and will not have an impact on the water quality in the sewer network.

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Attachment I.3 – Assessment of Impact of Sewage Discharge

There is currently only domestic wastewater effluent discharged to sewer at the facility from toilets and kitchenette sink outlets. This will have a minimal impact on the existing foul water drainage network in the industrial estate.

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Attachment I.4 – Assessment of Impact of ground/groundwater emissions

There will be no emissions to groundwater.

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Attachment I.5 – Ground and/or Groundwater Contamination

There has never been any ground or groundwater contamination assessment carried out at the site. The warehouse surfacing and external yard have always been covered in concrete hardstanding.

Previous activities on the site consisting of a welding company and a waste transfer station for WEEE and waste refrigerant gas. There are no underground storage tanks on the site.

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Attachment I.6 – Noise Impact

The reclaim plant will generate some noise during operations but this will not be audible by neighbouring facilities in the industrial estate when the warehouse doors are closed. It is considered that any noise inside the building will not affect neighbouring properties. The reclaim plant may be in operation at any time during the operating hours of the facility.

The only other plant/equipment associated with the activity is a forklift truck and weighing scales. The only external noise generating sources will be vehicle movements to/from the site (maximum of six movements per day) and the use of the forklift truck. There will be no fixed items of plant/equipment located externally. The noise associated with the vehicle movements to/from the site and operation of the forklift in the external yard will be similar to the existing vehicle movements within the Whitestown Industrial Estate and at neighbouring businesses. Therefore, there will be no perceptible increase in noise levels over and above the background noise levels as a result of the proposed activity.

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Attachment I.7 – Assessment of Ecological Impacts and Mitigation Measures

An Appropriate Assessment Screening Report was compiled by Moore Group and determined that no further stages of the Appropriate Assessment process would be required. The Screening Report is included in Attachment B.3.

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ATTACHMENT J ACCIDENT PREVENTION AND EMERGENCY RESPONSE

Attachment J.1 – Accident Prevention and Emergency Response

The facility is equipped with fire detection, alarm and emergency lighting systems which comply with I.S. 3218: 2013 and I.S. 3217: 2013. Fire doors comply with FD30s Standard.

Equipment such as fire alarms, fire extinguishers, emergency lighting and spill kits are regularly checked. All pressure receptacles and hoses are regularly tested to BS standards. Equipment undergoes regular maintenance and is fitted with pressure relief valves, emergency stop buttons and alarms. Waste liquids will be stored in a bunded tank and will be regularly inspected for signs of leaks or damage.

An Emergency Response Procedure has been created and is attached. This document includes procedures for reacting to fires, spillages and medical issues.

All accidents, incidents and near-misses are reviewed by management and procedures/preventative measures are updated as deemed appropriate.

The refrigerant gases represent a threat to the environment due to their global warming and ozone depleting potentials. Therefore safeguards are in place to prevent escape of gas to the atmosphere. These are detailed in the relevant Work Instructions.

A copy of the following procedures is included:

- Pollution Prevention and Control Plan; and
- Pollution Incident Response Plan.

An Environmental Liabilities Risk Assessment (ELRA) report is currently in place for the existing facility which has been agreed with SDCC (RH/14/8133WMR02a). This report has been updated to include the activities proposed under the Waste Licence and is attached (RH/14/8133WMR02b).

Harp Refrigerants Limited

Emergency Response Procedure

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Harp Refrigerants Limited
Unit 2, Whitestown Industrial Estate, Tallaght, Dublin 24

Registered in Ireland: Registration No. 532851

1. Purpose

This procedure ensures that potential incidents and emergency situations have been recognised, responses identified and plans put in place to minimise risks should such a situation ever occur.

2. Associated documents

Record of fire alarm tests
Record of fire extinguisher tests
Spill kit check list
Pollution Prevention and Control Plan
Pollution Incident Response Plan

3. Procedure

All accidents and incidents will be discussed at the Management Review and if any root cause trends are identified, the necessary preventative action(s) will be put in place. Procedures will be reviewed following any incidents.

3.1 Fire:

- 3.1.1 In the event of a fire, the nearest and safest fire alarm will be activated by breaking the glass.
- 3.1.2 All employees and visitors will leave the premises in an orderly fashion by the closest and safest emergency exit. The Facility Manager is the nominated incident controller. In the absence of the Facility Manager, the Deputy Facility Manager will be the incident controller.
- 3.1.3 The Facility Manager or Deputy Facility Manager will ensure a roll call is taken. It should be noted that it is expected that there will be a maximum of 4-5 persons on site at any one time during opening hours (i.e. two Harp employees, one delivery person and two visitors). However, it may only be the Facility Manager or Deputy Manager on site, in which case, a roll call will not be required.
- 3.1.4 The fire alarm is monitored externally. The local fire brigade will be notified by the external monitoring company that the alarm has been activated and will respond.
- 3.1.5 No employee or visitor will re-enter the building until the incident controller has given instruction.
- 3.1.6 A record of any incident will be completed and corrective action put in place immediately in accordance with the Pollution Incident Response Plan.
- 3.1.7 Fire alarms are tested bi-annually.
- 3.1.8 Fire extinguishers are tested annually by a competent person.

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3.2 Spillages

- 3.2.1 A spill kit and drip tray is located on site, adjacent to the spill pallet storing Jerry Cans with diesel for the forklift and the waste liquids storage tanks.
- 3.2.2 In the unlikely event of a diesel leak from the forklift, waste oil spillage or cooling fluid spillage, absorbent material / mats and a drip tray will be put in place to contain the release.
- 3.2.3 In the event of a small release from a delivery / collection vehicle, absorbent material/mats and drip tray will be put in place to contain the release. Nearby drains will be protected in the same manner.
- 3.2.4 The absorbent material / mats and any diesel collected in the drip tray will be appropriately contained in suitable receptacles and will be removed from site by a suitably permitted waste contractor for recovery or disposal at an authorised facility.
- 3.2.5 A record of spillages are maintained by the Facility Manager or Deputy Facility Manager and any corrective action taken.

3.3 Accidents

- 3.3.1 A first aid kit is located on site for use in the event of an accident.
- 3.3.2 If medical assistance is required an ambulance will be called.
- 3.3.3 All accidents are recorded by the Facility Manager or Deputy Facility Manager.
- 3.3.4 All accidents will be investigated and corrective plans put in place immediately.
- 3.3.5 If the accident results in an employee being unable to return to work for more than 3 consecutive days the Facility Manager or Deputy Facility Manager will report the accident to the Health and Safety Authority (HSA).
- 3.3.6 If the accident results in a Visitor requiring treatment from a medical practitioner, the Facility Manager or Deputy Facility Manager will report the accident to the HSA.

3.4 Illnesses

- 3.4.1 If a member of staff is taken ill, and medical intervention required, an ambulance will be called.
- 3.4.2 The cause of the illness will be investigated and if it is deemed to be work related, preventative action will be put in place.
- 3.4.3 Records of any such illnesses and preventative actions will be maintained by the Facility Manager or Deputy Facility Manager.

3.5 Near Misses

- 3.5.1 All near misses will be investigated and recorded by the Facility Manager and Deputy Facility Manager.

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3.5.2 Work instructions and Plans will be reviewed accordingly and preventative action put in place if applicable.

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Harp Refrigerants Limited

Pollution Prevention and Control

Plan

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1. Purpose

This plan has been prepared to identify the potential pollution risks at the facility and to identify the measures which are in place to prevent pollution occurring.

2. Environmental Risks

The environmental risks identified for the planned activity at the facility are detailed in the Environmental Liabilities Risk Assessment (ELRA) for the facility (Document Ref. RH/14/8133WMR02b) which was prepared in accordance with the EPA publications entitled 'Guidance on Assessing and Costing Environmental Liabilities' (2014) and 'Guidance on Financial Provision' (2015).

The environmental risks identified and their risk score can be summarised as follows:

Risk ID	Location	Potential Risk	Risk Score
1	Warehouse	Refrigerant gas leak	2
2	Warehouse	Fire caused by electrical fault	3
3	Within Site Boundary	Diesel leak from delivery/collection vehicle	1
4	Within Site Boundary	Diesel leak from forklift	1
5	Warehouse	Hazardous liquid spill from oil or cooling fluid storage tank	2
6	Warehouse	Waste oil leak from reclamation plant	1

All risks identified have a low or very low likelihood of occurrence and are trivial (risk score 1), minor (risk score 2) or moderate (risk score 3) (as defined by the ELRA Guidance Document). All risks are categorised in the green zone (ELRA Insert 4.5) which indicates the need for continuing awareness and monitoring on a regular basis. The output of the risk treatment process is the development of a statement of measures to be taken to minimise the environmental risk of the activity. The statement of measures is presented in the table below. Ongoing maintenance and inspection procedures have been outlined and highlighted to ensure that the likelihood of occurrence of the identified risks and the potential environmental consequences are kept at a very low rating.

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Risk ID	Potential Hazard	Mitigation Measures to be Taken	Outcome	Action	Completion Date	Responsible Person
2	Fire caused by electrical fault	Programme for testing of electrical services/appliances (i.e. Static/PAT testing) to be prepared	Further reduce likelihood of electrical fault from portable equipment	A programme for Static/PAT testing will be prepared	Annually	Facility Manager
1	Refrigerant gas leak	Procedure already developed for acceptance of waste refrigerant cylinders and drums which specifies an inspection requirement (<i>Work Instruction No. 001</i>). Management to reinforce importance of inspections at regular meetings	Further reduce the likelihood of non-conforming cylinders or drums being received at the site and potentially leading to a gas leak.	Inspection procedure (<i>Work Instruction No. 001</i>) reminder to be regularly issued to any employees working at the facility.	Ongoing	Facility Manager
5	Hazardous liquid spill from oil or cooling fluid storage tanks	Fuel storage tanks brought to site for waste oil and cooling fluid storage will be in good condition and regularly inspected to ensure the tank and bund integrity is not compromised.	Reduced risk of leak or rupture of storage tanks	Tank integrity to be inspected as part of regular site inspections.	Ongoing	Facility Manager
3	Diesel leak from delivery/collection vehicle	A Pollution Prevention & Control Plan will be prepared which specifies measures in place to mitigate risk of diesel leak migrating to the	Further reduces the likelihood of diesel leak migrating to surface	Provision of copy of the Pollution Prevention & Control Plan in the office and providing	Ongoing	Facility Manager

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Risk ID	Potential Hazard	Mitigation Measures to be Taken	Outcome	Action	Completion Date	Responsible Person
		surface water drains	water drains	spill kits close to delivery areas.		
4	Diesel leak from forklift	A Pollution Prevention & Control Plan will be prepared which specifies measures in place to mitigate risk of diesel leak migrating to the surface water drains.	Further reduces the likelihood of diesel leak migrating to surface water drains	Provision of copy of the Pollution Prevention & Control Plan in the office and providing spill kits close to delivery areas.	Ongoing	Facility Manager
6	Waste oil leak from reclamation plant	A Pollution Prevention & Control Plan will be prepared which specifies measures in place to mitigate risk of diesel leak migrating to the surface water drains.	Further reduces the likelihood of diesel leak migrating to surface water drains	Provision of copy of the Pollution Prevention & Control Plan in the office and providing spill kits close to delivery areas.	Ongoing	Facility Manager

3. Pollution Prevention and Control Plan

This Pollution Prevention and Control Plan is in place to address any of the potential pollution incidents that could occur at the facility as summarised in Section 2 of this Plan and detailed in the ELRA for the facility (Document Ref. RH/14/8133W/MR02b).

3.1 Fire caused by electrical fault

The only plausible fire scenario anticipated at the facility is from an electrical fault. The likelihood of a fire occurring was determined in the ELRA to be very low and it was identified as having a moderate consequence.

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The potential environmental effects identified in the ELRA in the unlikely event of a fire from an electrical fault are release of smoke to atmosphere, generation of firewater and disposal of burnt waste material.

There are lights and basic electrical wiring at a high level throughout the warehouse and there is IT equipment and kitchen appliances in the office. The office area is constructed of concrete blocks with timber joists in the ceiling. Outside of the office area there is very little combustible material in the warehouse.

The reclaim plant runs on three phase electrical power and is fitted with emergency stops and trip switches in the event of an electrical fault. The plant is constructed from steel which is not highly combustible. The refrigerant gases are non-flammable and are fire retardants. The cylinders/drums for holding the gas are maintained in good condition.

The Pollution Prevention and Control measures that are in place include the following:

1. A programme for testing of electrical services/appliances (i.e. Static / PAT testing) is currently being prepared.
2. Fire extinguishers are strategically positioned within the warehouse.
3. The fire alarm is monitored externally.
4. No hazardous materials are stored in the office area so resultant smoke, firewater and ash will not contain significant hazardous substances.
5. In the unlikely event of a fire, firewater will be diverted to the storm-water drains at the site by using absorbent material / mats from the spill kit kept at the site. Firewater discharged from a fire at this facility would have a short-term moderate impact on the quality of the receiving storm water drainage system.
6. If possible, depending on the extent of the fire and firewater / extinguishers used, firewater will be contained and fully absorbed by using saw dust or other suitable absorbent material.
7. Fire damaged solid waste material including materials used for firewater absorption will be removed from site by a suitably permitted waste contractor for recovery or disposal at an authorised facility.

3.2 Leak of refrigerant gas from storage cylinder or drum

The potential environmental effects identified in the ELRA from a leak of refrigerant gas from storage cylinder or drum is the release of gas which may have ozone layer depleting effects or global warming potential. The likelihood of this occurring was determined in the ELRA to be low with a trivial consequence (i.e. no impact or negligible change to the environment). The potential volume of gas which could be released in an incident would be minute in terms of ozone layer depletion.

The Pollution Prevention and Control measures that are in place include the following:

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1. The gas cylinders and drums owned by Harp Refrigerants are maintained in good condition prior to distribution from their UK facility.
2. All cylinders and drums accepted at the site will be inspected to ensure they are in good condition in accordance with *Work Instruction No. 001*. Management to reinforce importance of inspections at regular meetings. To further reduce the likelihood of non-conforming cylinders or drums being received at the site and potentially leading to a gas leak, a *Work Instruction No. 001* reminder will be regularly issued to any employees working at the facility.
3. The reclaim plant is operated at negative pressure so that there is no release to atmosphere from connection and disconnection of hosing.

3.3 Diesel leak from delivery/collection vehicle

The potential environmental effects identified in the ELRA from a diesel leak from delivery or collection vehicle at the site is the potential for the leaked diesel to reach storm-water drains on site and be carried to receiving surface water body. The likelihood of this occurring was determined in the ELRA to be very low with a trivial consequence (i.e. no impact or negligible change to the environment).

The entire site is covered in concrete hardstanding so any potential release would be prevented from reaching soil or groundwater.

Major tank rupture and large volume release at the site is not considered plausible so potential release would be small in volume and could easily be contained by a spill kit which would prevent the diesel from reaching the storm-water drain. The closest storm-water drain is likely to be at least 5m from parked location of delivery / collection truck at any time and would allow enough time for absorbent booms and drip tray to be put in place.

In the unlikely event of leak or release, it is likely to be very small in volume and would be significantly diluted by other contributions to the municipal storm-water network prior to release to surface water.

The Pollution Prevention and Control measures that are in place include the following:

1. A spill kit and drip tray will be stored on site.
2. All personnel will be trained in the use of the spill kit and drip tray.
3. In the event of a small release from a delivery / collection vehicle, absorbent material/mats and drip tray will put in place to contain the release.
4. The absorbent materials / mats and any diesel collected in the drip tray will be appropriately contained in suitable receptacles and will be removed from site by a suitably permitted waste contractor for recovery or disposal at an authorised facility.
5. A reminder of this Pollution Prevention and Control Plan will be regularly issued to any employees working at the facility.

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3.4 Diesel leak from forklift

The potential environmental effects identified in the ELRA from a diesel leak from forklift used on site for loading and unloading is the potential for the leaked diesel to reach storm-water drains on site and be carried to receiving surface water body. The likelihood of this occurring was determined in the ELRA to be very low with a trivial consequence (i.e. no impact or negligible change to the environment).

The entire site area is covered in hardstanding so there is no direct pathway from the surface to the soil or groundwater. Storage of diesel and refuelling of the forklift will be carried out internally, away from the surface water drainage gulleys on site so there is minimal risk of contamination of the municipal network from a diesel spill.

The Pollution Prevention and Control measures that are in place include the following:

1. The diesel used for refuelling the forklift is stored in two 20 litre Jerry Cans within the warehouse on a suitably sized spill pallet. The spill pallet will be inspected regularly and will be retested in accordance with the manufacturers recommended frequency.
2. A spill tray will be used for refuelling. The spill tray are located adjacent to the spill pallet at all times.
3. A spill kit is stored adjacent to the spill pallet.
4. Refuelling of the forklift will only take place in this area.
5. All personnel will be trained in the use of the spill kit and drip tray for refuelling.
6. In the unlikely event of a diesel leak from the forklift, absorbent material / mats and a drip tray will put in place to contain the release.
7. The absorbent material / mats and any diesel collected in the drip tray will be appropriately contained in suitable receptacles and will be removed from site by a suitably permitted waste contractor for recovery or disposal at an authorised facility.
8. A reminder of this Pollution Prevention and Control Plan will be regularly issued to any employees working at the facility.

3.5 Hazardous liquid spill from oil or cooling fluid storage tanks

The potential environmental effects identified in the ELRA from a leak from waste liquid storage tanks is the potential for the leaked liquids to reach storm-water drains on site and be carried to receiving surface water body. The likelihood of this occurring was determined in the ELRA to be very low with a minor consequence (i.e. negligible change to the environment).

The entire site area is covered in hardstanding so there is no direct pathway from the surface to the soil or groundwater. Tanks for storage waste oil and cooling fluid will be internally away from surface water drainage gulleys so there is minimal risk of contamination of the sewer network from a spill or leak. The maximum quantity of material that will be stored on site will be 4,000 litres but for the majority of time, the actual quantity stored will be much less. Deliveries of waste oil and cooling fluid

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will be in small drums (typically 205 litre drums) so any accident during transfer or decanting into the storage tanks would be small in quantity.

The Pollution Prevention and Control measures that are in place include the following:

1. The waste oil and cooling fluid storage tanks will be bunded and located internally in the warehouse. The tanks will be inspected regularly and maintained according to the manufacturers recommendations.
2. A spill kit will be stored adjacent to the tanks.
3. Decanting into the tanks will be from small drums and collection of the waste oil will most likely be carried out using a suction hose.
4. All personnel will be trained in the use of the spill kit and procedure for decanting.
5. In the unlikely event of spill or leak, absorbent material / mats and a drip tray will put in place to contain the release.
6. The absorbent material / mats and any fluids collected in drip trays will be appropriately contained in suitable receptacles and will be removed from site by a suitably permitted waste contractor for recovery or disposal at an authorised facility.
7. A reminder of this Pollution Prevention and Control Plan will be regularly issued to any employees working at the facility.

3.6 Waste oil leak from reclaim plant

The potential environmental effects identified in the ELRA from an oil leak from the reclaim plant is the potential for the leaked liquids to reach storm-water drains on site and be carried to receiving surface water body. The likelihood of this occurring was determined in the ELRA to be very low with a trivial consequence (i.e. no impact or negligible change to the environment).

The entire site area is covered in hardstanding so there is no direct pathway from the surface to the soil or groundwater. The reclaim plant will be located at the rear of the warehouse, a significant distance from any surface water drainage gulleys so there is minimal risk of contamination of the sewer network from a spill or leak. Any leak of oil from the equipment would be easily identifiable and would be small in volume.

The Pollution Prevention and Control measures that are in place include the following:

1. There is a waste oil sump in the reclaim plant which will retain the oil within the equipment during the reclamation process. When this sump is reaching full, the sump can be emptied and the contents transferred to the waste oil storage tank on site.
2. The reclaim plant will undergo regular scheduled maintenance and the waste oil sump will be inspected as part of the maintenance process.
3. A spill tray will be available for use where required.

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4. A spill kit will be stored adjacent to the fuel and waste liquids storage tanks and available for use if required.
5. All personnel will be trained in the appropriate process for draining oil from the equipment.
6. In the unlikely event of a leak from the equipment, absorbent material / mats and a drip tray will put in place to contain the release.
7. The absorbent material / mats and any oil collected in the drip tray will be appropriately contained in suitable receptacles and will be removed from site by a suitably permitted waste contractor for recovery or disposal at an authorised facility.
8. A reminder of this Pollution Prevention and Control Plan will be regularly issued to any employees working at the facility.

In the event that a pollution incident does occur, the steps that will be taken to respond to the pollution incident are detailed in the Pollution Incident Response Plan.

4. Recording

In the event that a pollution incident does occur, a unique number will be allocated by Harp to the incident and full details of the incident be documented in a register on Harp's intranet.

5. Notification to EPA

The Agency will be notified of any significant pollution incident at the site in accordance with the requirements of the Waste Licence.

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Pollution Incident Response Plan

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Unit 2, Whitestown Industrial Estate, Tallaght, Dublin 24

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Pollution Incident Response Plan

1. Purpose

This plan has been prepared to outline the procedures to be carried out in the event of an incident at the facility.

2. Environmental Risks

The environmental risks identified for the planned activity at the facility are detailed in the Environmental Liabilities Risk Assessment (ELRA) for the facility (Document Ref. RH/14/8133WMR02b) which was prepared in accordance with the EPA publications entitled 'Guidance on Assessing and Costing Environmental Liabilities' (2014) and 'Guidance on Financial Provision' (2015).

The environmental risks identified and their risk score can be summarised as follows:

Risk ID	Location	Potential Risk	Risk Score
1	Warehouse	Refrigerant gas leak	2
2	Warehouse	Fire caused by electrical fault	3
3	Within Site Boundary	Diesel leak from delivery/collection vehicle	1
4	Within Site Boundary	Diesel leak from forklift	1
5	Warehouse	Hazardous liquid spill from oil or cooling fluid storage tank	2
6	Warehouse	Waste oil leak from reclamation plant	1

All risks identified have a low or very low likelihood of occurrence and are trivial (risk score 1), minor (risk score 2) or moderate (risk score 3) (as defined by the ELRA Guidance Document). All risks are categorised in the green zone (ELRA Insert 4.5) which indicates the need for continuing awareness and monitoring on a regular basis. The output of the risk treatment process is the development of a statement of measures to be taken to minimise the environmental risk of the activity. The statement of measures is presented in the table below. Ongoing maintenance and inspection procedures have been outlined and highlighted to ensure that the likelihood of occurrence of the identified risks and the potential environmental consequences are kept at a very low rating.

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Risk ID	Potential Hazard	Mitigation Measures to be Taken	Outcome	Action	Completion Date	Responsible Person
2	Fire caused by electrical fault	Programme for testing of electrical services/appliances (i.e. Static/PAT testing) to be prepared	Further reduce likelihood of electrical fault from portable equipment	A programme for Static/PAT testing will be prepared	Annually	Facility Manager
1	Refrigerant gas leak	Procedure already developed for acceptance of waste refrigerant cylinders and drums which specifies an inspection requirement (<i>Work Instruction No. 001</i>). Management to reinforce importance of inspections at regular meetings	Further reduce the likelihood of non-conforming cylinders or drums being received at the site and potentially leading to a gas leak.	Inspection procedure (<i>Work Instruction No. 001</i>) reminder to be regularly issued to any employees working at the facility.	Ongoing	Facility Manager
5	Hazardous liquid spill from oil or cooling fluid storage tanks	Fuel storage tanks brought to site for waste oil and cooling fluid storage will be in good condition and regularly inspected to ensure the tank and bund integrity is not compromised.	Reduced risk of leak or rupture of storage tanks	Tank integrity to be inspected as part of regular site inspections.	Ongoing	Facility Manager
3	Diesel leak from delivery/collection vehicle	A Pollution Prevention & Control Plan will be prepared which specifies measures in place to mitigate risk of diesel leak migrating to the	Further reduces the likelihood of diesel leak migrating to surface	Provision of copy of the Pollution Prevention & Control Plan in the office and providing	Ongoing	Facility Manager

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Risk ID	Potential Hazard	Mitigation Measures to be Taken	Outcome	Action	Completion Date	Responsible Person
		surface water drains	water drains	spill kits close to delivery areas.		
4	Diesel leak from forklift	A Pollution Prevention & Control Plan will be prepared which specifies measures in place to mitigate risk of diesel leak migrating to the surface water drains.	Further reduces the likelihood of diesel leak migrating to surface water drains	Provision of copy of the Pollution Prevention & Control Plan in the office and providing spill kits close to delivery areas.	Ongoing	Facility Manager
6	Waste oil leak from reclamation plant	A Pollution Prevention & Control Plan will be prepared which specifies measures in place to mitigate risk of diesel leak migrating to the surface water drains.	Further reduces the likelihood of diesel leak migrating to surface water drains	Provision of copy of the Pollution Prevention & Control Plan in the office and providing spill kits close to delivery areas.	Ongoing	Facility Manager

3. Pollution Incident Response Plan

The steps that will be taken to respond to the pollution incident include:

- a) A unique number will be allocated to the incident and it will be documented in a register on Harp's intranet.
- b) The incident will be investigated to determine the causes or potential causes of the incident and determine the nature and extent of the pollution caused, if any.

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- c) Appropriate action will be taken to minimise the effect on the environment, including preventive measures, if required.
- d) Steps will be taken to avoid reoccurrence.
- e) Any remedial action will be taken, if required.

4. Recording

A unique number will be allocated by Harp to the incident and full details of the incident will be documented in a register on Harp's intranet. The requirements for recording of incidents as outlined in the Conditions of the Waste Licence will also be recorded. If necessary, this Incident Response Plan will be updated.

5. Notification to EPA

The Agency will be notified immediately by telephone/fax/email of any incident which occurs as a result of the activity at the facility which:

- a) Has the potential for environmental contamination of surface water or ground water, or
- b) Poses an environmental threat to air or land, or
- c) Requires an emergency response by the local authority.

Full details of this incident will be forwarded to the Agency in writing in accordance with the requirements of the Waste Licence. It is anticipated that notification of the incident will be required to be made via the Agency's online EDEN portal.

The details will include, at a minimum, the following:

- a) The date and time of the incident, or when the incident was noticed;
- b) Details of the incident and the causes of potential causes of it;
- c) An evaluation of environmental pollution caused, if any;
- d) Actions taken to minimise the effect on the environment, including preventative measures;
- e) Steps taken to avoid reoccurrence;
- f) Details of any site investigations instigated by the registration holder; and
- g) Any other remedial action taken.

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ENVIRONMENTAL LIABILITIES RISK ASSESSMENT (ELRA)

(2017 UPDATE)

Technical Report Prepared For

Harp Refrigerants Limited
Unit 2,
Whitestown Industrial Estate,
Tallaght,
Dublin 24.

Prepared By

Robert Hunt, Senior Environmental
Consultant

Our Reference

RH/14/8133WMR02b

Date of Issue

03 May 2017

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Cork Office


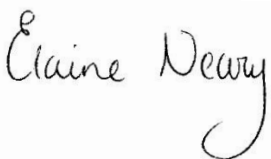
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Document History

Document Reference		Original Issue Date	
RH/14/8133WMR02b		21 December 2015	
Revision Level	Revision Date	Description	Sections Affected
a	12 April 2016	Updated following review by SDCC to amend COR reference number (new COR revision issued since original ELRA issue) and update maximum annual tonnage permitted.	Executive Summary & Sections 1.0, 2.0, 2.7.1, 4.0.
b	03 May 2017	Updated for Waste Licence Application and proposed new recovery activities	All

Record of Approval

Details	Written by	Approved by
Signature		
Name	Robert Hunt	Elaine Neary
Title	Senior Environmental Consultant	Principal Consultant
Date	03 May 2017	03 May 2017

EXECUTIVE SUMMARY

Harp Refrigerants Limited (Harp) have submitted an application to the EPA (the Agency) for a Waste Licence to operate a waste refrigerant gas reclamation facility at Unit 2, Whitestown Industrial Estate, Tallaght, Dublin 24. Harp currently operate a waste acceptance and temporary storage facility at the site under a Certificate of Registration (COR-DS-15-0003-04) issued by South Dublin County Council (SDCC).

Report Preparation and Guidance

An Environmental Liabilities Risk Assessment (ELRA) was prepared in 2015 for submission to SDCC as part of compliance with the COR for the facility. This document presents an updated ELRA for the facility in line with the proposed additional activities to be carried out at the site under the Waste Licence.

This document has been prepared in accordance with the EPA publications entitled '*Guidance on Assessing and Costing Environmental Liabilities*' (2014) and '*Guidance on Financial Provision*' (2015).

This report has been prepared by AWN Consulting Ltd. – Clonsaugh Business and Technology Park, Dublin 17.

Comparison with Previous Plans

This is the second version of the CRAMP for this facility. Previous CRAMP costs, as agreed with SDCC, are presented below.

Year	ELRA Cost	Financial Provision
2015	€10,562.50	Environmental Liability Insurance
2017	€10,562.50	Environmental Liability Insurance

The financial provision has been based on the risk that poses the plausible worst case scenario. This is the maximum liability that may be incurred and, as such, financial provision is calculated as €10,562.50 based on this event.

Harp propose to provide environmental liability insurance as financial provision to cover the potential cost of the worst case risk of environmental pollution from the facility. This will be subject to agreement with the Agency.

Risk management at Harp is a dynamic process and will be revised through the addition of new risks or the omission of redundant risks. The financial provision will be reviewed in accordance with the requirements of the facility registration to ensure that it continues to cover the environmental liabilities.

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FIGURES

Figure 1 – Site Location Map

Figure 2 – Site Layout Map

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1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) have prepared this Environmental Liabilities Risk Assessment on behalf of Harp Refrigerants Limited (Harp) for their waste facility at Unit 2, Whitestown Industrial Estate, Tallaght, Dublin 24.

Harp currently operate the waste facility under a Certificate of Registration (COR) from South Dublin County Council (SDCC) for the *'temporary storage of deposits of reclaimed waste refrigerants'*. The COR reference number is COR-DS-15-0003-04 and is valid from 5th February 2016 to 2nd November 2020.

This 2017 update of the Environmental Liabilities Risk Assessment (ELRA) is being prepared as part of a Waste Licence Application to the EPA (the Agency) to carry out additional reclamation of refrigerant gas from waste gas at the facility.

The proposed principal activity which will be carried out at the facility under the Waste Licence (in accordance with the *Fourth Schedule* of the *Waste Management Act 1996*, as amended) will be:

"R3 – Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes), which includes gasification and pyrolysis using the components as compounds".

In addition, the following activities will also be carried out at the facility:

"R12 – Exchange of waste for submission to any of the operations numbered R1 to R11 (if there is no other R code appropriate, this can include preliminary operations prior to recovery including pre-processing such as, amongst others, dismantling, sorting, crushing, compacting, pelletising, drying, shredding, conditioning, repackaging, separating, blending or mixing prior to submission to any of the operations numbered R1 to R11)"

and

"R13 – Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage (being preliminary storage according to the definition of 'collection' in Section 5 (1)), pending collection on the site where the waste is produced)".

This document presents the ELRA for the facility. A Closure, Restoration and Aftercare Management Plan (CRAMP) has also been prepared and is presented under a separate cover (AWN Ref. RH/14/8133WMR01b). Both documents are prepared in accordance with the EPA publications entitled *'Guidance on Assessing and Costing Environmental Liabilities'* (2014) and *'Guidance on Financial Provision'* (2015) as well as the *'Additional Guidance on Environmental Impairment Liability Insurance'* published in 2016.

This risk assessment has been prepared by an appropriately qualified consultant at:

AWN Consulting Ltd.
The Tecpro Building,
Clonsaugh Business & Technology Park,
Dublin 17.

1.1 Scope of Work

The scope of this report is covered by the requirements provided in the guidance documents referenced above as well as Section J of the Waste Licence Application.

The areas covered in this revision of the ELRA include:

- Site evaluation, comprising:
 - Baseline review;
 - Plant and equipment on site; and
 - Environmental performance.
- Site assessment and review with Harp;
- Risk identification and assessment;
- Identification of risk mitigation measures and the development of a risk management programme; and
- Quantification of the plausible worst case scenario.

1.2 Key Assumptions

There is a reasonable degree of uncertainty involved in environmental liabilities risk assessment and therefore it is important to identify any assumptions at an early stage.

It is assumed that Harp will maintain the site conditions in accordance with the requirements of the Waste Licence until closure of the facility. Future revisions of this document will account for any significant changes in the environmental condition of the site. No provision has been made for costs associated with any legal proceedings that could arise relating to an environmental incident, as firstly, there is goodwill and a strong desire by Harp to remain compliant with relevant legislation, the facility Waste Licence and the EPA's requirements and, secondly, such costs are uninsurable and cannot be underwritten by any third party or insurance organisation.

This ELRA has been based upon historic uses of the site and current operational activities. The report has not considered the potential environmental liabilities associated with significant changes in use of the site, such as redevelopment for other commercial or industrial purposes by Harp, or any other party, as these would require a separate risk assessment exercise, should they arise.

It should also be noted that this risk assessment does not include a costing of the final clean-up of the site after closure. This is set out in the CRAMP submitted under a separate cover.

1.3 Disclaimer

This ELRA report is based on previous documented information and information supplied by Harp to AWN. This report has been prepared for the use of Harp only and for submission to the EPA. Specified costs are based on best estimates within the market place at the time of submission and will vary with time.

2.0 SITE DESCRIPTION

Harp currently operate a centralised collection and transfer station for refrigerant gases from the facility in Tallaght. At present, there is no processing of waste at the facility and gas cylinders/drums are temporarily stored at the facility, for a period of less than six months in accordance with the facility registration, pending onward transfer to Harp

International in the UK for recovery, where possible. The maximum quantity of refrigerant gases permitted to be stored on the site at any one time is 18 tonne and the annual tonnage permitted is 500 tonnes under the existing COR. Upon receipt of a Waste Licence, it is proposed to store a maximum of 45 tonne of waste gas at any one time with the annual maximum tonnage remaining at 500 tonne.

The Harp facility is located in the Whitestown Industrial Estate in Tallaght as shown in Figure 1. The land use around the facility is mostly industrial in nature with a welding company to the north and other manufacturing businesses surrounding the site. There is an indoor adventure centre in the warehouse building to the south of Harp's facility. Henkel Ltd. is a significant manufacturing operation in the industrial estate and the facility to the east of Harp's site holds an IED Licence (Reg. No. P0079-03) from the EPA for the "chemical manufacture of glues, bonding agents and adhesives".

The closest residential development to the site is approximately 400m to the east.

There is a warehouse located on the site which occupies approximately 70% of the site area. The internal warehouse area and all of the external areas of the site are covered in concrete hardstanding. The site is surrounded by fencing approximately 2m in height on all sides. All waste storage activities are carried out inside the warehouse. A site layout plan is included as Figure 2.

The topography of the area is flat and the closest watercourse is the Whitestown Stream which runs to the south of the site through the middle of the industrial estate. The stream is approximately 90m from the facility boundary. There is no direct hydrological link between the site and the stream.

The site occupies an area of c. 750m² and currently employs two people to work at the facility on a part-time basis. Upon receipt of the Waste Licence, it is anticipated that this will increase to three employees. Full-time or part-time employment will depend on the quantities of waste accepted at the site.

SDCC currently regulates the facility through a Certificate of Registration (COR-DS-15-0003-04).

Harp's parent company (Harp International Ltd) in the UK has management systems that are certified to ISO9001:2008 (Quality), ISO14001:2004 (Environmental) and OHSAS18001:2007 (Health & Safety). Harp Refrigerants Ltd.'s environmental management system and procedures mirror the parent company procedures, where applicable.

2.1 Facility Description

The site layout map in Figure 2 shows the general layout of the warehouse building and delivery/parking areas at the facility. The main operations can be divided into the following key areas:

- Waste delivery and acceptance;
- Sampling, weighing, recording and labelling;
- Waste gas reclamation;
- Temporary storage; and
- Dispatch from site as waste or as reclaimed gas product.

The ancillary processes and operations are as follows:

- Gas cylinder or drum weighing;

- Fire protection;
- Forklift refuelling; and
- Office administration.

Waste refrigerant gases are delivered to the site in cylinders/drums typically in rigid body curtain sided trucks. The cylinders/drums are usually contained within cages to assist with lifting and transport. A site dedicated forklift is used to offload the cages from the truck and transfer inside the building to the Waste Holding Area. The cylinders/drums are checked, weighed and recorded in accordance with *Work Instruction 001: Waste Acceptance, Recording, Handling and Storage of Cylinders or Drums containing Waste Refrigerants*.

Under the Waste Licence authorisation, Harp will be able to process a portion of the waste gas cylinders/drums received at the facility using the company's bespoke reclamation plant. The suitability of the waste gas for processing using the reclamation equipment proposed for installation in Tallaght will depend on the refrigerant gas type, purity and level of impurities present. Although some of the waste gas received may not be able to be reclaimed using the equipment to be installed in Tallaght, it may still be suitable for reclamation using more advanced equipment at the Harp International facility in Pontypridd in Wales. The facility in Wales operates on a much larger scale than what is proposed for Tallaght and there is a much larger waste refrigerant gas market in the UK to justify more advanced treatment options and laboratory facilities.

Waste refrigerant gas that is reclaimed in Ireland will be sampled to confirm its quality and purity and made available to the Irish market as reclaimed refrigerant. Waste refrigerant gas that is not suitable for reclamation in Tallaght will be exported to Harp International in Wales for more detailed analysis and reclamation, where possible. In some cases, the waste gas is not suitable for reclamation and has to be disposed of by high temperature incineration.

In addition to temporary storage and reclamation of waste refrigerant gas, the facility in Tallaght will also accept small quantities of waste refrigeration oil and cooling fluid from suitably registered refrigeration and air conditioning (RAC) contractors. The waste oil and cooling fluid will be deposited into two 2,000 litre capacity bunded storage tanks pending collection by an authorised hazardous waste contractor for off-site recovery.

The warehouse is the only building on the site and measures approximately 50m long, 10m wide and 10m high at the apex.

2.1.1 Main Plant

The primary facility processes and activities are summarised as follows:

Inputs:

- Waste refrigerant gases;
- Diesel Fuel;
- Electricity; and
- Water (for welfare facilities only).

Unit Operations:

- Waste acceptance, sampling, weighing, recording and labelling;
- Waste gas reclamation; and
- Temporary storage of waste material.

Outputs:

- Waste materials;
 - Waste refrigerant gas in cylinders/drums;
 - Waste refrigerant oil;

- Waste cooling fluid;
- Non-hazardous commercial waste (i.e. general and recycling)
- Emission of air contamination from cylinders/drums during reclamation; and
- Removal of reclaimed gas product from site.

2.1.2 Ancillary Facilities

Office

There is an office located adjacent to the main entrance to the warehouse which is used for general administration activities. The office also includes basic welfare facilities (kitchenette and WC) for employees.

Weighing

There is a trade approved calibrated weighing scales located in the warehouse which will be used for weighing the incoming cylinders/drums prior to storage. The gross weight of the cylinder/drum will be displayed on the weighing scales and the tare weight (i.e. empty weight of the cylinder/drum) is displayed on each cylinder/drum. The net weight of the waste is the gross weight less the tare weight.

Utilities

Electricity is used to power lighting, heating systems and office equipment.

A small supply of diesel is stored onsite for refuelling the forklift. The diesel is stored in two 20 litre Jerry Cans in the warehouse on a suitably sized spill pallet. A spill kit and spill tray is located adjacent to the spill pallet at all times. Refuelling of the forklift will only take place in this area.

Fire Protection

Fire extinguishers are located throughout the warehouse and are maintained on a regular basis.

Fire doors and emergency lighting/way finding have been installed and escape access routes provided. The fire detection and alarm system was upgraded in 2015/2016 in accordance with the requirements of I.S. 3218:2013.

A Fire Safety Compliance Report was completed by Fahy Fitzpatrick Consulting Engineers in April 2016 and submitted to SDCC as part of compliance with the COR.

Security

The facility is surrounded by fencing and the access gate is closed and secured when there is no-one at the facility. The warehouse building is secured separately.

The site is monitored by CCTV 24 hours per day, 7 days per week.

There is an intruder alarm on the warehouse which is monitored remotely.

2.1.2 Inventory of raw materials/products/wastes

An inventory of the raw materials, products and wastes generated at the facility along with maximum storage capacities are presented in Insert 2.1 below. The inventory and associated storage capacities are based on the proposed materials and quantities in the Waste Licence Application.

TYPE	STORAGE AREA	STORAGE TYPE	MAX STORAGE CAPACITY	MEASUREMENT UNIT
Raw Materials				
Diesel	Warehouse	Jerry cans	40	litres
Products				
Reclaimed Refrigerant Gas	Warehouse (Treated Waste Storage Area)	Cylinders/Drums	15	tonnes
Waste				
Refrigerant Gas	Warehouse (Waste Holding, Untreated Waste Storage and Quarantine Areas)	Cylinders/Drums	31	tonnes
Refrigerant Oil	Warehouse	Storage tank	2,000	litres
Cooling Fluid	Warehouse	Storage tank	2,000	litres
Molecular sieve absorbent (non-hazardous drying agent)	Warehouse (Office Area)	Small bins	120	litres
Non-Hazardous Commercial Waste (general and recycling)	Warehouse (Office Area)	Small bins	120	litres

Insert 2.1 Inventory of raw materials, products and wastes at the Harp facility

2.2 Facility Operations

The proposed hours of operation will be between 8am and 6pm from Monday to Friday and between 8am and 2pm on Saturday. The facility will not be operational on Sundays or Bank Holidays.

In the first number of months, it is likely that the incoming quantities of waste will not justify the facility being open full-time. There may not be deliveries of waste to the facility on a daily basis and removal of waste from the facility will be as required. Operation of the reclamation plant is likely to run when there is sufficient quantity of suitable waste available to process (subject to maximum storage allowable as per Insert 2.1).

There will be Facility Manager/Deputy Facility Manager who will be on-site at all times during deliveries and collections. There will also be at least one technician on-site while gas reclamation is taking place.

2.3 Emissions

The activities at the facility will not generate any process emissions to water, land or sewer. There will be a discharge of air impurities from the reclamation process which will be released to atmosphere. There will also be a minute fugitive gas release from the infrared gas analyser during sampling.

The welfare facilities in the office area are connected to the municipal foul sewer network and surface water run-off from the warehouse roof and car park area at the entrance are discharged to the municipal storm-water sewer network.

Noise emissions from the facility are consistent with the local industrial environment and are isolated to times of deliveries and collections when the forklift is active and there are vehicles being loaded or unloaded.

The forklift at the site is powered by diesel and waste deliveries to the site are typically by rigid body trucks. At maximum, there will be six vehicle movements per day to/from the site.

2.4 Waste

As discussed in Section 2.1, some of the waste refrigerant gas received will not be suitable for reclamation at the facility due to the gas type, impurities type or the level of impurities. The gas type and purity will be determined by use of an infrared gas analyser. Where waste gas is not suitable for reclamation at the facility, it will be moved to temporary storage with similar cylinders/drums and when sufficient quantities have accumulated (typically about 10 tonne), the waste will be exported under TFS to Harp International in Wales. This procedure is detailed in *Work Instruction 002: Shipping Waste to the UK*.

Note: The vast majority of cylinders/drums are required to be returned to Harp only as Harp own the cylinders/drums and 'rent' them on provision of a deposit to the end users.

Waste refrigerant oil and cooling fluid will also be accepted at site and pooled into 2,000 litre capacity storage tanks for temporary storage and collection by authorised hazardous waste contractors. Waste refrigerant oil will also be generated in the on-site reclamation process and this waste oil will be transferred to the 2,000 litre storage tank for removal off-site. The waste oil and cooling fluid will be recovered off-site, where possible.

Molecular sieve absorbent waste is also generated in the reclamation process and this can be disposed of with general office waste.

Office waste will be stored in general waste and recyclable waste bins and collected by a suitably permitted waste contractor. It is envisaged that these waste quantities will be very small. Collections will be arranged as required.

All documentation related to waste movements is retained on-site and stored electronically. Harp maintain an online tracking system for new, reclaimed and waste gas cylinders which keeps records of waste incoming and outgoing from the site. In addition, waste oil and cooling fluid intake and collection will be recorded.

2.5 Bund Integrity Testing

There is one spill pallet used on site to store the diesel Jerry Cans for refuelling the forklift. This spill pallet will be inspected regularly and will be retested in accordance with the manufacturers recommended frequency.

Upon grant of the Waste Licence, two 2,000 litre capacity banded fuel storage tanks will be installed at the site. The tank bunding will be regularly inspected and maintained in accordance with the manufacturers recommendations.

2.6 Geology and Hydrogeology

According to the Geological Survey of Ireland (GSI), the site area is underlain by the Calp bedrock formation which comprises typically dark grey to black limestone and shale. The overburden is comprised of glacial till.

The GSI online database describes the groundwater vulnerability at the site as *Low* but there are areas of *Moderate* to *Extreme* vulnerability, as well as areas where rock is close to or at surface, to the north and south of the site. The bedrock aquifer underlying the site is described as being a *Locally Important Aquifer – Bedrock which is Moderately Productive only in local zones*.

Site investigations from neighbouring sites indicate that the bedrock is approximately 2.5 – 5.5m below ground level (bgl) and is overlain by sandy gravelly boulder clays which are common in the Dublin area.

The closest watercourse is the Whitestown Stream which runs through the middle of the industrial estate and approximately 90m to the south of the site. The Whitestown Stream water quality has not been classified but the nearby River Dodder has a *Good Quality* status. There is no direct hydrological link between the site and the stream.

2.6.1 Environmental and Ecological Designations

There are no ecological designations within 1km of the facility. A *Report for Appropriate Assessment Screening* was carried out by Moore Group in April 2016 and concluded that:

- “1. The project is not directly connected with, or necessary to the conservation management of the European sites considered in [the] assessment.
2. The implementation of the project will not have a direct impact on the European sites considered in [the] assessment.
3. The project, alone or in combination with other projects or plans, is not likely to have a significant effect on any European sites in view of their conservation objectives.”

2.6.2 Source-Pathway-Receptor Assessment

The primary facility operations will involve acceptance, recovery and temporary storage of waste gas refrigerants in sealed cylinders/drums. The only emissions from the reclamation process will be air which contaminates the refrigerant gas in the cylinder and waste oil which is collected in a container at the base of the plant. The air emission from the reclamation process is of atmospheric quality and will not negatively impact on air quality.

Waste oil and cooling fluid will be stored in bunded fuel storage tanks within the warehouse. A small volume of diesel (approximately 40 litres) is held on site for refuelling the forklift and this is contained in a Jerry Cans which are stored on a suitably sized spill pallet. A spill kit and spill tray are located adjacent to the spill pallet.

The entire site area is covered in hardstanding so there is no direct pathway from the surface to ground or groundwater. The concrete surface in the warehouse and in the delivery/parking area is in good condition. Storage of diesel and refuelling will be carried out internally, away from the surface water drainage gulleys so there is minimal risk of contamination of the municipal network from a diesel spill. The area where trucks will park during loading and offloading is also away from the surface water gully so that in the event of a fuel leak from a delivery/collection vehicle, there would be sufficient time to place containment booms around the drainage points.

Overall, it is considered that there is little or no risk of a pollutant linkage existing at the facility.

2.7 Operator Performance

2.7.1 Harp Management Systems

A site specific Environmental Management System (EMS) and Work Instructions, based on the Harp International management systems, have been developed for the facility. The Harp International management systems are certified to ISO9001:2008 (Quality), ISO14001:2004 (Environmental) and OHSAS18001:2007 (Health & Safety).

2.7.2 Historical Record

SDCC currently regulates the facility through a Certificate of Registration (COR-DS-15-0003-04). The facility has been in operation since April 2016 and there have been no incidents or complaints to date. SDCC carried out a site visit of the facility in mid-2016.

The site was previously occupied by Smart Waste Solutions Ltd. (since 2001). Smart Waste Solutions Ltd. ceased operations at the site in December 2014. As part of the company's due diligence, a site inspection was carried out prior to submission of the COR application and there was no visual or olfactory evidence of contamination at the site. Additionally, there is no previous record of contamination at the site.

2.8 Risk Management

Harp International operates waste management facilities in numerous countries around the world. The company have an environmental policy and corporate integrated management system which identifies the company's commitment to protection of the environment from their activities. The company's integrated management system is externally audited and certified.

The environmental policy states the company's commitment to "*Ensure employees, including contractors, are responsible for working in a manner that promotes quality and minimises risk of harm to the environment or human health*".

Harp's facility in Whitestown Industrial Estate also has a site specific EMS, Workplan and Work Instructions. The site EMS identifies the environmental impacts of the facility daily operations and identifies the procedures in place to mitigate or eliminate these risks. Employees at the facility are trained in the documented EMS, Workplan and Work Instructions and bespoke waste tracking software used at the facility.

Monthly inspections of the facility are carried out by the Facility Manager (or suitable persons nominated by the Facility Manager).

3.0 ENVIRONMENTAL SENSITIVITY

3.1 Risk Identification

AWN has considered the activities carried out at the facility and generated a list of the processes and activities with the potential to result in harmful environmental effects. The generic risks presented in Table 3.2 of the EPA guidance document have been considered in the preparation of this list.

It is noted that the primary activities carried out at the site are delivery and collection of gas cylinders/drums and reclamation of a portion of the waste gas received. It is, therefore, considered that the number of potential risks to the environment from the site activities are low. A number of potentially hazardous scenarios were considered in the preparation of this ELRA but were considered to not be plausible for the following reasons:

- Errors in waste classification/labelling – most gas cylinders/drums accepted, stored, reclaimed and transported from the site are classified as 14 06 01*. There is no requirement to reclassify the waste material on-site and the staff working at the facility will be trained in identification of cylinders or drums by their barcode (on every Harp owned cylinder / drum), labelling and the incoming documentation. The only other waste types accepted are 16 05 04*, 16 05 05, 16 05 08* or 16 05 09. The waste contractor and receiving waste facility in the UK are permitted to receive all of the above waste types. It is not anticipated that errors in waste classification will occur at the site and in the unlikely event of an error, it is not considered that this will pose an environmental risk at the facility.
- Explosion – The refrigerant cylinders and drums accepted by Harp at the facility are not explosive or flammable. There are refrigerant gases on the market such as propane and ammonia which are flammable but Harp do not accept them at this facility. Cylinders and drums containing flammable refrigerants are easily distinguishable from non-flammable containers by means the valve used for refilling. In non-flammable containers accepted by Harp the valve is made from brass but in ammonia containers the valve has to be made from stainless steel to avoid corrosion. The valve connection to refill non-flammable containers accepted at Harp will not connect to the valve on a propane supply line, so it not possible to have these flammable substances in the non-flammable containers accepted by Harp.
- Soil or Groundwater contamination – The entire site is covered in hardstanding so there is no direct contamination pathway to soil or groundwater.

A list of the plausible risks identified at the facility are presented in Insert 3.1.

Risk ID	Location	Potential Risk
1	Warehouse	Refrigerant gas leak
2	Warehouse	Fire caused by electrical fault
3	Within Site Boundary	Diesel leak from delivery/collection vehicle
4	Within Site Boundary	Diesel leak from forklift
5	Warehouse	Hazardous liquid spill from oil or cooling fluid storage tanks
6	Warehouse	Waste oil leak from reclamation plant

Insert 3.1 Plausible risks identified for the Harp Refrigerants facility

4.0 RISK ANALYSIS

The risks identified above have been assessed in terms of their likelihood and consequence based on the classifications presented in Inserts 4.1 and 4.2. The consequence rating in terms of potential environmental impacts and costs of a hazard occurrence given the existing controls are presented in Insert 4.1. The cost reflects the expense that may be incurred in managing and rectifying the hazard event. Insert 4.2 rates the likelihood of the potential hazard actually occurring given the existing controls.

Rating	Consequence	
	Category	Description
1	Trivial	No impact or negligible change to the environment
2	Minor	Minor impact/localised or nuisance
3	Moderate	Moderate impact to the environment
4	Major	Sever impact to the environment
5	Massive	Massive impact to a large area, irreversible in the medium term

Insert 4.1 Risk Classification Table – Consequence

Rating	Likelihood	
	Category	Description
1	Very Low	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring
3	Medium	Medium chance of hazard occurring
4	High	High chance of hazard occurring
5	Very High	Very high chance of hazard occurring

Insert 4.2 Risk Classification Table – Likelihood

Insert 4.3 over presents the risk assessment of the identified risks listed previously. For each risk, the table presents the nature of the hazard and its potential environmental effect. A likelihood (L) and consequence (C) rating is assigned to each risk and a risk score is generated based on the product of the two ratings (i.e. L x C). This risk score allows the identified risks to be ranked.

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Risk ID	Area	Potential Risk	Environmental Effect	(L) Rating	Basis of Rating	(C) Rating	Basis of Rating	Risk Score
1	Warehouse	Leak of refrigerant gas from storage cylinder/drum or reclaim plant	Release of gas which may have ozone depleting effects or global warming potential	2	<p>Gas cylinders/drums owned by Harp Refrigerants are maintained in good condition. All cylinders and drums accepted at this site in Tallaght will be inspected to ensure they are in good condition.</p> <p>Hosing and connections are regularly inspected to ensure there is no damage. Reclaim plant is operated under negative pressure so gas release is not likely.</p>	1	Potential volume of gas which could be released during pooling, sampling or reclamation would be tiny and not significant in terms of ozone depletion or global warming.	2
2	Warehouse	Fire caused by electrical fault	Release of smoke to atmosphere, generation of firefighting water/foam and disposal of burnt waste material	1	<p>Electrical supply to the office area will be to power basic equipment only including lights, computer, welfare appliances etc. Equipment will be maintained in good working order and any damaged cables will be removed and repaired or replaced. Likelihood of spark or overloading of equipment is very low.</p> <p>Reclamation plant operates on three phase power supply. Equipment is maintained in good condition and 'clean' nature of the work means that damage to cables or equipment which may produce spark is unlikely.</p>	3	<p>No hazardous materials will be stored in the office of area so resultant firewater and ash will not have hazardous content. Refrigerant gas which is accepted at the facility is not flammable.</p> <p>Fire will cause some release of smoke to atmosphere.</p> <p>Firewater will be diverted to the storm-water drains at the site by using absorbent booms from spill kits kept at the site. Firewater discharged from a fire at this facility would have a moderate short-term impact on the quality of the receiving storm water drainage system but would be highly diluted by the time it reaches a treatment system/receiving body.</p> <p>If possible, depending on the extent of the fire and firewater/extinguishers used, firewater will be contained and fully absorbed by using saw dust or other suitable absorbent material.</p>	3

Risk ID	Area	Potential Risk	Environmental Effect	(L) Rating	Basis of Rating	(C) Rating	Basis of Rating	Risk Score
							Fire damaged solid waste material including materials used for firewater absorption will be removed from site by a suitably permitted waste contractor for recovery or disposal at an authorised facility.	
3	Within Site Boundary	Diesel leak from delivery or collection vehicle at the site	Potential for diesel leak to impact on environmental soil or water quality.	1	<p>Entire site is covered in concrete hardstanding so any potential release would be prevented from direct release to soil or groundwater.</p> <p>Major tank rupture and large volume release at the site is not considered plausible so potential release would be small in volume and could easily be contained by spill kit which would prevent the diesel from reaching the surface water drain. Closest surface water drain is likely to be at least 5m from parked location of delivery/collection truck at any time and would allow enough time for absorbent booms and drip tray to be put in place.</p>	1	Leak or release into surface water drain is likely to be very small in volume and would be significantly diluted by other contributions to the municipal storm-water network prior to release to treatment system/receiving body.	1
4	Within Site Boundary	Diesel leak from forklift used on site for loading and unloading	Potential for diesel leak to impact on environmental soil or water quality.	1	<p>Entire site is covered in concrete hardstanding so any potential release would be prevented from direct release to soil or groundwater.</p> <p>Release would be small in volume and could easily be contained by spill kits which would prevent the diesel from reaching the surface water drain. Closest surface water drain is likely to be at least 5m from forklift activities at any time</p>	1	Forklift diesel tank capacity is 50 litres so leak or release is likely to be very small in volume and would be significantly diluted by other contributions to the municipal storm-water network prior to release to treatment system/receiving body.	1

Risk ID	Area	Potential Risk	Environmental Effect	(L) Rating	Basis of Rating	(C) Rating	Basis of Rating	Risk Score
					and would allow enough time for absorbent booms and drip tray to be put in place. Refuelling will only be carried out internally using a drip tray and will be carried out next to the spill kit.			
5	Warehouse	Hazardous liquid spill from oil or cooling fluid storage tanks	Potential for waste oil or cooling fluid leak/spill to impact on environmental soil or water quality.	1	Deliveries of waste oil and cooling fluid will be infrequent (likely once per week on average). Liquids will be stored in bunded fuel tanks so that any tank leak will be contained.	2	Small quantity leak/spill may occur during loading/unloading but consequence would be low due to hardstanding site cover and distance to surface water drain. Large spill or tank rupture is highly unlikely but in the event of occurrence and release to the surface water drainage network would have a short term impact on the receiving sewer. High level of dilution would occur.	2
6	Warehouse	Waste oil leak from reclamation plant	Potential for waste oil from reclaim plant to impact on environmental soil or water quality.	1	Waste oil in reclaim plant collects in sealed sump. Damage or leak from container is unlikely.	1	Quantity of waste oil within plant is small and area is covered in hardstanding. Considerable distance to the surface water drain. Any leak from sump would be identified quickly.	1

Insert 4.3 Assessment of Environmental Risks at Harp facility

4.1 Risk Evaluation

Insert 4.4 presents the assessed risks from Insert 4.3 in ranked order based on risk score to assist in prioritisation for risk treatment process.

Risk ID	Location	Potential Risk	(C x L) Risk Score
2	Warehouse	Fire caused by electrical fault	3
1	Warehouse	Refrigerant gas leak	2
5	Warehouse	Hazardous liquid spill from oil or cooling fluid storage tanks	2
3	Within Site Boundary	Diesel leak from delivery/collection vehicle	1
4	Within Site Boundary	Diesel leak from forklift	1
6	Warehouse	Waste oil leak from reclamation plant	1

Insert 4.4 Identified risks ranked in terms of risk score

A Risk Matrix has been developed to display the risks visually with colour coding to give an indication of the critical nature of each risk. The risk scores of each of the identified risks from Insert 4.3 and Insert 4.4 are presented on the risk matrix in Insert 4.5 (referenced by the Risk ID).

LIKELIHOOD	Very High	5					
	High	4					
	Medium	3					
	Low	2					
	Very Low	1	3, 4, 6	5	2		
			Trivial	Minor	Moderate	Major	Massive
			1	2	3	4	5
			CONSEQUENCE				

Insert 4.5 Risk matrix for Harp Refrigerants facility (numbers in shaded cells are Risk IDs)

The risk matrix indicates that there are no potential risks in the red zone or the amber zone.

All risks are located in the green zone which indicates the need for continuing awareness and monitoring on a regular basis.

5.0 RISK TREATMENT

The output of the risk treatment process is the development of a statement of measures to be taken to minimise the environmental risk of the activity. The statement of measures is presented in Insert 5.1. Ongoing maintenance and inspection procedures have been outlined and highlighted to ensure that the likelihood of occurrence of the identified risks and the potential environmental consequences are

kept at a low or very low rating. Any potential mitigation measures which are identified during operations will be implemented and recorded in future versions of this ELRA.

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Risk ID	Area	Potential Hazard	Risk Score	Mitigation Measures to be Taken	Outcome	Action	Completion Date	Responsible Person
2	Warehouse	Fire caused by electrical fault	3	Programme for testing of electrical services/appliances (i.e. Static/PAT testing) to be implemented.	Further reduce likelihood of electrical fault from portable equipment	A programme for Static/PAT testing will be prepared	Annually	Facility Manager
1	Warehouse	Refrigerant gas leak	2	Procedure already developed for acceptance of waste refrigerant cylinders/drums which specifies an inspection requirement (<i>Work Instruction No. 001</i>). Management to reinforce importance of inspections at regular meetings.	Further reduce the likelihood of non-conforming cylinders/drums being received at the site and potentially leading to a gas leak.	Inspection procedure (<i>Work Instruction No. 001</i>) reminder to be regularly issued to any employees working at the facility.	Ongoing	Facility Manager
5	Warehouse	Hazardous liquid spill from oil or cooling fluid storage tanks	2	Fuel storage tanks brought to site for waste oil and cooling fluid storage will be in good condition and regularly inspected to ensure the tank and bund integrity is not compromised.	Reduced risk of leak or rupture of storage tanks	Tank integrity to be inspected as part of regular site inspections.	Ongoing	Facility Manager
3	Within Site Boundary	Diesel leak from delivery/collection vehicle	1	A Pollution Prevention & Control Plan has been prepared which specifies measures in place to mitigate risk of diesel leak migrating to the surface water drains.	Further reduces the likelihood of diesel leak migrating to surface water drains	Provision of copy of the Pollution Prevention & Control Plan in the office and providing spill kits close to delivery areas.	Ongoing	Facility Manager
4	Within Site Boundary	Diesel leak from forklift	1	A Pollution Prevention & Control Plan has been prepared which specifies measures in place to mitigate risk of diesel leak migrating to the surface water drains.	Further reduces the likelihood of diesel leak migrating to surface water drains	Provision of copy of the Pollution Prevention & Control Plan in the office and providing spill kits close to delivery areas.	Ongoing	Facility Manager
6	Warehouse	Waste oil leak from reclamation plant	1	A Pollution Prevention & Control Plan has been prepared which specifies measures in place to mitigate risk of diesel leak migrating to the surface water drains.	Further reduces the likelihood of diesel leak migrating to surface water drains	Provision of copy of the Pollution Prevention & Control Plan in the office and providing spill kits close to delivery areas.	Ongoing	Facility Manager

Risk ID	Area	Potential Hazard	Risk Score	Mitigation Measures to be Taken	Outcome	Action	Completion Date	Responsible Person
				Reclaim plant and waste oil sump integrity to be inspected as part of regular maintenance on the reclaim plant.				

Insert 5.1 Statement of risk mitigation measures

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6.0 IDENTIFICATION OF PLAUSIBLE WORST CASE SCENARIO

The ELRA for the Harp facility has not identified any risks with moderate or major environmental consequences. There was only one risk identified as having a moderate consequence; Risk ID No. 2 (*Fire caused by electrical fault*).

The potential consequences to the environment from a fire at the facility have been determined as the most plausible worst case scenario event. The only realistic ignition source at the facility is electrical supply which may occur in the office area or where the reclamation plant is located. Fire detection equipment installed at the facility will alert the facility manager of the fire and the fire service will be contacted immediately.

There are very few combustible materials stored at the facility and the waste refrigerant gas which is currently accepted (and proposed for acceptance under the Waste Licence) is not flammable. In fact, the waste refrigerant gases received by Harp at the facility are fire retardants.

The office unit is built using concrete blocks and timber ceiling joists with typical office/domestic appliances within. There will be no hazardous substances stored in this area other than small quantities of typical domestic cleaning products. The warehouse building shell is constructed from structural steel and metal cladding and it is expected that a fire in the office would not be sufficient to engulf the whole building or cause major structural damage in a short period of time.

7.0 QUANTIFICATION AND COSTING

The potential for a fire and the resultant costs associated with fire-fighting and clean-up have been quantified in Insert 7.1

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Task	Description	Quantity	Measurement Unit	Unit Rate (€)	Cost (€)	Source of Unit Rates
Risk ID 2: Fire caused by electrical fault	Fire fighting	5	hours	€610 (for first hour and €485 thereafter)	2,550	Emergency Services
	Sampling and analysis of burnt material	1	unit	500	500	WAC Analysis and Sampling Costs
	Transport of waste materials from site	10	tonne	80	800	Waste Contractor
	Disposal of burnt solid waste – non-hazardous	10	tonne	160	1,600	Waste Contractor - Disposal Costs
	Clean-up of building	3	days	1,000	3,000	Harp Estimate
	Subtotal				8,450	
	Contingency @ 25%				2,112.50	
	Total				10,562.50	

Insert 7.1 Quantification and costing of plausible worst case scenario at the Harp facility

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8.0 CONCLUSION

An environmental liabilities risk assessment has been completed for the waste activities carried out at the Harp Refrigerants Ltd. facility in accordance with current EPA guidance.

The financial provision has been based on the risk that poses the plausible worst case scenario. It is anticipated that the scenario which poses the most significant risk of environmental damage is a fire at the facility. This event has been quantified as the maximum liability that may be incurred (including 25% contingency) and, as such, financial provision is calculated as €10,562.50 based on this event.

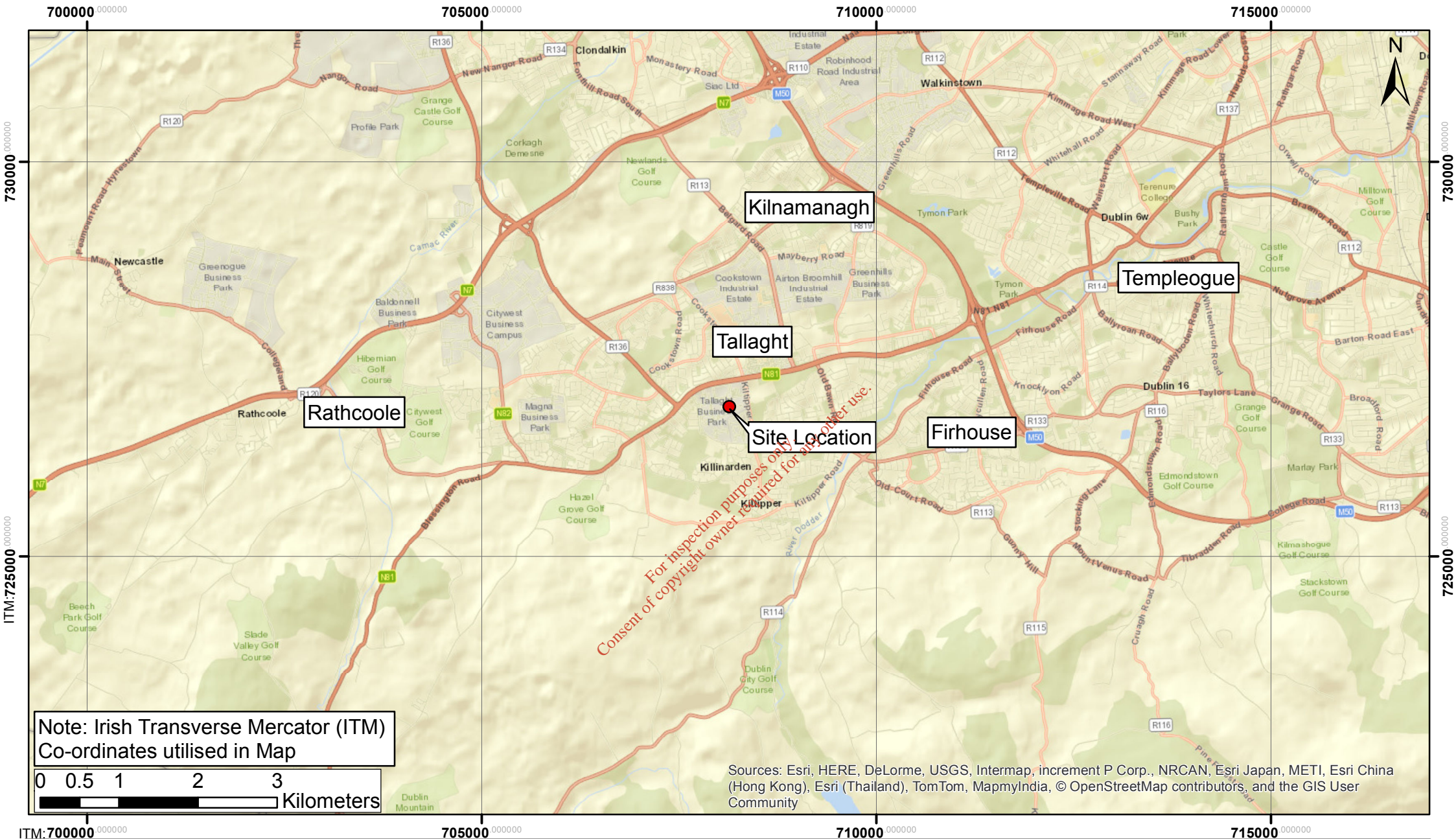
Harp propose to provide this financial provision by way of an environmental liability insurance policy with wording to the agreement of the Agency. Upon approval by the Agency of the estimated costs, Harp will engage with the Agency to put the financial provision in place.

Risk management at Harp is a dynamic process and will be revised through the addition of new risks of the omission of redundant risks. The financial provision will be reviewed in accordance with the requirements of the facility registration to ensure that it continues to cover the environmental liabilities.

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FIGURE 1 – SITE LOCATION MAP

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PROJECT:
CRAMP/ELRA Report

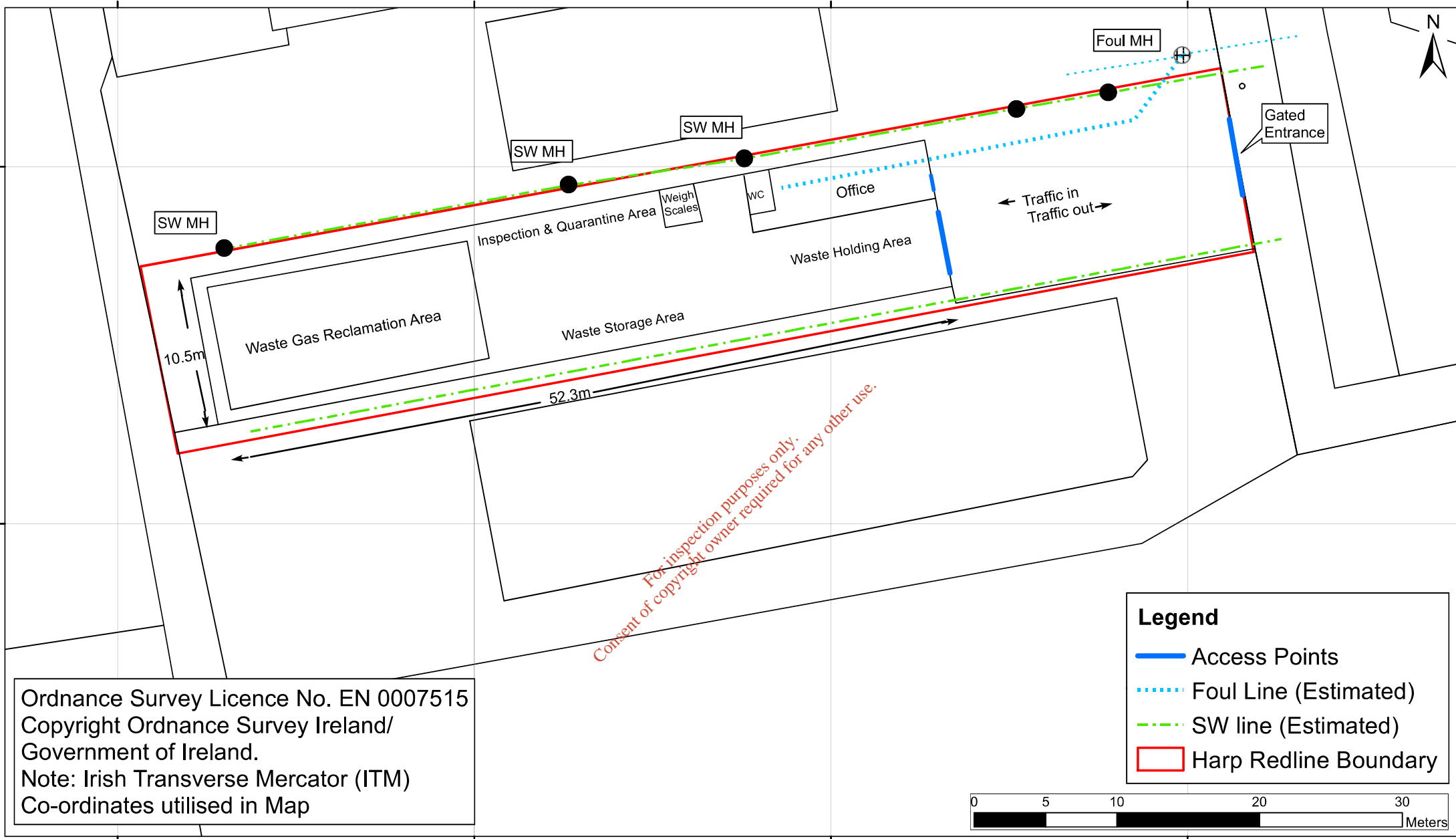
DRAWING TITLE:
Site Location Map

Project Ref. 14/8133

DRAWN	CHECKED	APPROVED	APPD DATE
R.H.	R.H.	E.N	03/05/2017
		No. of Shts	SIZE
		1	A4
		SCALE	SCALE
		1:50,000	
DRAWING NUMBER			SHEET
D001			REV
			1

FIGURE 2 – SITE LAYOUT PLAN

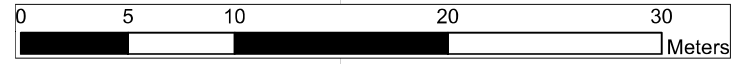
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 Note: Irish Transverse Mercator (ITM)
 Co-ordinates utilised in Map

Legend

- Access Points
- ⋯ Foul Line (Estimated)
- - - SW line (Estimated)
- Harp Redline Boundary



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Harp Refrigerants Ltd

PROJECT:
CRAMP/ELRA Report

DRAWING TITLE:
Site Layout Plan

Project Ref. 14/8133

DRAWN	CHECKED	APPROVED	APPD DATE
R.H.	R.H.	E.N	03/05/2017
No. of Shts		SIZE	SCALE
1		A3	1:250
DRAWING NUMBER		SHEET	REV
D002		1	1

ATTACHMENT K REMEDIATION, DECOMMISSIONING, RESTORATION AND AFTERCARE

Attachment K.1 – Remediation, Decommissioning, Restoration and Aftercare

An Closure, Restoration and Aftercare Management Plan (CRAMP) report is currently in place for the existing facility which has been agreed with SDCC (RH/14/8133WMR01a). This report has been updated to include the activities proposed under the Waste Licence and is attached (RH/14/8133WMR01b).

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CLOSURE, RESTORATION AND AFTERCARE MANAGEMENT PLAN (CRAMP)

(2017 UPDATE)

Technical Report Prepared For

Harp Refrigerants Limited
Unit 2,
Whitestown Industrial Estate,
Tallaght,
Dublin 24.

Prepared By

Robert Hunt, Senior Environmental
Consultant

Our Reference

RH/14/8133WMR01b

Date of Issue

27 April 2017

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Document History

Document Reference		Original Issue Date	
RH/14/8133WMR01b		27 December 2015	
Revision Level	Revision Date	Description	Sections Affected
a	12 April 2016	Updated following review by SDCC to amend COR reference number (new COR revision issued since original ELRA issue) and update maximum annual tonnage permitted.	Executive Summary & Sections 1.0, 2.0, 2.7.1, 4.0
b	27 April 2017	Updated for Waste Licence Application and proposed new recovery activities	All

Record of Approval

Details	Written by	Approved by
Signature		
Name	Robert Hunt	Elaine Neary
Title	Senior Environmental Consultant	Principal Consultant
Date	27 April 2017	27 April 2017

EXECUTIVE SUMMARY

Harp Refrigerants Limited (Harp) have submitted an application to the EPA (the Agency) for a Waste Licence to operate a waste refrigerant gas reclamation facility at Unit 2, Whitestown Industrial Estate, Tallaght, Dublin 24. Harp currently operate a waste acceptance and temporary storage facility at the site under a Certificate of Registration (COR-DS-15-0003-04) issued by South Dublin County Council (SDCC).

Report Preparation and Guidance

A Closure, Restoration and Aftercare Management Plan (CRAMP) was prepared in 2015 for submission to SDCC as part of compliance with the COR for the facility. This document presents an updated CRAMP for the facility in line with the proposed additional activities to be carried out at the site under the Waste Licence.

This document has been prepared in accordance with the EPA publications entitled '*Guidance on Assessing and Costing Environmental Liabilities*' (2014) and '*Guidance on Financial Provision*' (2015).

This report has been prepared by AWN Consulting Ltd. – Clonshaugh Business and Technology Park, Dublin 17.

Comparison with Previous Plans

This is the second version of the CRAMP for this facility. Previous CRAMP costs, as agreed with SDCC, are presented below.

Year	Closure Restoration and Aftercare Cost	Financial Provision
2015	€4,873	Bank Guarantee – Awaiting confirmation from SDCC
2017	€30,576	Bank Guarantee

The scope of this CRAMP addresses the key issues which would occur in an orderly shutdown of all the site activities. It is envisaged that the site will be able to achieve a clean closure so this report presents a closure plan only and not a restoration/aftercare plan. The basis of the plan is to ensure that, upon completion of the closure plan, the facility would be in a suitable state for future industrial use and its condition would not pose a risk to public health and safety or the environment.

Harp intends to utilise existing staff resources to form a team to manage and execute the CRAMP. This team would be responsible for managing and executing this plan in its entirety. The costs associated with closure are generally related to the removal of waste from the site.

As required under the guidance, a detailed costing exercise has been undertaken as part of this CRAMP report. It is estimated that a cost of approximately €30,576 would be incurred to close the facility. A contingency of 5% has also been allowed for unforeseen items.

Harp Refrigerants Ltd. is the Irish subsidiary of Harp International with corporate headquarters in Pontypridd in Wales as well as offices in the US, Qatar and the UAE. Any decision to close the Harp waste facility in Tallaght will be taken by both management at Harp Refrigerants Ltd. and Harp International Ltd.

Harp propose to issue a bank guarantee as financial provision to cover the potential cost of closure of the facility. This will be subject to agreement with the Agency.

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- Figure 1 – Site Location Map
- Figure 2 – Site Layout Map

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- Appendix A – Detailed Costs Assessment for Closure

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1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) have prepared this Closure, Restoration and Aftercare Management Plan on behalf of Harp Refrigerants Limited (Harp) for their waste facility at Unit 2, Whitestown Industrial Estate, Tallaght, Dublin 24.

Harp currently operate the waste facility under a Certificate of Registration (COR) from South Dublin County Council (SDCC) for the *'temporary storage of deposits of reclaimed waste refrigerants'*. The COR reference number is COR-DS-15-0003-04 and is valid from 5th February 2016 to 2nd November 2020.

This 2017 update of the Closure, Restoration and Aftercare Management Plan (CRAMP) is being prepared as part of a Waste Licence Application to the EPA (the Agency) to carry out additional reclamation of refrigerant gas from waste gas at the facility.

The proposed principal activity which will be carried out at the facility under the Waste Licence (in accordance with the *Fourth Schedule of the Waste Management Act 1996*, as amended) will be:

"R3 – Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes), which includes gasification and pyrolysis using the components as compounds".

In addition, the following activities will also be carried out at the facility:

"R12 – Exchange of waste for submission to any of the operations numbered R1 to R11 (if there is no other R code appropriate, this can include preliminary operations prior to recovery including pre-processing such as, amongst others, dismantling, sorting, crushing, compacting, pelletising, drying, shredding, conditioning, repackaging, separating, blending or mixing prior to submission to any of the operations numbered R1 to R11).

and

"R13 – Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage (being preliminary storage according to the definition of 'collection' in Section 5 (1)), pending collection on the site where the waste is produced)".

This document presents the CRAMP for the facility. An Environmental Liabilities Risk Assessment (ELRA) has also been prepared and is presented under a separate cover (AWN Ref. RH/14/8133WMR02b). Both documents are prepared in accordance with the EPA publications entitled *'Guidance on Assessing and Costing Environmental Liabilities'* (2014) and *'Guidance on Financial Provision'* (2015) as well as the *'Additional Guidance on Environmental Impairment Liability Insurance'* published in 2016.

This report has been prepared by an appropriately qualified consultant at:

AWN Consulting Ltd.
The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17.

1.1 Scope of Work

The scope of this report is covered by the requirements provided in the guidance documents referenced above as well as Section K of the Waste Licence Application.

The areas covered in this revision of the CRAMP include:

- Site evaluation, comprising:
 - Baseline review;
 - Plant and equipment on site; and
 - Environmental performance.
- Site assessment and review with Harp;
- Quantification of costs associated with potential closure of the facility.

Based upon a review of the site activities, desk-top research and discussions with site management, a thorough assessment was made of liabilities associated with the closure of the site to which costs could be assigned.

1.2 Closure Scenarios covered in the Plan

As described in Section 3.1 of this report, clean closure of the facility is anticipated. No restoration or aftercare management plan will be required and no such details are included in this report.

This plan has been prepared based on a full closure scenario only i.e. complete shutdown of all activities on site at the same time. It is not anticipated that the facility would be suitable for any sort of phased or partial closure.

1.3 Key Assumptions

It is assumed that Harp will maintain the site condition in accordance with the requirements of the Waste Licence until closure. Future revisions of this document will account for any significant changes in the environmental condition or activities at the site. No provision has been made for costs associated with any legal proceedings that could arise relating to closure as there is goodwill and a strong desire by Harp to remain fully compliant with the relevant legislation, the facility Waste Licence and ultimately to achieve clean closure.

Successful closure will be determined as being complete when wastes, or any other materials that could result in environmental pollution are removed from site and recycled, recovered or disposed of in accordance with best practice and the relevant regulations at that time. This CRAMP will result in a decommissioned and decontaminated site suitable for future industrial use. Buildings, equipment and site services, whilst emptied and cleaned as part of the closure, will remain in place after final closure as the facility is currently under lease and is not owned by Harp.

Water supply and electrical/communication services to the building will be retained for future tenants or the owner. Harp will liaise with the landlord to transfer service provider contracts to the new tenants or to the landlord, as appropriate. It is anticipated that this will depend on whether future occupants of the site are in place at the time of closure or not.

1.4 Disclaimer

This report is based on previous documented information and information supplied by Harp to AWN. This report has been prepared for the use of Harp only and for

submission to EPA. Specified costs are based on best estimates within the market place at the time of submission and will vary with time.

2.0 SITE EVALUATION

Harp currently operate a centralised collection and transfer station for refrigerant gases from the facility in Tallaght. At present, there is no processing of waste at the facility and gas cylinders/drums are temporarily stored at the facility, for a period of less than six months in accordance with the facility registration, pending onward transfer to Harp International in the UK for recovery, where possible. The maximum quantity of refrigerant gases permitted to be stored on the site at any one time is 18 tonne and the annual tonnage permitted is 500 tonnes under the existing COR. Upon receipt of a Waste Licence, it is proposed to store a maximum of 45 tonne of waste gas at any one time with the annual maximum tonnage remaining at 500 tonne.

The Harp facility is located in the Whitestown Industrial Estate in Tallaght as shown in Figure 1. The land use around the facility is mostly industrial in nature with a welding company to the north and other manufacturing businesses surrounding the site. There is an indoor adventure centre in the warehouse building to the south of Harp's facility. Henkel Ltd. is a significant manufacturing operation in the industrial estate and the facility to the east of Harp's site holds an IED Licence (Reg. No. P0079-03) from the EPA for the "chemical manufacture of glues, bonding agents and adhesives".

The closest residential development to the site is approximately 400m to the east.

There is a warehouse located on the site which occupies approximately 70% of the site area. The internal warehouse area and all of the external areas of the site are covered in concrete hardstanding. The site is surrounded by fencing approximately 2m in height on all sides. All waste storage activities are carried out inside the warehouse. A site layout plan is included as Figure 2.

The topography of the area is flat and the closest watercourse is the Whitestown Stream which runs to the south of the site through the middle of the industrial estate. The stream is approximately 90m from the facility boundary. There is no direct hydrological link between the site and the stream.

The site occupies an area of c. 750m² and currently employs two people to work at the facility on a part-time basis. Upon receipt of the Waste Licence, it is anticipated that this will increase to three employees. Full-time or part-time employment will depend on the quantities of waste accepted at the site.

SDCC currently regulates the facility through a Certificate of Registration (COR-DS-15-0003-04).

Harp's parent company (Harp International Ltd) in the UK has management systems that are certified to ISO9001:2008 (Quality), ISO14001:2004 (Environmental) and OHSAS18001:2007 (Health & Safety). Harp Refrigerants Ltd.'s environmental management system and procedures mirror the parent company procedures, where applicable.

2.1 Facility Description

The site layout map in Figure 2 shows the general layout of the warehouse building and delivery/parking areas at the facility. The main operations can be divided into the following key areas:

- Waste delivery and acceptance;

- Sampling, weighing, recording and labelling;
- Waste gas reclamation;
- Temporary storage; and
- Dispatch from site as waste or as reclaimed gas product.

Waste refrigerant gases are delivered to the site in cylinders/drums typically in rigid body curtain sided trucks. The cylinders/drums are usually contained within cages to assist with lifting and transport. A site dedicated forklift is used to offload the cages from the truck and transfer inside the building to the Waste Holding Area. The cylinders/drums are checked, weighed and recorded in accordance with *Work Instruction 001: Waste Acceptance, Recording, Handling and Storage of Cylinders or Drums containing Waste Refrigerants*.

Under the Waste Licence authorisation, Harp will be able to process a portion of the waste gas cylinders/drums received at the facility using the company's bespoke reclamation plant. The suitability of the waste gas for processing using the reclamation equipment proposed for installation in Tallaght will depend on the refrigerant gas type, purity and level of impurities present. Although some of the waste gas received may not be able to be reclaimed using the equipment to be installed in Tallaght, it may still be suitable for reclamation using more advanced equipment at the Harp International facility in Pontypridd in Wales. The facility in Wales operates on a much larger scale than what is proposed for Tallaght and there is a much larger waste refrigerant gas market in the UK to justify more advanced treatment options and laboratory facilities.

Waste refrigerant gas that is reclaimed in Ireland will be sampled to confirm its quality and purity and made available to the Irish market as reclaimed refrigerant. Waste refrigerant gas that is not suitable for reclamation in Tallaght will be exported to Harp International in Wales for more detailed analysis and reclamation, where possible. In some cases, the waste gas is not suitable for reclamation and has to be disposed of by high temperature incineration.

In addition to temporary storage and reclamation of waste refrigerant gas, the facility in Tallaght will also accept small quantities of waste refrigeration oil and cooling fluid from suitably registered refrigeration and air conditioning (RAC) contractors. The waste oil and cooling fluid will be deposited into two 2,000 litre capacity bunded storage tanks pending collection by an authorised hazardous waste contractor for off-site recovery.

The warehouse is the only building on the site and measures approximately 50m long, 10m wide and 10m high at the apex.

2.1.1 Main Plant

The primary facility processes and activities are summarised as follows:

Inputs:

- Waste refrigerant gases;
- Diesel Fuel;
- Electricity; and
- Water (for welfare facilities only).

Unit Operations:

- Waste acceptance, sampling, weighing, recording and labelling;
- Waste gas reclamation; and
- Temporary storage of waste material.

Outputs:

- Waste materials;
 - Waste refrigerant gas in cylinders/drums;

- Waste refrigerant oil;
- Waste cooling fluid;
- Non-hazardous commercial waste (i.e. general and recycling)
- Emission of air contamination from cylinders/drums during reclamation; and
- Removal of reclaimed gas product from site.

2.1.2 Ancillary Facilities

Office

There is an office located adjacent to the main entrance to the warehouse which is used for general administration activities. The office also includes basic welfare facilities (kitchenette and WC) for employees.

Weighing

There is a trade approved calibrated weighing scales located in the warehouse which will be used for weighing the incoming cylinders/drums prior to storage. The gross weight of the cylinder/drum will be displayed on the weighing scales and the tare weight (i.e. empty weight of the cylinder/drum) is displayed on each cylinder/drum. The net weight of the waste is the gross weight less the tare weight.

Utilities

Electricity is used to power lighting, heating systems and office equipment.

A small supply of diesel is stored onsite for refuelling the forklift. The diesel is stored in two 20 litre Jerry Cans in the warehouse on a suitably sized spill pallet. A spill kit and spill tray is located adjacent to the spill pallet at all times. Refuelling of the forklift will only take place in this area.

Fire Protection

Fire extinguishers are located throughout the warehouse and are maintained on a regular basis.

Fire doors and emergency lighting/way finding have been installed and escape access routes provided. The fire detection and alarm system was upgraded in 2015/2016 in accordance with the requirements of I.S. 3218:2013.

A Fire Safety Compliance Report was completed by Fahy Fitzpatrick Consulting Engineers in April 2016 and submitted to SDCC as part of compliance with the COR.

Security

The facility is surrounded by fencing and the access gate is closed and secured when there is no-one at the facility. The warehouse building is secured separately.

The site is monitored by CCTV 24 hours per day, 7 days per week.

There is an intruder alarm on the warehouse which is monitored remotely.

2.1.2 Inventory of raw materials/products/wastes

An inventory of the raw materials, products and wastes generated at the facility along with maximum storage capacities are presented in Insert 2.1 below. The inventory and associated storage capacities are based on the proposed materials and quantities in the Waste Licence Application.

TYPE	STORAGE AREA	STORAGE TYPE	MAX STORAGE CAPACITY	MEASUREMENT UNIT
Raw Materials				
Diesel	Warehouse	Jerry cans	40	litres
Products				
Reclaimed Refrigerant Gas	Warehouse (Treated Waste Storage Area)	Cylinders/Drums	15	tonnes
Waste				
Refrigerant Gas	Warehouse (Waste Holding, Untreated Waste Storage and Quarantine Areas)	Cylinders/Drums	31	tonnes
Refrigerant Oil	Warehouse	Storage tank	2,000	litres
Cooling Fluid	Warehouse	Storage tank	2,000	litres
Molecular sieve absorbent (non-hazardous drying agent)	Warehouse (Office Area)	Small bins	120	litres
Non-Hazardous Commercial Waste (general and recycling)	Warehouse (Office Area)	Small bins	120	litres

Insert 2.1 Inventory of raw materials, products and wastes at Harp facility

2.2 Facility Operations

The proposed hours of operation will be between 8am and 6pm from Monday to Friday and between 8am and 2pm on Saturday. The facility will not be operational on Sundays or Bank Holidays.

In the first number of months, it is likely that the incoming quantities of waste will not justify the facility being open full-time. There may not be deliveries of waste to the facility on a daily basis and removal of waste from the facility will be as required. Operation of the reclamation plant is likely to run when there is sufficient quantity of suitable waste available to process (subject to maximum storage allowable as per Insert 2.1).

There will be Facility Manager/Deputy Facility Manager who will be on-site at all times during deliveries and collections. There will also be at least one technician on-site while gas reclamation is taking place.

2.3 Emissions

The activities at the facility will not generate any process emissions to water, land or sewer. There will be a discharge of air impurities from the reclamation process which will be released to atmosphere. There will also be a minute fugitive gas release from the infrared gas analyser during sampling.

The welfare facilities in the office area are connected to the municipal foul sewer network and surface water run-off from the warehouse roof and car park area at the entrance are discharged to the municipal storm-water sewer network.

Noise emissions from the facility are consistent with the local industrial environment and are isolated to times of deliveries and collections when the forklift is active and there are vehicles being loaded or unloaded.

The forklift at the site is powered by diesel and waste deliveries to the site are typically by rigid body trucks. At maximum, there will be six vehicle movements per day to/from the site.

2.4 Waste

As discussed in Section 2.1, some of the waste refrigerant gas received will not be suitable for reclamation at the facility due to the gas type, impurities type or the level of impurities. The gas type and purity will be determined by use of an infrared gas analyser. Where waste gas is not suitable for reclamation at the facility, it will be moved to temporary storage with similar cylinders/drums and when sufficient quantities have accumulated (typically about 10 tonne), the waste will be exported under TFS to Harp International in Wales. This procedure is detailed in *Work Instruction 002: Shipping Waste to the UK*.

Note: The vast majority of cylinders/drums are required to be returned to Harp only as Harp own the cylinders/drums and 'rent' them on provision of a deposit to the end users.

Waste refrigerant oil and cooling fluid will also be accepted at site and pooled into 2,000 litre capacity storage tanks for temporary storage and collection by authorised hazardous waste contractors. Waste refrigerant oil will also be generated in the on-site reclamation process and this waste oil will be transferred to the 2,000 litre storage tank for removal off-site. The waste oil and cooling fluid will be recovered off-site, where possible.

Molecular sieve absorbent waste is also generated in the reclamation process and this can be disposed of with general office waste.

Office waste will be stored in general waste and recyclable waste bins and collected by a suitably permitted waste contractor. It is envisaged that these waste quantities will be very small. Collections will be arranged as required.

All documentation related to waste movements is retained on-site and stored electronically. Harp maintain an online tracking system for new, reclaimed and waste gas cylinders which keeps records of waste incoming and outgoing from the site. In addition, waste oil and cooling fluid intake and collection will be recorded.

2.5 Bund Integrity Testing

There is one spill pallet used on site to store the diesel Jerry Cans for refuelling the forklift. This spill pallet will be inspected regularly and will be retested in accordance with the manufacturers recommended frequency.

Upon grant of the Waste Licence, two 2,000 litre capacity bunded fuel storage tanks will be installed at the site. The tank bunding will be regularly inspected and maintained in accordance with the manufacturers recommendations.

2.6 Geology and Hydrogeology

According to the Geological Survey of Ireland (GSI), the site area is underlain by the Calp bedrock formation which comprises typically dark grey to black limestone and shale. The overburden is comprised of glacial till.

The GSI online database describes the groundwater vulnerability at the site as *Low* but there are areas of *Moderate* to *Extreme* vulnerability, as well as areas where rock is close to or at surface, to the north and south of the site. The bedrock aquifer underlying the site is described as being a *Locally Important Aquifer – Bedrock which is Moderately Productive only in local zones*.

Site investigations from neighbouring sites indicate that the bedrock is approximately 2.5 – 5.5m below ground level (bgl) and is overlain by sandy gravelly boulder clays which are common in the Dublin area.

The closest watercourse is the Whitestown Stream which runs through the middle of the industrial estate and approximately 90m to the south of the site. The Whitestown Stream water quality has not been classified but the nearby River Dodder has a *Good Quality* status. There is no direct hydrological link between the site and the stream.

2.6.1 Environmental and Ecological Designations

There are no ecological designations within 1km of the facility. A *Report for Appropriate Assessment Screening* was carried out by Moore Group in April 2016 and concluded that:

“1. The project is not directly connected with, or necessary to the conservation management of the European sites considered in [the] assessment.

2. The implementation of the project will not have a direct impact on the European sites considered in [the] assessment.

3. The project, alone or in combination with other projects or plans, is not likely to have a significant effect on any European sites in view of their conservation objectives.”

2.6.2 Source-Pathway-Receptor Assessment

The primary facility operations will involve acceptance, recovery and temporary storage of waste gas refrigerants in sealed cylinders/drums. The only emissions from the reclamation process will be air which contaminates the refrigerant gas in the cylinder and waste oil which is collected in a container at the base of the plant. The air emission from the reclamation process is of atmospheric quality and will not negatively impact on air quality.

Waste oil and cooling fluid will be stored in bunded fuel storage tanks within the warehouse. A small volume of diesel (approximately 40 litres) is held on site for refuelling the forklift and this is contained in a Jerry Cans which are stored on a suitably sized spill pallet. A spill kit and spill tray are located adjacent to the spill pallet.

The entire site area is covered in hardstanding so there is no direct pathway from the surface to ground or groundwater. The concrete surface in the warehouse and in the delivery/parking area is in good condition. Storage of diesel and refuelling will be carried out internally, away from the surface water drainage gulleys so there is minimal risk of contamination of the municipal network from a diesel spill. The area where trucks will park during loading and offloading is also away from the surface water gully so that in the event of a fuel leak from a delivery/collection vehicle, there would be sufficient time to place containment booms around the drainage points.

Overall, it is considered that there is little or no risk of a pollutant linkage existing at the facility.

2.7 Operator Performance

2.7.1 Harp Management Systems

A site specific Environmental Management System (EMS) and Work Instructions, based on the Harp International management systems, have been developed for the facility. The Harp International management systems are certified to ISO9001:2008 (Quality), ISO14001:2004 (Environmental) and OHSAS18001:2007 (Health & Safety).

2.7.2 Historical Record

SDCC currently regulates the facility through a Certificate of Registration (COR-DS-15-0003-04). The facility has been in operation since April 2016 and there have been no incidents or complaints to date. SDCC carried out a site visit of the facility in mid-2016.

The site was previously occupied by Smart Waste Solutions Ltd. (since 2001). Smart Waste Solutions Ltd. ceased operations at the site in December 2014. As part of the company's due diligence, a site inspection was carried out prior to submission of the COR application and there was no visual or olfactory evidence of contamination at the site. Additionally, there is no previous record of contamination at the site.

3.0 CLOSURE CONSIDERATIONS

3.1 Closure Declaration

Based on the information provided in the previous sections such as the planned activities at the facility, existing site conditions and historical site record, it is considered that clean closure of the facility is likely.

The existing concrete hardstanding will be maintained in good condition across the site to ensure that any potential fuel or oil spillage/leak will not enter the soil environment or surface water drainage network. Refrigerant gas cylinder/drums will be inspected upon offloading to ensure that the containment valves are in good condition to prevent fugitive releases of refrigerant gas to atmosphere. Any cylinders/drums on-site will be removed off-site to Harp International in the UK prior to closure so there will be no refrigerant gas remaining on closure.

Harp are fully committed to ensuring the site is not contaminated during the life of the facility. Therefore, it is expected that the likelihood of ground contamination on closure of the facility is very low.

3.2 Scope of the Closure Plan

The closure plan will involve the safe and correct removal of all waste materials from the site as well as the cleaning of the facility and any plant to ensure there is no potential contamination source post-closure. This scope outlines the key steps that will be taken as part of an orderly shutdown of the facility.

It is noted that the Agency guidance requires that the cost calculations for a closure should be made on the basis of a sudden closure scenario. The costs outlined in Section 4 and Appendix A are calculated on this basis.

The aim of the closure plan is to ensure that the vacant site does not pose a risk of environmental pollution. The primary elements will be:

- Cessation of all waste acceptance;

- Implementation of the agreed management structure to oversee the closure plan;
- Export of all waste refrigerant gases stored at the facility at the time of closure to Harp International in Wales;
- Removal of any waste oil or molecular sieve absorbent from the reclamation plant and disconnection from power;
- Draining of fuel and oil from the forklift, removal of any diesel fuel from the site and cleaning of the spill pallet;
- Collection of waste oil and cooling fluid from storage tanks and cleaning of tanks;
- Cleaning of office, welfare facilities, warehouse and external yard and appropriate removal of all waste materials;
- All relevant records relating to movement, transfer or disposal of waste to be managed and retained throughout the closure process and available for review;
- Independent verification and certification of clean closure status; and
- The site to remain compliant with its Waste Licence during the closure process and until the date of Licence surrender.

The facility warehouse and surrounding boundary fencing belongs to the site landlord and will remain in place following closure of the facility. It is also proposed that the reclaim plant and forklift will remain in place at the site following closure.

Assuming an orderly shutdown, Harp will use existing staff resources to form a team to manage and execute the closure plan. This closure team will be responsible for managing and executing the complete plan.

Approval will be sought from the Agency for any sub-contractors required for specialist cleaning at the site (e.g. oil and cooling fluid tanks). Harp will carry out all reclamation plant decommissioning and general cleaning works using their own employees. Any new contractors required for waste removal will also be subject to approval by the Agency, however it is not anticipated that it will be necessary to engage new contractors to remove waste from the site.

3.3 Criteria for a Successful Closure

Successful clean closure will be considered to be achieved when it can be demonstrated that there are no remaining environmental liabilities at the site.

Following the closure phase it will be demonstrated that the following criteria have been met:

- All waste refrigerant gas cylinders/drums have been dispatched from the site (either as waste under TFS or as reclaimed product);
- All waste oil and cooling fluid is removed from site;
- There is no diesel stored on site;
- All municipal wastes have been removed from site;
- There are no residues, which could pose an environmental hazard, remaining at the facility;
- All relevant records relating to waste and materials movement were managed and retained throughout the closure process;
- No environmental contamination of soil and groundwater has occurred;

- The requirements of the facility's EMS and Waste Licence remained in place and were actively implemented during the closure process; and
- All relevant records relating to the closure have been retained on file.

3.4 Roles and Responsibilities during Site Closure

The following personnel outlined in Insert 3.1 will have specific responsibility in the event of closure of the site.

Personnel	Area of Responsibility as part of Closure Plan
Facility Manager	Overall responsibility for facility closure and assignment of responsibilities to site operatives. Liaison with regulatory authorities.
Deputy Facility Manager	Monitoring and protection of surface water drainage point during closure. Disconnection and decommissioning of the reclamation plant. Ensuring all documentation is maintained and daily inspections are carried out during closure.

Insert 3.1 Roles and Responsibilities as part of closure plan

3.5 Programme to Achieve the Stated Criteria

The plan set out below is based on the anticipated sequence of events which will occur in the event of an orderly closure.

The sequence will be as follows:

- Phase 1 – Cancellation of incoming waste materials
- Phase 2 – Reclamation plant decommissioning and disconnect
- Phase 3 – Removal of hazardous wastes and substances from site
- Phase 4 – Cleaning of office, warehouse and external yard and removal of storage tanks from site
- Phase 5 – Removal of remaining waste materials

Phase 1 – Cancellation of incoming waste materials

Upon announcement of cessation of waste activities, all incoming waste deliveries to the facility will be cancelled and contracts with customers will be revised or cancelled, as appropriate. No more waste gas cylinders/drums, oil or cooling fluid will be accepted at the facility.

Phase 2 – Reclamation plant decommissioning and disconnect

The Deputy Facility Manager will be responsible for completing any reclamation activity in progress upon the decision to shut down the facility. Any refrigerant gas in the system will be pooled into reclaimed gas cylinders or waste gas cylinders and moved to storage pending transfer off-site. Any waste oil in the plant sump will be drained and transferred into the waste oil storage tank.

The equipment will be fully decontaminated, decommissioned and disconnected from power. The only waste that will be generated from decontamination will be waste oils and oil stained rags etc.

Phase 3 – Removal of hazardous wastes and substances from site

The gas cylinders/drums will be transferred into suitable cages, where appropriate, and prepared for removal off-site. Where possible, reclaimed gas will be distributed to customers in Ireland. Where suitable outlets for the reclaimed gas are not available at the time of closure, the cylinders/drums will be sent back to Harp in the UK to be redistributed from that location.

All waste gas in cylinders/drums will be made ready for shipping to Harp in the UK in accordance with the relevant Work Instructions and will be carried out under TFS.

Once all of the cylinders/drums have been removed from site, the forklift will not be required anymore. The diesel and oil will be drained from the forklift to ensure there is no potential for an oil and diesel spill/leak post closure. The engine oil from the forklift will be stored separately from the waste refrigerant oil. Draining of the oil and diesel will be carried out inside the warehouse away from surface receptors and a spill kit will be on-hand.

The waste refrigerant oil and cooling fluid will be collected from the two 2,000 litre storage tanks and both tanks cleaned/drained by the hazardous waste contractor. It is anticipated that this contractor will also be able to take the drained engine oil from site. Any remaining diesel in jerry cans and drained diesel will be taken off-site.

Phase 4 – Cleaning of office, warehouse and external yard and removal of storage tanks from site

Once all cylinders/drums and hazardous substances have been removed from site, the office, warehouse and external yard will be cleaned. Any small equipment brought to the facility by Harp, such as weighing scales, infrared gas analyser, computers, printers, trolleys etc. will be arranged for collection and removal off-site.

It is also likely that the reclaim plant will be arranged for shipment back to the UK, although this will be determined at time of closure and will be dependent on the future use of the facility.

Where required, utilities will be disconnected and left for future reconnection by a new tenant or the landlord.

Phase 5 – Removal of remaining waste materials

All waste materials generated during final cleaning will be disposed of in recyclable and non-recyclable waste containers at the site pending collection by the non-hazardous waste contractor.

Records of all waste and reclaimed gas movements from the site during the closure period will be tracked using the Harp online tracking system in accordance with current procedures. All other waste movements such as waste oil and cooling fluids will also be recorded and copies of waste transfer dockets retained on site for the duration of the closure period (in accordance with the requirements of the Waste Licence).

Based on the above schedule of activities, it is anticipated that the closure period will take one month to complete.

3.6 Surface Water Protection during Closure

The surface water protection measures as documented in the Pollution Prevention Control Plan will be implemented during site closure.

3.7 Contaminated Soils

The entire site is covered in hardstanding and it is considered that the risk of soil contamination occurring during the closure period would be very low. No allowance has been made for the potential removal of contaminated soil from site.

3.8 Closure Plan Validation

An Independent Closure Audit (ICA) of the site will be undertaken prior to cessation of operations and actual closure of the facility. The audit will compile an accurate inventory of all plant, equipment and wastes on the site. The inventory will be used as a benchmark against which successful closure will be assessed.

3.8.1 Environmental Monitoring

There are no ongoing requirements for environmental monitoring at the facility and it is not anticipated that there will be any monitoring requirements imposed when the Waste Licence is granted.

A visual inspection of the surface water drainage gulley will be carried out at least daily during cleaning of the facility for the duration of the closure period.

Dust and noise generation will be kept at a minimum during the closure period in accordance with the requirements of the Waste Licence.

3.8.2 Closure Validation Audit

It is understood that the Agency will require the following list of information for a site which proposes to close in the immediate future:

- Submit name of person(s) completing closure audit for approval;
- Identify environmental liabilities or remediation issues with proposals on how these shall be dealt with post closure;
- Proposal for sampling analysis, where required, for agreement with the Agency.
- Submit names of all proposed waste handling procedures during closure i.e. waste contractors, proposed final destination etc. for approval.

3.8.3 Closure Validation Report and Test Programme

As required in the Agency guidance, a final validation report for the site will be submitted to the Agency within three months of execution of the plan. In addition, Harp will carry out such tests or investigations and submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment. It is not anticipated that there will be any requirement for testing upon closure due to the absence of a pollutant linkage as discussed in Section 2.6.2.

The report will present all of the information required to demonstrate that the criteria for successful closure (Section 3.3) has been achieved as well as the information necessary for making an application for surrender of the Waste Licence.

It is considered that a test programme to confirm clean closure will not be required. Regular visual inspections of the concrete surface for staining and the storm-water drainage gulley will identify any potential spillages/leaks.

3.8.4 Closure Validation Certificate

Harp will carry out inspections as above and testing, if required by the Agency, and submit a validation certificate to the satisfaction of the Agency, to confirm that there is no continuing risk to the environment.

4.0 CRAMP COSTINGS

As required under the EPA guidance, a detailed cost assessment has been completed as part of the preparation of the CRAMP.

The costs are summarised in Insert 4.1 below and are provided in more detail in Appendix A. In general, the closure requirements and associated costs likely to arise for this activity are well defined and are not subject to significant unknowns. Nevertheless, to ensure adequate cost provision, a contingency of 5% has been allowed for unplanned and unforeseen items.

The costings in Insert 4.1 have been designed to be sufficient to cover a sudden closure scenario though it is anticipated that a phased shut-down of the facility will most likely occur over a maximum time period of one month from notification of intention to close.

Activity	Estimated Costs (€)	Source of Costs
Reclaim plant decommissioning and cleaning	(incl. in Management & Staffing Costs)	Works to be carried out by facility staff. No specialist input required.
General site cleaning	250	Cost for hazardous contractor cleaning of waste oil and cooling fluid tanks (general cleaning to be carried out by Harp staff)
Waste removal and transportation	14,940	Worst case 37.5 tonnes of waste refrigerant gas, 2,000 litres of waste oil, 2,000 litres of cooling fluid and wash-water
Validation Audit, Documenting Closure	1,680	AWN Estimate
Management and Staffing Costs (1 month)	6,250	Labour cost – Harp
Waste Licence surrender costs	6,000	EPA Guidance
Subtotal	29,120	
Contingency (5%)	1,456	
Total	€30,576	

Insert 4.1 Summary of closure costs for Harp waste facility

It is estimated that a cost of approx. €30,576 would be incurred to decommission the site allowing a contingency of 5% for unforeseen events.

4.1 Ongoing Costs

It is anticipated that there will not be any ongoing costs once the facility has closed.

As the site is currently leased, it is anticipated that the landlord will regain security control once Harp have fully decommissioned the site and surrendered their Waste Licence.

4.2 Future Proofing of Costs

It is anticipated that upon closure, the closure costs set out above will be incurred immediately. As such there is no need to allow for additional future proofing of the costs associated with closure.

Future revisions of this CRAMP will need to be updated in line with inflation. It should be noted that the costs presented in Insert 4.1 are subject to the following assumptions:

- The site will be left in a clean condition, i.e. decontaminated and certified as being free of potentially hazardous substances. All buildings will be retained.
- No liabilities will be incurred due to activities of contractors engaged as part of the closure process. Waste management procedures as outlined in previous sections will be implemented to ensure this.
- No civil liability will be incurred as a result of third parties alleging environmental damage arising from the operational phase or closure.
- The site and warehouse facility will remain under the ownership of the landlord. The costs assume that control of the site can be passed back to the landlord after closure and surrender of the Waste Licence and there will not be any penalties related to the lease contract between the landlord and the tenant.
- Normal practice would be applied to minimise ongoing liabilities and to fulfil insurance requirements.
- No factors have been identified that would indicate an unusual liability for the site in comparison with other industrial sites.

5.0 FINANCIAL PROVISION

Harp can confirm that the company has more than adequate resources from its corporate entity to fund the costs of closure, as set out above, at their facility at Unit 2, Whitestown Industrial Estate, Tallaght, Dublin 24. Harp Refrigerants Ltd. is the Irish subsidiary of Harp International with corporate headquarters in Pontypridd in Wales as well as offices in the US, Qatar and the UAE.

Any decision to close the Harp waste facility in Tallaght will be taken by both management at Harp Refrigerants Ltd. and Harp International Ltd.

Harp propose to provide a bank guarantee to the value of the cost presented in Section 4.0. Upon approval by the Agency of the estimated costs, Harp will engage with the Agency to put a suitable financial provision in place.

6.0 FUTURE REVIEWS OF THE CRAMP

This plan will be reviewed on an annual basis as part of the company's annual environmental reporting (AER) and EMS procedures. The review shall be carried out by the Facility Manager or by persons nominated by the Facility Manager.

Any change and/or proposed amendments to the CRAMP shall be notified to the Agency for agreement as part of the annual environmental review.

6.1 Scope of Review

The annual review shall take note of the following items:

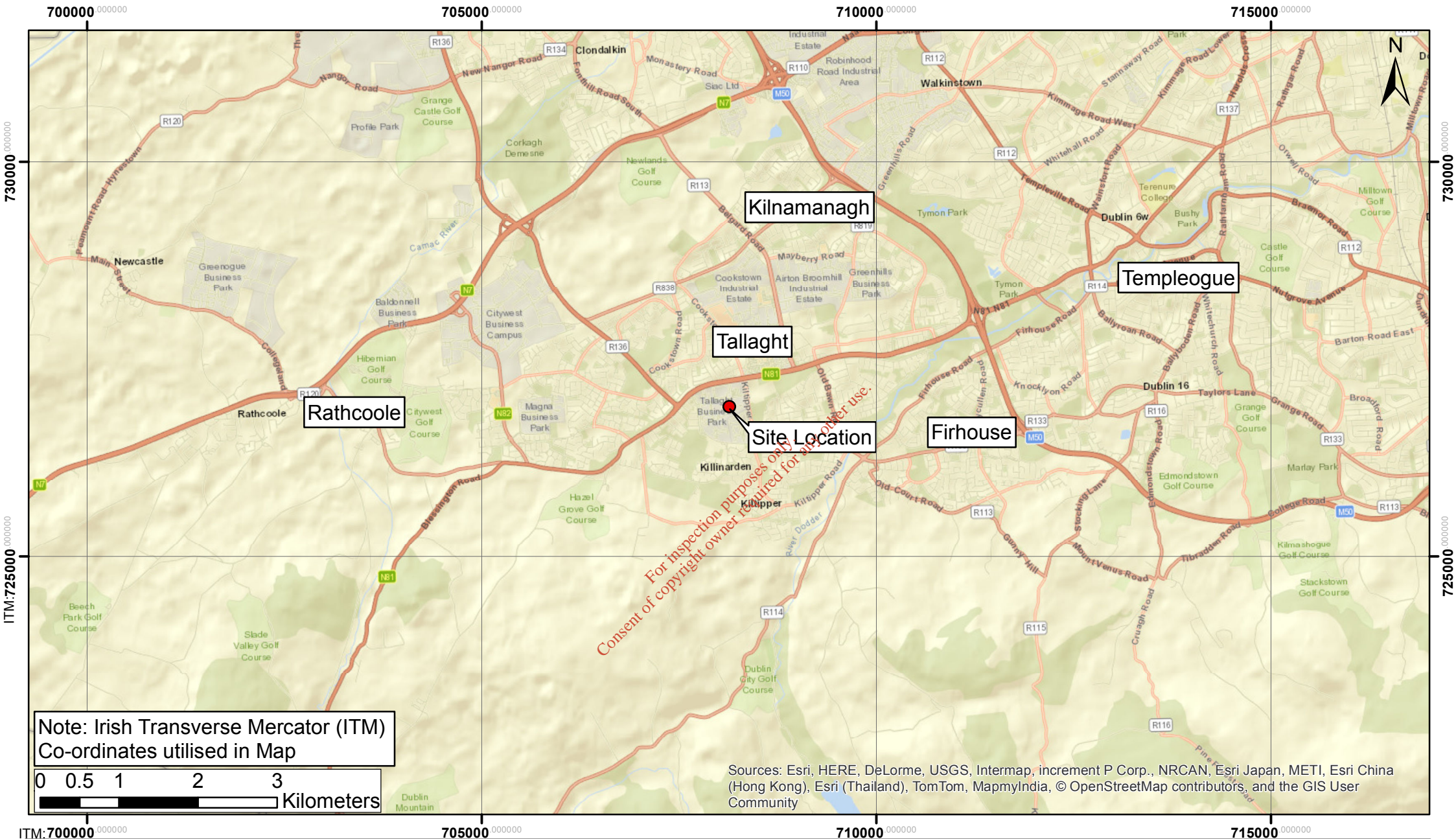
- Materials stored on site;

- Additional equipment brought on site;
- Changes in waste acceptance procedures and/or reclamation procedures;
- Amended costings associated with closure plan; and
- Any changes in respect of refrigerant gases that may impact on operations.

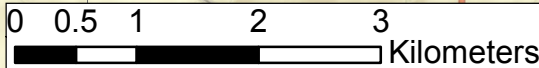
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FIGURE 1 – SITE LOCATION MAP

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Note: Irish Transverse Mercator (ITM)
Co-ordinates utilised in Map



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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CLIENT:
Harp Refrigerants Ltd

PROJECT:
CRAMP/ELRA Report

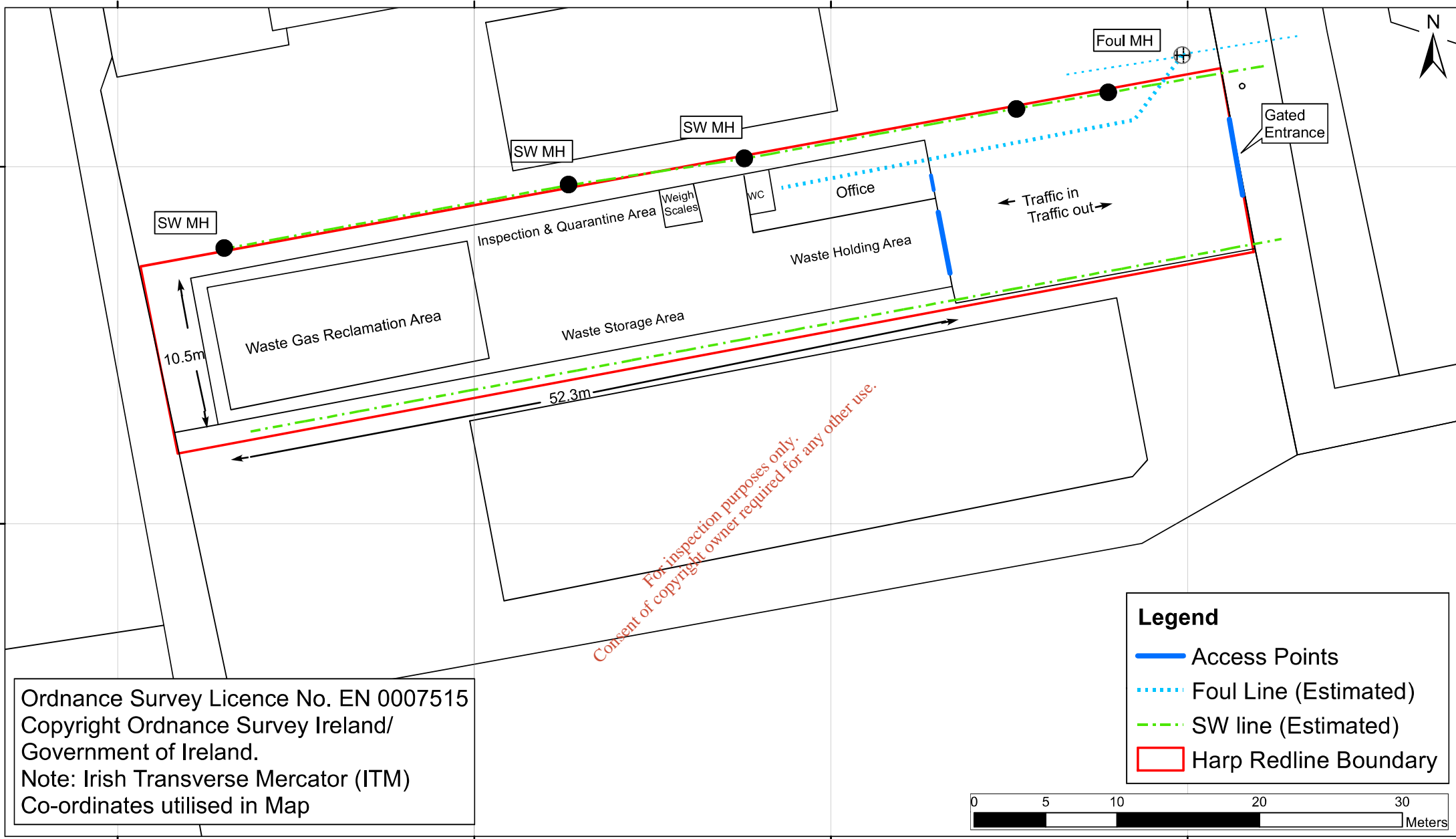
DRAWING TITLE:
Site Location Map

Project Ref. 14/8133

DRAWN	CHECKED	APPROVED	APPD DATE
R.H.	R.H.	E.N	03/05/2017
		No. of Shts	SIZE
		1	A4
		SCALE	SCALE
		1:50,000	
DRAWING NUMBER			SHEET
D001			REV
			1

FIGURE 2 – SITE LAYOUT PLAN

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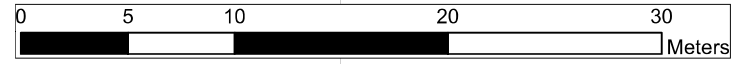


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Legend

- Access Points
- ⋯ Foul Line (Estimated)
- - - SW line (Estimated)
- Harp Redline Boundary



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CLIENT:
Harp Refrigerants Ltd

PROJECT:
CRAMP/ELRA Report

DRAWING TITLE:
Site Layout Plan

Project Ref. 14/8133

DRAWN	CHECKED	APPROVED	APPD DATE
R.H.	R.H.	E.N	03/05/2017
No. of Shts		SIZE	SCALE
1		A3	1:250
DRAWING NUMBER		SHEET	REV
D002		1	1

APPENDIX A – DETAILED COSTS ASSESSMENT FOR CLOSURE

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BREAKDOWN COSTING FOR HARP CRAMP 2017

Task	Description	Quantity No.	Measurement Unit	Unit Rate €	Cost €	Source of Unit Rates
Reclaim plant decommissioning and cleaning	Final run through of waste gas in system and transfer to waste or reclaim cylinders	1	days	0	0	Carried out by Harp staff, included as 1 month salary cost below
	Draining waste oil, removal of drying agent and general cleaning of equipment	0.5	days	0	0	Carried out by Harp staff, included as 1 month salary cost below
	Disconnection, shut down of equipment and preparation for removal from site	1	days	0	0	Carried out by Harp staff, included as 1 month salary cost below
	SUBTOTAL				0	
Office, warehouse and external yard cleaning	Forklift oil and diesel draining	0.5	days	0	0	Carried out by Harp staff, included as 1 month salary cost below
	Waste refrigerant oil tank, cooling fluid tank and diesel spill pallet draining/cleaning	1	unit	250	250	Estimated cost from Rilta
	General site cleanup and utilities disconnection	1	days	0	0	Carried out by Harp staff, included as 1 month salary cost below
	SUBTOTAL				250	
Waste removal costs (incl. transport)	Removal of remaining cylinders/drums to Harp in UK (assume worst case scenario that facility is at maximum capacity (50 tonnes))	5	loads	550	2750	Maximum waste per load to UK is 10 tonnes = 5 no. loads at €550 per load transport cost.
	Cost for disposal of waste gas in the UK (worst case scenario assume that there is 75% waste gas (25% reclaimed gas) and 15% of this waste gas is not suitable for reclamation and has to be sent for high temperature incineration)	5.6	tonnes	1250	7000	Incineration typically in Liverpool (Current cost from Harp is €1.25/kg)
	Cost for reclamation of waste gas in the UK (worst case scenario assumes that only 85% of waste gas is reclaimable and is carried out at the Harp UK facility)	31.9	tonnes	100	3190	Reclamation at Harp UK (There is a positive value to the reclaimed gas produced. Estimated cost for employees to reclaim gas is €0.10/kg)
	Cost for collection and recovery/disposal of waste refrigerant oil and cooling fluid	4000	litres	0.5	2000	Quote from Rilta of €0.50/litre for collection
	SUBTOTAL				14940	
Validation Audit, Documenting Closure Process, Reporting	Environmental Consultant Costs	2	days	840	1680	AWN Consulting Estimate
Management and Staffing Costs	1 month salary cost for CRAMP team (facility manager, deputy facility manager and one technician)	1	unit	6,250	6250	Labour Costs - Harp
Waste Licence Surrender Cost	Fee payable to Agency for surrender of Waste Licence	1	no.	6000	6000	EPA document 'Guidance to Licensees on Surrender, Cessation and Closure of Licensed Sites'
TOTAL					29,120	
CONTINGENCY	5% CONTINGENCY OF TOTAL ABOVE				1,456	
TOTAL INCLUDING CONTINGENCY					30,576	

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ATTACHMENT L STATUTORY REQUIREMENTS

Attachment L.1 – Section 40(4) Waste Management Act

In order to meet the criteria of Section 40 (4) of the *Waste Management Act 1996*, as amended, the following information is provided:

- (a) *Any emissions from the disposal or recovery activity in question will not result in the contravention of any standard, including any standard for an environmental medium, or any relevant emission limit value, prescribed under any other enactment.*

There are no emissions to air, water or ground from the proposed activity. Noise emissions from the reclamation process will not be audible outside of the warehouse and traffic movements will be typical of activities in the industrial estate during operational hours.

- (b) *The activity concerned, carried on in accordance with such conditions as may be attached to the licence, will not cause environmental pollution.*

Harp are committed to carrying out the waste activity at the facility in full compliance with the requirements of a Waste Licence.

- (c) *The best available technology not entailing excessive costs will be used to prevent or eliminate or, where that is not practicable, to limit, abate or reduce an emission from the activity concerned.*

As per (a), there are no emissions to air, water or ground from the proposed activity and, therefore there is no abatement required. Noise emissions will be limited by closing the door to the warehouse when not required. The forklift will only operate outside the warehouse during loading and off-loading.

The waste oil generated from the waste gas reclamation process is a contaminant and will be transferred off-site for recovery.

- (d) *If the applicant is not a local authority, the corporation of a borough that is not a county borough, or the council of an urban district, subject to subsection (8), he or she is a fit and proper person to hold a waste licence.*

Harp Refrigerants Ltd. (or any of its Directors) has never been convicted under the *Waste Management Act 1996*, as amended, the *EPA Act 1992*, as amended, the *Local Government (Water Pollution) Acts 1977 and 1990* or the *Air Pollution Act 1987*.

Further detail on the suitability of Harp to hold a waste licence is provided in Attachment L.2.

- (e) *The applicant has complied with any requirements under Section 53.*

Harp can provide details as required by the Agency in respect of the company's financial ability to carry out the activities at the site.

Harp confirm that the company complies with the requirements under Section 53.

An Appropriate Assessment Screening Report was compiled by Moore Group and determined that no further stages of the Appropriate Assessment process would be required. The Screening Report is included in Attachment B.3.

BAT Compliance

In terms of BAT, the most relevant document is the *'Integrated Pollution Prevention and Control Reference Document on Best Available Techniques for the Waste Treatment*

Industries' adopted by the European Commission in August 2006. However, it should be noted that the Scope of the BREF document identifies that the principal activity proposed at the site (R3) is not covered by the document (it is understood that this is mainly due to a separate BREF document which covers waste incineration, pyrolysis and gasification). Other activities (R12 and R13) are covered by the document.

In terms of the Common Techniques discussed in the BREF document, pre-acceptance and acceptance of suitable waste refrigerant gas is considered to be met by acceptance of gas from pre-approved contractors who are PAN registered. The market of refrigeration and air conditioning contractors in Ireland is quite small and prior to establishment of Harp Refrigerants Ltd. in Ireland, the company spoke with relevant contractors and suppliers to identify the requirements for the waste facility and reclamation process. The BREF identifies the need for sampling a portion of the waste accepted at site – in the case of this facility, every single cylinder/drum accepted at the facility will be sampled and this is integral to the efficiency of the business by ensuring the maximum quantity of reclaimable gas is retained on site for treatment. It is not currently proposed to install a laboratory function at the facility due to the financial commitments but where the quantity of waste accepted at the facility permits, this will be explored in future. Inspection of waste cylinders/drums occurs as soon as the delivery vehicle is opened as cylinders/drums owned by Harp are immediately identifiable and the condition of the cylinder/drum and, most importantly, the valve connection can be visually inspected. Additionally, all waste will be offloaded to a Holding Area inside the main warehouse door and then on to the Inspection Area for a detailed inspection of every cylinder/drum.

Management systems at the Harp facility in Tallaght are not currently certified to any criteria, however Harp International in the UK systems are ISO certified (9001, 14001 and 18001) and the procedures and systems in place at Harp Refrigerants Ltd. are set up and managed according to Harp corporate requirements. It is intended to have the facility and operations in Tallaght covered under the corporate ISO certification in the short term.

The BREF document refers to emissions from CFC recovery treatments in Section 3.1.3 (although it should be noted that CFC's are banned from refrigeration applications globally so it is highly unlikely that any CFC's will be received at the facility – in the event of any CFC's being delivered to the facility, the gas will not be reclaimed and will be sent to Harp in the UK for detailed analysis), and identifies the potential for small quantities of gas release from sampling. This section also identifies the waste oil and drying agent (desiccant) generated in the reclamation process which have been discussed in detail in this application.

Reference has also been made to the '*Conclusions on BAT from the Emissions from Storage BAT Reference Document*'. BAT 1 and BAT 2 of the document are met using alarms and emergency stop functions on the reclamation plant to ensure that any deviation from normal operating procedure is identified. Harp have developed and evolved the technology for refrigerant gas reclamation at their facility in the UK and the knowledge and experience gained by their technical and managerial staff in the UK will be directly transferred to operations in Ireland. BAT 23 is met by implementation of health and safety management at the facility in accordance with Harp International standard which is accredited to OHSAS18001. The following plans/procedures have also been formalised for the facility operations:

- Emergency Response Procedure
- Pollution Incident Response Procedure
- Pollution Prevention and Control Plan

BAT 24 is met through a formalised Training Procedure (*Work Instruction No. 003*) which is adopted for all staff.

In reference to meeting the requirements of Section 5.2.2.4 (BAT 62 to 66), where relevant, the reclamation equipment and compressor will be subject to regular maintenance and pre-start checks to ensure it is running efficiently and that all seals/fixings are in-tact. As discussed previously, Harp have developed the reclamation equipment technology and their technical staff are well equipped with the knowledge and skills to ensure the equipment is running correctly.

The EPA publication '*Final Draft BAT Guidance Note on Best Available Techniques for the Waste Sector: Waste Transfer and Materials Recovery*' has also been consulted. The Whitestown Industrial Estate is considered a suitable location for the proposed activity on the basis that the vehicle movements to and from the site are typical of the current activity in the estate and that the activities will be carried out during working hours which will not impact negatively on neighbours in the estate. The facility is also suitably located close to significant industrial businesses on the outskirts of Dublin and is easily accessible for businesses from the south and west to access. There is no additional development required at the facility and there will be no equipment located externally so there will be no change in the visual appearance of the facility. Waste gas acceptance at the facility will be subject to visual inspection as well as sampling verification and waste oil generated from the reclamation process will be taken off-site for recovery in accordance with BAT.

There are no emissions to air, water or ground from the proposed activity and, as a result, there is no requirement for emissions control or monitoring. Waste oil and cooling fluid will be stored in suitably bunded tanks and labelled in accordance with BAT.

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Attachment L.2 – Fit and Proper Person

Harp Refrigerants Ltd. (or any of its Directors) has never been convicted under the *Waste Management Act 1996*, as amended, the *EPA Act 1992*, as amended, the *Local Government (Water Pollution) Acts 1977 and 1990* or the *Air Pollution Act 1987*.

The technical competence of the Company Director (Mr. Bryan Davies), Facility Manager (Mr. Noel Williams) and the Deputy Facility Manager (Mr. John Flynn) are provided in Attachment C.1.

Harp Refrigerants Limited is a subsidiary of Harp International Limited which is a global leader in the provision of refrigerants to industry. In addition, Harp International has expanded its services with the addition of a selection of products and services that are principally tailored for the foam blowing and aerosol propellants industries. Harp International Limited has a strong financial standing supported by continued expansion in the global market. The potential financial liabilities which may be incurred as a result of activities at the facility or sudden closure of the facility are detailed in the ELRA report in Attachment J.1 and the CRAMP report in Attachment K.1.

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Attachment L.3 – Waste Hierarchy

The application of the principles of the waste hierarchy are discussed in Attachment H.5.

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Attachment L.4 – Principles of Self-Sufficiency and Proximity

The introduction of a facility in Ireland which can accept and process waste refrigerant gases is central to the Principles of Self-Sufficiency and Proximity. Currently, all of Irelands waste refrigerant gas is being exported abroad for recovery or disposal, as appropriate.

The proposed facility in Tallaght will not only have the capability to manage treatment of waste refrigerant gas but will provide a central depot for collation of gas cylinders and reclamation, where possible. The location of the facility in Tallaght is appropriate to service the significant market in Dublin and is close to large industrial areas along the N7/M7 and the Long Mile Road.

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