SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Name of the substance	Lt. Cycle Oil
Identification number	649-435-00-3
Registration number	01-2119489734-23-0000
Synonyms	None.
SDS number	2007
Issue date	29-July-2011
Version number	05
Revision date	27-June-2013
Supersedes date	17-August-2012

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Distribution of a substance. Formulation & (re) packaging of substances and mixtures. Manufacture of substance. Use as a Fuel. Use as an intermediate.
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name	Valero Energy Ltd
Address	1 Westferry Circus Canary Wharf London E14 4HA UK
Telephone	01/210 345 4593 (General information; US)
e-mail	CorpHSE@valero.com
Contact person	Industrial Hygienist

1.4. Emergency telephone number 0044/(0)18 65 407333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Directive 67/548/EEC or 1999/45/EC as amended

Classification R10, Carc. Cat. 2;R45, Xn;R20-65-48/21, Xi;R38, N;R50/53

The full text for all R-phrases is displayed in section 16.

Classification according to Regulation (EC) No 1272/2008 as amended

Physical hazards		
Flammable liquids	Category 3	H226 - Flammable liquid and vapour.
Health hazards		
Acute toxicity, inhalation	Category 4	H332 - Harmful if inhaled.
Skin corrosion/irritation	Category 2	H315 - Causes skin irritation.
Carcinogenicity	Category 1B	H350 - May cause cancer.
Specific target organ toxicity - repeated exposure	Category 2 (blood, thymus, liver)	H373 - May cause damage to organs (blood, thymus, liver) through prolonged or repeated exposure.
Aspiration hazard	Category 1	H304 - May be fatal if swallowed and enters airways.
Environmental hazards		
Hazardous to the aquatic environment, long-term aquatic hazard	Category 1	H410 - Very toxic to aquatic life with long lasting effects.

Hazard summary

Physical hazards Flammable.

Health hazards May cause cancer. Also harmful by inhalation. Irritating to skin. Also harmful: danger of serious damage to health by prolonged exposure in contact with skin. Also harmful: may cause lung damage if swallowed.

Environmental hazards Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Specific hazards Prolonged or repeated contact with skin may cause redness, itching, irritation, eczema/chapping and oil acne. Prolonged and repeated contact with the product may cause skin cancer. Components of the product may be absorbed into the body through the skin. Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia. Material will float and can be re-ignited on surface of water.

Main symptoms Irritation of eyes and mucous membranes. Skin irritation. Dermatitis. Ingestion may cause irritation and malaise.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: Distillates (petroleum), light catalyst cracked

Identification number 649-435-00-3

Hazard pictograms

Signal word Danger

Hazard statements
H226 - Flammable liquid and vapour.
H304 - May be fatal if swallowed and enters airways.
H315 - Causes skin irritation.
H332 - Harmful if inhaled.
H350 - May cause cancer.
H373 - May cause damage to organs (blood, thymus, liver) through prolonged or repeated exposure.
H410 - Very toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention
P201 - Obtain special instructions before use.
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P260 - Do not breathe mist/vapours/spray.

Response
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTRE or doctor/physician.
P331 - Do NOT induce vomiting.

Storage P403 + P233 - Store in a well-ventilated place. Keep container tightly closed.

Disposal P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information Repeated exposure may cause skin dryness or cracking.

2.3. Other hazards

Static accumulator - Static accumulating flammable materials can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite material and vapor may cause flash fire (or explosion).

SECTION 3: Composition/information on ingredients

3.1. Substances

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Distillates (petroleum), light catalyst cracked	100	64741-59-9 265-060-4	01-2119489734-23-0000	649-435-00-3	

Classification: **DSD:** R10, Carc. Cat. 2;R45, Xn;R20-65-48/21, Xi;R38, N;R50/53

CLP: Flam. Liq. 3;H226, Asp. Tox. 1;H304, Skin Irrit. 2;H315, Acute Tox. 4;H332, Carc. 1B;H350, STOT RE 2;H373, Aquatic Chronic 1;H410

DSD: Directive 67/548/EEC.
CLP: Regulation No. 1272/2008.

Composition comments The product is a UVCB substance. The full text for all R- and H-phrases is displayed in section 16. All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4: First aid measures

General information If exposed or concerned: get medical attention/advice. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before re-use.

4.1. Description of first aid measures

Inhalation Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Skin contact Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes. If high pressure injection under the skin occurs, always seek medical attention.

Eye contact Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.

Ingestion Rinse mouth thoroughly. Do not induce vomiting without advice from poison control centre. Do not give mouth-to-mouth resuscitation. Get medical attention immediately.

4.2. Most important symptoms and effects, both acute and delayed Skin irritation. Defatting of the skin. Rash. May cause eye irritation on direct contact. Aspiration may cause pulmonary oedema and pneumonitis. In high concentrations, vapours are narcotic and may cause headache, fatigue, dizziness and nausea.

4.3. Indication of any immediate medical attention and special treatment needed Treat symptomatically. Symptoms may be delayed.

SECTION 5: Firefighting measures

General fire hazards The product is flammable, and heating may generate vapours which may form explosive vapour/air mixtures. Containers may explode when heated.

5.1. Extinguishing media

Suitable extinguishing media Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

5.3. Advice for firefighters

Special protective equipment for firefighters Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

Special fire fighting procedures Withdraw immediately in case of rising sound from venting safety devices or any discolouration of tanks due to fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray. Cool containers exposed to flames with water until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Vapours may form explosive air mixtures even at room temperature. Prevent buildup of vapours or gasses to explosive concentrations. Some of these materials, if spilled, may evaporate leaving a flammable residue. Water runoff can cause environmental damage.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 for personal protective equipment. Local authorities should be advised if significant spillages cannot be contained.

For emergency responders Keep unnecessary personnel away. Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Fire and Explosion Hazard Data before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies.

6.3. Methods and material for containment and cleaning up

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Use non-sparking tools and explosion-proof equipment. Stop leak if you can do so without risk. This material is a water pollutant and should be prevented from contaminating soil or from entering sewage and drainage systems and bodies of water. Dike the spilled material, where this is possible. Prevent entry into waterways, sewers, basements or confined areas.

Small Spills: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. This material and its container must be disposed of as hazardous waste.

Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent product from entering drains. Do not allow material to contaminate ground water system. Should not be released into the environment.

6.4. Reference to other sections

Not available.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Before entering storage tanks and commencing any operation in a confined area check the atmosphere for oxygen content and flammability. Access to work area should be restricted to people handling the product only. Aerosol producing work should be handled in closed systems, if possible. Avoid contact with eyes, skin, and clothing. Avoid inhalation of vapours. Wear appropriate personal protective equipment. The product is extremely flammable, and explosive vapour/air mixtures may be formed even at normal room temperatures. Ground container and transfer equipment to eliminate static electric sparks. Vapours are heavier than air and may travel along the floor and in the bottom of containers. Immediately change contaminated clothes. Do not eat, drink or smoke when using the product. Observe good industrial hygiene practices.

7.2. Conditions for safe storage, including any incompatibilities

Flammable liquid storage. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. The pressure in sealed containers can increase under the influence of heat. Keep container tightly closed in a cool, well-ventilated place.

7.3. Specific end use(s)

Distribution of a substance. Formulation & (re) packaging of substances and mixtures. Manufacture of substance. Use as a Fuel. Use as an intermediate.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

No exposure limits noted for ingredient(s).

Biological limit values

No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures

Follow standard monitoring procedures.

Derived no-effect level (DNEL)

Components	Type	Route	Value	Form
Distillates (petroleum), light catalyst cracked (CAS 64741-59-9)	Workers	Dermal	2,4 mg/kg/8h	Long term Systemic effects
		Inhalation	2230 mg/m³/15min	Aerosol, Acute Systemic effects
		Inhalation	30 mg/m³/8h	Aerosol, Long term Systemic effects

Predicted no effect concentrations (PNECs)

Not available.

8.2. Exposure controls

Appropriate engineering controls

Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

General information

Use personal protective equipment as required. Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Keep working clothes separately. Launder contaminated clothing before reuse.

Eye/face protection

Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles.

Skin protection

- Hand protection

Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Wear suitable gloves tested to EN374.

- Other

Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.

Respiratory protection	Wear a NIOSH-approved (or equivalent) full-facepiece airline respirator in the positive pressure mode with emergency escape provisions. In case of inadequate ventilation or risk of inhalation of vapours, use suitable respiratory equipment with gas filter (type A2). Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.
Thermal hazards	When material is heated, wear gloves to protect against thermal burns.
Hygiene measures	Consult supervisor for special handling instructions. Avoid contact with eyes. Avoid contact with skin. Wash hands before breaks and immediately after handling the product. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practices.
Environmental exposure controls	Contain spills and prevent releases and observe national regulations on emissions.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	Colourless liquid.
Physical state	Liquid.
Form	Liquid.
Colour	Colourless.
Odour	Petroleum.
Odour threshold	Not available.
pH	Not available.
Melting point/freezing point	-20 °C (-4 °F)
Initial boiling point and boiling range	150 - 411 °C (302 - 771,8 °F)
Flash point	56,0 - 154,0 °C (132,8 - 309,2 °F) Pensky-Martens Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Vapour pressure	0,4 kPa (40°C)
Vapour density	Not available.
Relative density	> 0,9 (15°C)
Solubility(ies)	Insoluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	<= 225 °C (<= 437 °F)
Decomposition temperature	Not available.
Viscosity	1,1 - 4,5 mm²/s (40°C)
Explosive properties	Not available.
Oxidizing properties	Not available.
9.2. Other information	
Density	0,82 - 0,99 g/cm³
Explosive limit	Not available.

SECTION 10: Stability and reactivity

10.1. Reactivity	The product is stable and non reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Stable under normal temperature conditions and recommended use.
10.3. Possibility of hazardous reactions	Hazardous polymerisation does not occur.
10.4. Conditions to avoid	Heat, flames and sparks. Ignition sources. Contact with incompatible materials. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.

10.5. Incompatible materials Strong acids. Strong oxidizers such as nitrates, chlorates, peroxides.

10.6. Hazardous decomposition products Carbon oxides. Hydrocarbons.

SECTION 11: Toxicological information

General information Occupational exposure to the substance or mixture may cause adverse effects.

Information on likely routes of exposure

Ingestion Ingestion may cause irritation and malaise. Swallowing or vomiting of the liquid may result in aspiration into the lungs.

Inhalation In high concentrations, vapours and spray mists are narcotic and may cause headache, fatigue, dizziness and nausea.

Skin contact Causes skin irritation.

Eye contact Direct contact with eyes may cause temporary irritation.

Symptoms Irritation of eyes and mucous membranes. Skin irritation. Dermatitis. Ingestion may cause irritation and malaise.

11.1. Information on toxicological effects

Acute toxicity May be fatal if swallowed and enters airways. In high concentrations, vapours and spray mists are narcotic and may cause headache, fatigue, dizziness and nausea.

Components	Species	Test results
Distillates (petroleum), light catalyst cracked (CAS 64741-59-9)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
Inhalation		
LC50	Rat	> 4,65 mg/l
Oral		
LD50	Rat	> 3200 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Based on available data, the classification criteria are not met.

Respiratory sensitisation Due to lack of data the classification is not possible.

Skin sensitisation Not classified.

Germ cell mutagenicity Test data conclusive but not sufficient for classification.

Carcinogenicity May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Distillates (petroleum), light catalyst cracked (CAS 64741-59-9)	3 Not classifiable as to carcinogenicity to humans.

Reproductive toxicity Test data conclusive but not sufficient for classification.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure May cause damage to organs through prolonged or repeated exposure: Blood. Thymus. Liver.

Aspiration hazard May be fatal if swallowed and enters airways.

Mixture versus substance information Not applicable.

Other information Symptoms may be delayed.

SECTION 12: Ecological information

12.1. Toxicity Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Global Warming Potential (GWP, 100 year): 1300.

Components		Species	Test results
Distillates (petroleum), light catalyst cracked (CAS 64741-59-9)			
Aquatic			
Algae	IC50	Algae	0,51 mg/l
Crustacea	EL50	Invertebrates (Invertebrates)	0,32 mg/l
Fish	LL50	Fish	> 0,3 mg/l

12.2. Persistence and degradability	An evaluation of representative hydrocarbon structures indicates some structures meet the persistent (P) or very persistent (vP) criteria.
12.3. Bioaccumulative potential	The product does not contain any substances expected to be bioaccumulating.
Partition coefficient n-octanol/water (log Kow)	Not available.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	Not available.
12.5. Results of PBT and vPvB assessment	Not a PBT or vPvB substance or mixture.
12.6. Other adverse effects	Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste	Dispose of in accordance with local regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied.
EU waste code	13 07 03* The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Disposal methods/information	Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Do not discharge into drains, water courses or onto the ground.

SECTION 14: Transport information

ADR

14.1. UN number	UN1202
14.2. UN proper shipping name	GAS OIL
14.3. Transport hazard class(es)	3
Subsidiary class(es)	-
14.4. Packing group	III
14.5. Environmental hazards	Yes
Tunnel restriction code	D/E
Labels required	3
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

RID

14.1. UN number	UN1202
14.2. UN proper shipping name	GAS OIL
14.3. Transport hazard class(es)	3
Subsidiary class(es)	-
14.4. Packing group	III
14.5. Environmental hazards	Yes
Labels required	3
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

ADN

14.1. UN number	UN1202
14.2. UN proper shipping name	Gas Oil
14.3. Transport hazard class(es)	3
Subsidiary class(es)	-
14.4. Packing group	III
14.5. Environmental hazards	Yes
Labels required	3
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IATA

14.1. UN number	UN1202

14.2. UN proper shipping name	Gas oil
14.3. Transport hazard class(es)	3
Subsidiary class(es)	-
14.4. Packing group	III
14.5. Environmental hazards	Yes
Labels required	3
ERG Code	3L
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

14.1. UN number	UN1202
14.2. UN proper shipping name	GAS OIL
14.3. Transport hazard class(es)	3
Subsidiary class(es)	-
14.4. Packing group	III
14.5. Environmental hazards	
Marine pollutant	Yes
Labels required	3
EmS	F-E, S-E
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable. However, this product is a liquid and if transported in bulk covered under MARPOL 73/78, Annex I.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I

Not listed.

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(1) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Distillates (petroleum), light catalyst cracked (CAS 64741-59-9)

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not regulated.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding

Distillates (petroleum), light catalyst cracked (CAS 64741-59-9)

Other EU regulations

Directive 96/82/EC (Seveso II) on the control of major-accident hazards involving dangerous substances

Not regulated.

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

Distillates (petroleum), light catalyst cracked (CAS 64741-59-9)

Directive 94/33/EC on the protection of young people at work

Distillates (petroleum), light catalyst cracked (CAS 64741-59-9)

Other regulations	The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended and respective national laws implementing EC directives. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006. 96/82/EC (Seveso II) Directive; Part 2 (Classified Substances) - Flammable 96/82/EC (Seveso II) Directive; Part 2 (Classified Substances) - Dangerous for the Environment (i)
National regulations	Young people under 18 years old are not allow to work with this product according to the EU Directive 94/33/EC on the protection of young people at work.
15.2. Chemical safety assessment	For this substance a chemical safety assessment has been carried out.

SECTION 16: Other information

List of abbreviations	UVCB: Substances of Unknown or Variable composition, Complex reaction products or Biological materials. DSD: Directive 67/548/EEC. CLP: Regulation No. 1272/2008. DNEL: Derived No-Effect Level. PNEC: Predicted No-Effect Concentration. PBT: Persistent, bioaccumulative and toxic. vPvB: Very Persistent and very Bioaccumulative. eSDS: extended Safety Data Sheet. STP: Sewage Treatment Plant.
References	IUCLID Chemical safety report. IARC Monographs. Overall Evaluation of Carcinogenicity
Information on evaluation method leading to the classification of mixture	The mixture is classified based on test data for physical hazards. The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available. For details, refer to Sections 9, 11 and 12.
Full text of any statements or R-phrases and H-statements under Sections 2 to 15	R10 Flammable. R20 Also harmful by inhalation. R38 Irritating to skin. R45 May cause cancer. R48/21 Also harmful: danger of serious damage to health by prolonged exposure in contact with skin. R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R65 Also harmful: may cause lung damage if swallowed. H226 Flammable liquid and vapour. H304 May be fatal if swallowed and enters airways. H315 Causes skin irritation. H332 Harmful if inhaled. H350 May cause cancer. H373 May cause damage to organs through prolonged or repeated exposure. H410 Very toxic to aquatic life with long lasting effects.
This SDS contains revisions in the following section(s):	This safety data sheet contains revisions in the following section(s): 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16
Training information	Follow training instructions when handling this material.
Disclaimer	This material Safety Data Sheet (SDS) was prepared in accordance with EC No 1272/2008 by Valero Energy Ltd. Valero Energy Ltd. does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.

Annex to the extended Safety Data Sheet (eSDS)

1 - Exposure Scenario Worker

1. Distribution of substance

List of use descriptors

Sector(s) of Use	SU3: Industrial uses
Product categories [PC]:	Not available.
Name of contributing environmental scenario and corresponding ERC	ERC4: Industrial use of processing aids in processes and products, not becoming part of articles ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC6b: Industrial use of reactive processing aids ERC6c: Industrial use of monomers for manufacture of thermoplastics ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers ERC7: Industrial use of substances in closed systems Specific Environmental Release Category: ESVOC SpERC 1.1b.v1
List of names of contributing worker scenarios and corresponding PROCs	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15: Use as laboratory reagent
Further explanations	
Other Process or activity	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) of substance within closed or contained systems, including incidental exposures during its sampling, storage, unloading, maintenance and associated laboratory activities.

2.1. Contributing exposure scenario controlling environmental exposure for Industrial use of processing aids in processes and products, not becoming part of articles

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently). Substance is complex UVCB. Predominantly hydrophobic.
Physical state	Liquid With potential aerosol generation
Viscosity	
Kinematic viscosity	1,6 mm²/s 40 °C
Dynamic viscosity	Not available.

Amounts used

Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tons/year):	2,8 e5
Fraction of Regional tonnage used locally:	0,002
Annual site tonnage (tons/year):	5,6 e2
Maximum daily site tonnage (kg/day):	2,8 e4

Frequency and duration of use

Batch process	Not available.
Continuous process	Emission days (days/year): 20

Environment factors not influenced by risk management

Local freshwater dilution factor:	10
Local marine water dilution factor:	100

Other given operational conditions affecting environmental exposure

	Emission days	Emission factors			
Type	**(days/year)**	**Air**	**Soil**	**Water**	**Remarks**
initial release prior to RMM	20	0,001	0,00001	0,00001	

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air	Treat air emission to provide a typical removal efficiency of (%): 90
Soil	Not available.
Water	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): 0. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%): 0
Sediment	Not available.
Remarks	Risk from environmental exposure is driven by freshwater sediment. No wastewater treatment required.
Organisational measures to prevent/limit release from site	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type	Municipal STP
Discharge rate	2000
Treatment effectiveness	92,3
Sludge treatment technique	Not available.
Measures to limit air emissions	Not available.
Remarks	Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 9,2e5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	92,3

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment	Not available.
Disposal methods	Not available.
Treatment effectiveness	Not available.
Remarks	External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations	External recovery and recycling of waste should comply with applicable local and/or national regulations.
Treatment effectiveness	Not available.
Remarks	Not available.
Additional good practice advice beyond the REACH CSA	Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure

Process categories beyond the REACH CSA	Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Use as laboratory reagent

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently).

Physical form of the product	Liquid With potential aerosol generation
Vapour pressure	Liquid, vapour pressure <0,5 kPa at STP.
Process temperature	Assumes use at not more than 20°C above ambient temperature, unless stated differently.

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas	Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks

Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Process sampling; Sample via a closed loop or other system to avoid exposure. General exposures (closed systems); Handle substance within a predominantly closed system provided with extract ventilation. Bulk product storage; Store substance within a closed system. Equipment cleaning and maintenance; Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Technical conditions and measures to control dispersion from source towards the worker	Bulk closed loading and unloading; Ensure material transfers are under containment or extract ventilation. Equipment cleaning and maintenance; Clear spills immediately. Laboratory activities; Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.
Organizational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens); Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. General measures (skin irritants); Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. wash off any skin contamination immediately. provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
Conditions and measures related to personal protection, hygiene and health evaluations	Bulk closed loading and unloading; Wear suitable gloves tested to EN374. Equipment cleaning and maintenance; Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
General process exposures (no sampling)	0,01 mg/m³	0	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.140	**	All routes
General exposures (closed system) + With sample collection	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
General exposures (closed systems)	0,1 mg/m³	0	**	Inhalation Exposure
	0,03 mg/kg bw/day	0.010	**	Dermal Exposure
		0.020	**	All routes
Sample collection	1 mg/m³	0.040	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.180	**	All routes
Laboratory activities	0,05 mg/m³	0	**	Inhalation Exposure
	0,03 mg/kg bw/day	0.010	**	Dermal Exposure
		0.010	**	All routes
Bulk transfers (closed systems) e.g bottom loading	5 mg/m³	0.180	**	Inhalation Exposure
	6,86 mg/kg bw/day	0.570	**	Dermal Exposure
		0.750	**	All routes
Equipment cleaning and maintenance	0,5 mg/m³	0.020	**	Inhalation Exposure
	13,71 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
Bulk Storage	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation.

2 - Exposure Scenario Worker

1. Formulation & (re)packing of substances and mixtures

List of use descriptors

Sector(s) of Use	SU3: Industrial uses SU10: Formulation [mixing] of preparations and/or re-packaging
Product categories [PC]:	Not available.
Name of contributing environmental scenario and corresponding ERC	ERC2: Formulation of preparations Specific Environmental Release Category: ESVOC SpERC 2.2.v1
List of names of contributing worker scenarios and corresponding PROCs	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15: Use as laboratory reagent
Further explanations	
Other Process or activity	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities

2.1. Contributing exposure scenario controlling environmental exposure for Formulation of preparations

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently). Substance is complex UVCB. Predominantly hydrophobic.
Physical state	Liquid With potential aerosol generation
Viscosity	
Kinematic viscosity	1,6 mm²/s 40 °C
Dynamic viscosity	Not available.

Amounts used

Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tons/year):	2,4 e5
Fraction of Regional tonnage used locally:	0,125
Annual site tonnage (tons/year):	3 e4
Maximum daily site tonnage (kg/day):	1 e5

Frequency and duration of use

Batch process	Not available.
Continuous process	Emission days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor:	10
Local marine water dilution factor:	100

Other given operational conditions affecting environmental exposure

	Emission days	Emission factors			
Type	**(days/year)**	**Air**	**Soil**	**Water**	**Remarks**
initial release prior to RMM	300	0,01	0,0001	0,000083	

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air	Treat air emission to provide a typical removal efficiency of (%): 0

Soil	Not available.
Water	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): 96,5. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%): 54,1
Sediment	Not available.
Remarks	Risk from environmental exposure is driven by freshwater sediment. Onsite wastewater treatment required.
Organisational measures to prevent/limit release from site	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type	Municipal STP
Discharge rate	2000
Treatment effectiveness	92,3
Sludge treatment technique	Not available.
Measures to limit air emissions	Not available.
Remarks	Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 1,0e5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	96,5

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment	Not available.
Disposal methods	Not available.
Treatment effectiveness	Not available.
Remarks	External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations	External recovery and recycling of waste should comply with applicable local and/or national regulations.
Treatment effectiveness	Not available.
Remarks	Not available.
Additional good practice advice beyond the REACH CSA	Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure

Process categories beyond the REACH CSA	Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Use as laboratory reagent

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product	Liquid With potential aerosol generation
Vapour pressure	Liquid, vapour pressure <0,5 kPa at STP.
Process temperature	Assumes use at not more than 20°C above ambient temperature, unless stated differently.

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks

Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

Process sampling;
Sample via a closed loop or other system to avoid exposure.

General exposures (closed systems);
Handle substance within a predominantly closed system provided with extract ventilation.

Bulk product storage;
Store substance within a closed system.

Equipment cleaning and maintenance;
Drain down and flush system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or for subsequent recycle.

Technical conditions and measures to control dispersion from source towards the worker

Bulk transfers;
Ensure material transfers are under containment or extract ventilation.

Drum/batch transfers;
Ensure material transfers are under containment or extract ventilation.

Equipment cleaning and maintenance;
Clear spills immediately.

Laboratory activities;
Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.

Organizational measures to prevent/limit releases, dispersion and exposure

General measures (carcinogens);
Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

General measures (skin irritants);
Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. wash off any skin contamination immediately. provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Conditions and measures related to personal protection, hygiene and health evaluations

Equipment cleaning and maintenance;
Wear suitable gloves tested to EN374.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
General exposures (closed systems)	0,01 mg/m³	0	**	Inhalation Exposure
	0,03 mg/kg bw/day	0.010	**	Dermal Exposure
		0.010	**	All routes
General exposures (closed system) + With sample collection	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
General exposures (closed system) + Batch process + With sample collection	0,1 mg/m³	0	**	Inhalation Exposure
	0,03 mg/kg bw/day	0.010	**	Dermal Exposure
		0.020	**	All routes
Sample collection	1 mg/m³	0.040	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.180	**	All routes
Laboratory activities	0,05 mg/m³	0	**	Inhalation Exposure
	0,03 mg/kg bw/day	0.010	**	Dermal Exposure
		0.010	**	All routes
Bulk transfers (closed systems) e.g bottom loading	0,5 mg/m³	0.020	**	Inhalation Exposure
	0,69 mg/kg bw/day	0.290	**	Dermal Exposure
		0.310	**	All routes
Drum/batch transfers	0,5 mg/m³	0.020	**	Inhalation Exposure
	0,69 mg/kg bw/day	0.290	**	Dermal Exposure
		0.310	**	All routes
Equipment cleaning and maintenance	0,5 mg/m³	0.020	**	Inhalation Exposure
	13,71 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
Bulk product storage	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation.

3 - Exposure Scenario Worker

1. Manufacture of substance

List of use descriptors

Sector(s) of Use	SU3: Industrial uses SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals
Product categories [PC]:	Not available.
Name of contributing environmental scenario and corresponding ERC	ERC1: Manufacture of substances Specific Environmental Release Category: ESVOC SpERC 1.1.v1
List of names of contributing worker scenarios and corresponding PROCs	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15: Use as laboratory reagent
Further explanations	
Other Process or activity	Manufacture of the substance or use as a process chemical or extraction agent within closed or contained systems. Includes incidental exposures during recycling / recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel / barge, road / rail car and bulk container).

2.1. Contributing exposure scenario controlling environmental exposure for Manufacture of substances

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently). Substance is complex UVCB. Predominantly hydrophobic.
Physical state	Liquid With potential aerosol generation
Viscosity	
Kinematic viscosity	1,6 mm²/s 40 °C
Dynamic viscosity	Not available.

Amounts used

Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tons/year):	2,8 e5
Fraction of Regional tonnage used locally:	1
Annual site tonnage (tons/year):	2,8 e5
Maximum daily site tonnage (kg/day):	9,3 e5

Frequency and duration of use

Batch process	Not available.
Continuous process	Emission days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor:	10
Local marine water dilution factor:	100

Other given operational conditions affecting environmental exposure

	Emission days	Emission factors			
Type	**(days/year)**	**Air**	**Soil**	**Water**	**Remarks**
initial release prior to RMM	300	0,01	0,0001	0,0003	

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air	Treat air emission to provide a typical removal efficiency of (%): 90
Soil	Not available.
Water	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): 98,7. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%): 83,6
Sediment	Not available.
Remarks	Risk from environmental exposure is driven by freshwater sediment. Prevent discharge of undissolved substance to or recover from onsite wastewater. Onsite wastewater treatment required.
Organisational measures to prevent/limit release from site	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type	Municipal STP
Discharge rate	10000
Treatment effectiveness	92,3
Sludge treatment technique	Not available.
Measures to limit air emissions	Not available.
Remarks	Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 9,3e5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	98,7

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment	Not available.
Disposal methods	Not available.
Treatment effectiveness	Not available.
Remarks	During manufacturing no waste of the substance is generated to treat.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations	During manufacturing no waste of the substance is generated to recover.
Treatment effectiveness	Not available.
Remarks	Not available.
Additional good practice advice beyond the REACH CSA	Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure

Process categories beyond the REACH CSA	Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Use as laboratory reagent

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product	Liquid With potential aerosol generation
Vapour pressure	Liquid, vapour pressure <0,5 kPa at STP.
Process temperature	Operation is carried out at elevated temperature (> 20°C above ambient temperature).

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks

Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

Process sampling;
Sample via a closed loop or other system to avoid exposure.

General exposures (closed systems);
Handle substance within a predominantly closed system provided with extract ventilation.

Bulk product storage;
Store substance within a closed system.

Equipment cleaning and maintenance;
Drain down and flush system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or for subsequent recycle.

Technical conditions and measures to control dispersion from source towards the worker

Bulk closed loading and unloading;
Ensure material transfers are under containment or extract ventilation.

Equipment cleaning and maintenance;
Clear spills immediately.

Laboratory activities;
Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.

Organizational measures to prevent/limit releases, dispersion and exposure

General measures (carcinogens);
Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

General measures (skin irritants);
Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. wash off any skin contamination immediately. provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Conditions and measures related to personal protection, hygiene and health evaluations

Bulk closed loading and unloading;
Wear suitable gloves tested to EN374.

Equipment cleaning and maintenance;
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
General process exposures (no sampling)	0,01 mg/m³	0	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.140	**	All routes
General exposures (closed system) + With sample collection	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
General exposures (closed systems)	1 mg/m³	0.040	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.180	**	All routes
Sample collection	1 mg/m³	0.040	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.180	**	All routes
Laboratory activities	0,05 mg/m³	0	**	Inhalation Exposure
	0,03 mg/kg bw/day	0.010	**	Dermal Exposure
		0.010	**	All routes
Bulk transfers (closed systems) e.g bottom loading	5 mg/m³	0.180	**	Inhalation Exposure
	6,86 mg/kg bw/day	0.570	**	Dermal Exposure
		0.750	**	All routes
Equipment cleaning and maintenance	0,5 mg/m³	0.020	**	Inhalation Exposure
	13,71 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
Bulk Storage	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html). Scaled local assessments for EU refineries have been performed using site-specific data and are attached in PETRORISK file in IUCLID section 13 - "Site-Specific Production" worksheet.

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation.

4 - Exposure Scenario Worker

1. Use as a fuel

List of use descriptors

Sector(s) of Use	SU3: Industrial uses
Product categories [PC]:	Not available.
Name of contributing environmental scenario and corresponding ERC	ERC7: Industrial use of substances in closed systems Specific Environmental Release Category: ESVOC SpERC 7.12a.v1
List of names of contributing worker scenarios and corresponding PROCs	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC16: Using material as fuel sources, limited exposure to unburned product to be expected
Further explanations	
Other Process or activity	Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste.

2.1. Contributing exposure scenario controlling environmental exposure for Industrial use of substances in closed systems

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently). Substance is complex UVCB. Predominantly hydrophobic.
Physical state	Liquid With potential aerosol generation
Viscosity	
Kinematic viscosity	1,6 mm²/s 40 °C
Dynamic viscosity	Not available.

Amounts used

Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tons/year):	2 e5
Fraction of Regional tonnage used locally:	1
Annual site tonnage (tons/year):	2 e5
Maximum daily site tonnage (kg/day):	6,8 e5

Frequency and duration of use

Batch process	Not available.
Continuous process	Emission days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor:	10
Local marine water dilution factor:	100

Other given operational conditions affecting environmental exposure

	Emission days	Emission factors			
Type	**(days/year)**	**Air**	**Soil**	**Water**	**Remarks**
initial release prior to RMM	300	0,005	0	0,00001	

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air	Treat air emission to provide a typical removal efficiency of (%): 95

Soil	Not available.
Water	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): 88,9. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%): 0
Sediment	Not available.
Remarks	Risk from environmental exposure is driven by freshwater sediment. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.
Organisational measures to prevent/limit release from site	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type	Municipal STP
Discharge rate	2000
Treatment effectiveness	92,3
Sludge treatment technique	Not available.
Measures to limit air emissions	Not available.
Remarks	Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 9,2e5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	92,3

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment	Not available.
Disposal methods	Not available.
Treatment effectiveness	Not available.
Remarks	Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations	This substance is consumed during use and no waste of the substance is generated.
Treatment effectiveness	Not available.
Remarks	Not available.
Additional good practice advice beyond the REACH CSA	Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure

Process categories beyond the REACH CSA	Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Using material as fuel sources, limited exposure to unburned product to be expected

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product	Liquid With potential aerosol generation
Vapour pressure	Liquid, vapour pressure <0,5 kPa at STP.
Process temperature	Assumes use at not more than 20°C above ambient temperature, unless stated differently.

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks

Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

Use as a fuel, (closed systems);
Handle substance within a closed system.

Bulk product storage;
Store substance within a closed system.

Equipment cleaning and maintenance;
Drain down and flush system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or for subsequent recycle.

Technical conditions and measures to control dispersion from source towards the worker

Bulk transfers;
Ensure material transfers are under containment or extract ventilation.

Drum/batch transfers;
Ensure material transfers are under containment or extract ventilation.

Equipment cleaning and maintenance;
Clear spills immediately.

Organizational measures to prevent/limit releases, dispersion and exposure

General measures (carcinogens);
Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

General measures (skin irritants);
Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. wash off any skin contamination immediately. provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Conditions and measures related to personal protection, hygiene and health evaluations

Equipment cleaning and maintenance;
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
Bulk transfers	0,5 mg/m³	0.020	**	Inhalation Exposure
	0,69 mg/kg bw/day	0.290	**	Dermal Exposure
		0.310	**	All routes
Drum/batch transfers	0,5 mg/m³	0.020	**	Inhalation Exposure
	0,69 mg/kg bw/day	0.290	**	Dermal Exposure

		0.310	**	All routes
General exposures (closed systems)	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
Use as a fuel (closed system)	5 mg/m³	0.180	**	Inhalation Exposure
	0,03 mg/kg bw/day	0.010	**	Dermal Exposure
		0.200	**	All routes
Use as a fuel additive diluent (closed system)	1 mg/m³	0.040	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.180	**	All routes
Equipment cleaning and maintenance	0,5 mg/m³	0.020	**	Inhalation Exposure
	13,71 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
Vessel and container cleaning	0,5 mg/m³	0.020	**	Inhalation Exposure
	13,71 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
Bulk product storage	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation.

5 - Exposure Scenario Worker

1. Use as an intermediate

List of use descriptors

Sector(s) of Use	SU3: Industrial uses SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals
Product categories [PC]:	Not available.
Name of contributing environmental scenario and corresponding ERC	ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) Specific Environmental Release Category: ESVOC SpERC 6.1a.v1
List of names of contributing worker scenarios and corresponding PROCs	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15: Use as laboratory reagent
Further explanations	
Other Process or activity	Use of substance as an intermediate (not related to strictly controlled conditions) within closed or contained systems. Includes incidental exposures during recycling / recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel / barge, road / rail car and bulk container).

2.1. Contributing exposure scenario controlling environmental exposure for Industrial use resulting in manufacture of another substance (use of intermediates)

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently). Substance is complex UVCB. Predominantly hydrophobic.
Physical state	Liquid With potential aerosol generation
Viscosity	
Kinematic viscosity	1,6 mm²/s 40 °C
Dynamic viscosity	Not available.

Amounts used

Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tons/year):	5,1 e4
Fraction of Regional tonnage used locally:	1
Annual site tonnage (tons/year):	1,5 e4
Maximum daily site tonnage (kg/day):	5 e4

Frequency and duration of use

Batch process	Not available.
Continuous process	Emission days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor:	10
Local marine water dilution factor:	100

Other given operational conditions affecting environmental exposure

	Emission days	Emission factors			
Type	**(days/year)**	**Air**	**Soil**	**Water**	**Remarks**
initial release prior to RMM	300	0,001	0,001	0,00017	

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air	Treat air emission to provide a typical removal efficiency of (%): 80
Soil	Not available.
Water	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): 95,3. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%): 38,8
Sediment	Not available.
Remarks	Risk from environmental exposure is driven by freshwater sediment. Prevent discharge of undissolved substance to or recover from onsite wastewater. Onsite wastewater treatment required.
Organisational measures to prevent/limit release from site	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type	Municipal STP
Discharge rate	2000
Treatment effectiveness	92,3
Sludge treatment technique	Not available.
Measures to limit air emissions	Not available.
Remarks	Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 5,0e4
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	95,3

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment	Not available.
Disposal methods	Not available.
Treatment effectiveness	Not available.
Remarks	This substance is consumed during use and no waste of the substance is generated to treat.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations	This substance is consumed during use and no waste of the substance is generated.
Treatment effectiveness	Not available.
Remarks	Not available.
Additional good practice advice beyond the REACH CSA	Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure

Process categories beyond the REACH CSA	Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Use as laboratory reagent

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product	Liquid With potential aerosol generation
Vapour pressure	Liquid, vapour pressure <0,5 kPa at STP.
Process temperature	Operation is carried out at elevated temperature (> 20°C above ambient temperature).

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks

Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

Process sampling;
Sample via a closed loop or other system to avoid exposure.

General exposures (closed systems);
Handle substance within a predominantly closed system provided with extract ventilation.

Bulk product storage;
Store substance within a closed system.

Equipment cleaning and maintenance;
Drain down and flush system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or for subsequent recycle.

Technical conditions and measures to control dispersion from source towards the worker

Bulk closed loading and unloading;
Ensure material transfers are under containment or extract ventilation.

Equipment cleaning and maintenance;
Clear spills immediately.

Laboratory activities;
Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.

Organizational measures to prevent/limit releases, dispersion and exposure

General measures (carcinogens);
Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

General measures (skin irritants);
Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. wash off any skin contamination immediately. provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Conditions and measures related to personal protection, hygiene and health evaluations

Bulk closed loading and unloading;
Wear suitable gloves tested to EN374.

Equipment cleaning and maintenance;
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
General process exposures (no sampling)	0,01 mg/m³	0	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.140	**	All routes
General exposures (closed system) + With sample collection	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
General exposures (closed systems)	1 mg/m³	0.040	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.180	**	All routes
Sample collection	1 mg/m³	0.040	**	Inhalation Exposure
	0,34 mg/kg bw/day	0.140	**	Dermal Exposure
		0.180	**	All routes
Laboratory activities	0,05 mg/m³	0	**	Inhalation Exposure
	0,03 mg/kg bw/day	0.010	**	Dermal Exposure
		0.010	**	All routes
Bulk transfers (closed systems) e.g bottom loading	5 mg/m³	0.180	**	Inhalation Exposure
	6,86 mg/kg bw/day	0.570	**	Dermal Exposure
		0.750	**	All routes
Equipment cleaning and maintenance	0,5 mg/m³	0.020	**	Inhalation Exposure
	13,71 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes
Bulk Storage	0,5 mg/m³	0.020	**	Inhalation Exposure
	1,37 mg/kg bw/day	0.570	**	Dermal Exposure
		0.590	**	All routes

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation.