Revision: 6.1 Date: 10.06.2019

ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product Name Fuel oil, residual

Product Description V2011-LOW SULPHUR FUEL OIL, RESIDUAL

Trade Name LOW SULPHUR FUEL OIL

 Product code
 LSFO, V2011

 CAS No.
 68476-33-5

 EC No.
 270-675-6

REACH Registration No.

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

and uses advised a

Identified Use(s)

No. Exposure Scenario

Distribution of Fuel oil, residual

Formulation and (re)packing of Fuel oil, residual

Use of Fuel oil, residual as a Fuel (Industrial)

Use of Fuel oil, residual as a Fuel (Professional)

22

Uses Advised Against Anything other than the above.

1.3 Details of the supplier of the safety data sheet

Company Identification Vitol SA

Place des Bergues 3 P.O. Box 2056 1211 Geneva 1 Switzerland

 Telephone
 +31 10 498 7200

 Fax
 +31 10 452 9545

 E-Mail (competent person)
 xrea ch@vitol.com

1.4 Emergency telephone number

Emergency Phone No. +44 (0) 1235 239 670, 24/7
Languages spoken All official European languages.

#### **SECTION 2: HAZARDS IDENTIFICATION**

#### 2.1 Classification of the substance or mixture

**2.1.1 Regulation (EC) No. 1272/2008 (CLP)** Asp. Tox. 1; H304

Acute Tox. 4; H332 Carc. 1B; H350 Repr. 2; H361d

STOT RE 2; H373 (Thymus, Liver, blood effects)

Aquatic Acute 1; H400 Aquatic Chronic 1; H410

2.2 Label elements According to Regulation (EC) No. 1272/2008 (CLP)

Product Description V2011-LOW SULPHUR FUEL OIL, RESIDUAL

Hazard Pictogram(s)







Signal Word(s)

Danger

Page: 1 of 25

Revision: 6.1 Date: 10.06.2019

### ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



Hazard Statement(s) H304: May be fatal if swallowed and enters airways.

> H332: Harmful if inhaled. H350: May cause cancer.

H361d: Suspected of damaging the unborn child.

H373: May cause damage to organs through prolonged or repeated exposure:

Thymus, Liver, blood effects

H410: Very toxic to aquatic life with long lasting effects.

Precautionary Statement(s) P201: Obtain special instructions before use.

> P260: Do not breathe dust/fume/gas/mist/vapours/spray. P281: Use personal protective equipment as required.

P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or

doctor/physician.

P331: Do NOT induce vomiting. P273: Avoid release to the environment.

Supplemental information EUH066: Repeated exposure may cause skin dryness or cracking.

Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances. Remove contaminated clothing and wash clothing before reuse. Vapour may create explosive atmosphere. The vapour is heavier than air;

beware of pits and confined spaces.

### **SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

#### 3.1 **Substances**

Other hazards

2.3

	SUBSTANCE	CAS No.	EC No.	REACH Registration No.	%W/W
	Fuel oil, residual	68476-33-5	270-675-6	-	100

### SECTION 4: FIRST AID MEASURES



#### 4.1 Description of first aid measures

Self-protection of the first aider

H2S Warning: Hydrogen sulphide (H2S) can accumulate in the headspace of storage tanks and reach potentially hazardous concentrations.

If there is any suspicion of inhalation: A self contained breathing apparatus

The vapour is heavier than air; beware of pits and confined spaces. If it is suspected that fumes are still present, the responder should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Avoid all contact. Do not

should be worn. Remove to fresh air immediately.

IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in

a position comfortable for breathing. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. If symptoms persist, obtain medical attention.

IF ON SKIN (or hair): Remove contaminated clothing immediately and drench affected skin with plenty of water, then wash with soap and water. If irritation

(redness, rash, blistering) develops, get medical attention.

ingest. If swallowed then seek immediate medical assistance.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get

medical advice/attention.

IF SWALLOWED: Do not induce vomiting because of risk of aspiration into the lungs. If vomiting occurs spontaneously, keep head below hips to prevent

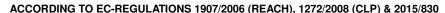
Inhalation

Skin Contact

Eye Contact

Ingestion

Revision: 6.1 Date: 10.06.2019





4.2 Most important symptoms and effects, both acute and delayed aspiration into the lungs. If unconscious, place in recovery position and get medical attention immediately. Do not give anything by mouth to an unconscious person. Get medical attention immediately. Do not wait for symptoms to appear. Inhalation: Vapour may be irritant to the respiratory tract.

Skin Contact: Repeated and/or prolonged skin contact may cause irritation.

Eye Contact: May cause eye irritation.

Ingestion: Aspiration hazard. Aspiration into the lungs may cause chemical pneumonitis, which can be fatal.

If breathing is laboured, oxygen should be administered by qualified personnel. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

IF INHALED: If unconscious, place in recovery position and get medical attention immediately. Administer oxygen if available and artificial respiration if necessary.

IF SWALLOWED: Do not induce vomiting because of risk of aspiration into the lungs. If aspiration is suspected obtain immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration into the lungs.

and delayed

Indication of any immediate medical attention and

Notes to a physician:

special treatment needed

4.3

# **SECTION 5: FIREFIGHTING MEASURES**

5.1 Extinguishing media

Suitable Extinguishing media
Unsuitable extinguishing media

5.2 Special hazards arising from the substance or mixture

5.3 Advice for fire-fighters

Foam, Carbon dioxide, Water fog or dry powder.

Do not use water jet. Direct water jet may spread the fire.

Not flammable but will support combustion. The vapour is heavier than air; beware of pits and confined spaces. Will float and can be reignited on surface water. Decomposes in a fire giving off toxic fumes: A mixture of solid and liquid particulates and gases including unidentified organic and inorganic compounds. If sulphur compounds are present in appreciable amounts, combustion products may include also H2S and SOx (sulfur oxides) or sulfuric acid

Fight fire with normal precautions from a reasonable distance. Fire fighters should wear complete protective clothing including self-contained breathing apparatus. Keep containers cool by spraying with water if exposed to fire. Avoid release to the environment. Dike fire control water for later disposal.

#### **SECTION 6: ACCIDENTAL RELEASE MEASURES**

6.1 Personal precautions, protective equipment and emergency procedures

H2S Warning:

Small spillages: Large spillages:

6.2 Environmental precautions

6.3 Methods and material for containment and cleaning up Caution - spillages may be slippery. Ensure operatives are trained to minimise exposures. Ensure suitable personal protection during removal of spillages. Eliminate sources of ignition. Shut off leaks if without risk. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Avoid all contact with substance. Ensure adequate ventilation. Do not breathe vapour. Do not ingest. If swallowed then seek immediate medical assistance. Do not use sparking tools.

Product may release Hydrogen Sulphide. Exposure controls - These controls may include: Segregation of areas, Access only to authorised persons, Permit to work systems, Confined space working procedures, Area H2S alarms, Personal H2S alarms, Personal escape sets, H2S awareness training. Please see section 8 for appropriate personal protection equipment

Wear flame-resistant antistatic protective clothing.

Evacuate the area and keep personnel upwind. Drench contaminated clothing with water before removing to avoid risk of sparks from static electricity. Avoid all contact. Wear chemical protection suit and breathing apparatus. See Also Section: 8.

Avoid release to the environment. Do not allow to enter drains, sewers or watercourses. Spillages or uncontrolled discharges into watercourses must be alerted to the Environment Agency or other appropriate regulatory body. If necessary: Dike area to contain the spill and prevent releases to sewers, drains, or other waterways.

Provided it is safe to do so, isolate the source of the leak. The vapour is heavier than air; beware of pits and confined spaces. Ensure that the equipment is

Revision: 6.1 Date: 10.06.2019

ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



Spillages onto land:

adequately grounded. Allow small spillages to evaporate provided there is adequate ventilation.

In case of soil contamination, remove contaminated soil and treat in accordance with local regulations. Adsorb spillages onto sand, earth or any suitable adsorbent material. Transfer to a lidded container for disposal or recovery. Dispose of this material and its container as hazardous waste.

**Small spillages:** Allow small spillages to evaporate provided there is adequate ventilation. Wear flame-resistant antistatic protective clothing.

Large spillages: Cover spillage with foam to reduce evaporation. Do not use water jet.

Collect as much as possible in clean container for reuse or disposal.

**Small spillages:** Contain product with floating barriers or other equipment. Collect spilled product by absorbing with specific floating absorbents.

Large spillages: Open waters should be contained with floating barriers or other mechanical means and recovered, only if this is strictly necessary and if fire/explosion risks can be adequately prevented. Otherwise control the spreading of the spillage, and let the substance evaporate naturally.

See Section: 8,13

Reference to other sections

Spillages on water or at sea:

### **SECTION 7: HANDLING AND STORAGE**

7.1 Precautions for safe handling

6.4

H2S Warning:

7.2 Conditions for safe storage, including any incompatibilities

Storage temperature Storage measures

Incompatible materials
7.3 Specific end use(s)

Obtain special instructions before use. Keep away from sources of ignition - No smoking. Use only outdoors or in a well-ventilated area. Prevent vapour build up by providing adequate ventilation during and after use. Take action to prevent static discharges. Use non-sparking tools. All parts of the plant and equipment should be electrically bonded together and connected to earth. Electrical continuity should be checked at regular intervals. Antistatic clothing and footwear should be used. The vapour is heavier than air; beware of pits and confined spaces. Avoid all contact with substance. Do not ingest. If swallowed then seek immediate medical assistance. Do not breathe vapour. See Section: 8. Keep good industrial hygiene. Wash hands thoroughly after handling. Contaminated clothing should be thoroughly cleaned.

Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances. These controls may include: Segregation of areas, Access only to authorised persons, Permit to work systems, Confined space working procedures, Area H2S alarms, Personal H2S alarms, Personal escape sets, H2S awareness training.

Light hydrocarbon vapours can build up in the headspace of containers. These can cause flammability / explosion hazards. Bund storage facilities to prevent soil and water pollution in the event of spillage. Keep only in original packaging. Keep containers properly sealed when not in use. Protect from sunlight. Containers of this material may be hazardous when empty since they retain product residue. Empty container may contain product residue which may result in flammable or explosive vapours inside the container.

Stable at ambient temperatures.

Suitable containers: Stainless steel, Mild steel Unsuitable containers: Synthetic materials

Keep away from oxidising agents.

See Section: 1.2 and/or Exposure Scenario.

### SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Occupational Exposure Limits

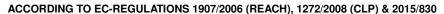
No Occupational Exposure Limit assigned. Users are advised to consider national Occupational Exposure Limits or other equivalent values.

8.1.2 Biological limit value

Not established.

Page: 4 of 25

Revision: 6.1 Date: 10.06.2019





#### 8.1.3 PNECs and DNELs

PNEC: Fuel Oil, Residual is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the environmental toxicity (HC5) of each group of components in the substance. These are used to estimate the environmental risk for the substance. Therefore individual environmental compartments PNECs are not available for this product.

Fuel Oil, Residual Derived No Effect Level	Oral	Inhalation	Dermal
Worker - Long Term - Systemic effects	0.015 mg/kg bw/day	0.18 mg/m <sup>3</sup>	0.065 mg/kg bw/day
Worker - Short term - Systemic effects	-	4700 mg/m <sup>3</sup>	-

#### 8.2 Exposure controls

#### 8.2.1 Appropriate engineering controls

Provide adequate ventilation, including appropriate local extraction if dusts, fumes or vapours are likely to be evolved. Store in a cool/low-temperature, well-ventilated (dry) place away from heat and ignition sources. Guarantee that the eye flushing systems and safety showers are located close to the working place.

# 8.2.2 Individual protection measures, such as personal protective equipment (PPE)

Protective clothing should be selected specifically for the working place, depending on concentration and quantity of the hazardous substances handled. The resistance of the protective clothing to chemicals should be ascertained with the respective supplier.

Fuels are typically used, transferred and transported in closed systems. If exposure is likely (i.e. during sampling) the following advice may be appropriate. Keep good industrial hygiene. Always wash hands before smoking, eating and drinking. Do not eat, drink or smoke at the work place.

Refer to annexes for exposure scenarios detailing use specific exposure controls

Eye/ face protection



Use eye protection according to EN 166, designed to protect against liquid splashes.

Skin protection



**Hand protection:** Wear impervious gloves (EN374). Gloves should be changed regularly to avoid permeation problems. Breakthrough time of the glove material: refer to the information provided by the gloves' producer.

Recommended: Nitrile rubber.

Body protection: Wear anti-static clothing and shoes.

small scale: Wear suitable coveralls to prevent exposure to the skin.

large scale: Chemical protection suit.

Respiratory protection



Thermal hazards

When the product is heated /In case of inadequate ventilation wear respiratory protection. The use of a high efficiency filter (EN143) is recommended. Filter type A2

Closed system(s): Not normally required.

Not applicable.

8.2.3 Environmental Exposure Controls Avoid release to the environment.

#### **SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

9.1 Information on basic physical and chemical properties

Appearance Odour

Odour threshold

рΗ

Melting point/freezing point

Liquid, Viscous, May be coloured.

Fuel oil-like Not established. Not established. < 30 °C

Page: 5 of 25

Revision: 6.1 Date: 10.06.2019

#### ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



Initial boiling point and boiling range  $$>350\ ^{\circ}\text{C}$$  Flash point  $$>60\ ^{\circ}\text{C}$$ 

Evaporation rate Not established .
Flammability (solid, gas) Not applicable - Liquid
Upper/lower flammability or explosive limits Not established.
Vapour pressure 0.5 kPa @ 20°C

Vapour pressure 0.5 kPa @ 2
Vapour density >1 (Air=1)

Relative density 0.80 - 0.99 g/cm³ @ 15 °C Solubility(ies) Water: 0.4 mg/l @ 22 °C Slightly soluble.

Partition coefficient: n-octanol/water 2.7 – 6 log P
Auto-ignition temperature > 225 °C
Decomposition Temperature Not established.

Viscosity 7 – 20.5 mm²/s @ 40 °C (<60 mm²/s @ 100 °C)

Explosive properties Not explosive. (Vapour may create explosive atmosphere.)

Oxidising properties Not oxidising.

**9.2 Other information** None known.

### **SECTION 10: STABILITY AND REACTIVITY**

10.1 Stability and reactivity Stable under normal conditions. Reacts with - Strong oxidising agents

10.2 Chemical stability Stable under normal conditions. Hazardous polymerisation will not occur.

Product may release Hydrogen Sulphide.

10.3 Possibility of hazardous reactions Vapours are heavier than air and may travel considerable distances to a source

of ignition and flashback. Product may release Hydrogen Sulphide.

**10.4 Conditions to avoid** Elevated temperature: > 50 °C

Keep away from heat, sources of ignition and direct sunlight.

10.5 Incompatible materials Keep away from oxidising agents. Strong Acids and Alkalis.

10.6 Hazardous decomposition product(s)

A mixture of solid and liquid particulates and gases including unidentified

organic and inorganic compounds. Decomposes in a fire giving off toxic fumes:

COx, H2S, SOx,

#### **SECTION 11: TOXICOLOGICAL INFORMATION**

mentioned.

Acute toxicity - Ingestion Based upon the available data, the classification criteria are not met.

LD50 (oral,rat) mg/kg: >2000 (OECD 401)

Acute toxicity - Inhalation Acute Tox. 4; Harmful if inhaled.

LC50 (inhalation,rat) mg/l/4h: 4.1 (EPA OTS 798.1150)

Acute toxicity - Skin Contact Based upon the available data, the classification criteria are not met.

LD50 (skin,rabbit) mg/kg: >2000 (OECD 434)

Skin corrosion/irritation Based upon the available data, the classification criteria are not met.

Not irritating to skin. (rabbit) (OECD 404)

EUH066: Repeated exposure may cause skin dryness or cracking. (rat) (OECD

410)

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

Not irritating to eyes. (rabbit) (EU Method B.5)

Respiratory or skin sensitization Based upon the available data, the classification criteria are not met.

Sensitisation (guinea pig) - Negative (OECD 406)

Germ cell mutagenicity

Based upon the available data, the classification criteria are not met.

ECHA Registration Endpoint summary:

Not classified. Studies showed no consistent evidence of mutagenic activity.

Carcinogenicity Carc. 1B; May cause cancer.

ECHA Registration Endpoint summary:

Positive (mouse)

Reproductive toxicity Repr. 2; H361d: Suspected of damaging the unborn child.

ECHA Registration Endpoint summary: Reproductive toxicity: Negative Developmental toxicity: Positive

STOT - single exposure Based upon the available data, the classification criteria are not met.

Revision: 6.1 Date: 10.06.2019

Aspiration hazard

Short Term (acute): Long Term (Chronic):

Bioaccumulative potential

12.3

12.4

12.5

12.6

#### ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



Weight of evidence approach

STOT - repeated exposure STOT RE 2; May cause damage to organs through prolonged or repeated

exposure.

Oral: No data Inhalation: No data

Dermal: NOAEL 1.06 mg/kg bw/day (rat) (OECD 410)

Asp. Tox. 1; May be fatal if swallowed and enters airways. Viscosity:  $7-20.5 \text{ mm}^2\text{/s} \otimes 40 \,^{\circ}\text{C} \ (<60 \text{ mm}^2\text{/s} \otimes 100 \,^{\circ}\text{C})$ 

11.2 Other information None.

#### **SECTION 12: ECOLOGICAL INFORMATION**

**12.1 Toxicity** Aquatic Acute 1; Very toxic to aquatic life.

Aquatic Chronic 1; Very toxic to aquatic life with long lasting effects.

EL50 48hr (Daphnia magna) 0.22 mg/l (OECD 202)

The aquatic toxicity was estimated using the PETROTOX computer model.

Estimated: 0.1 mg/l (Fish)

12.2 Persistence and degradibility Substance is complex UVCB. Standard tests for this endpoint are intended for

single substances and are not appropriate for this complex substance.

Substance is complex UVCB. Standard tests for this endpoint are intended for

single substances and are not appropriate for this complex substance.

Substance is complex UVCB. Standard tests for this endpoint are intended for

single substances and are not appropriate for this complex substance.

Not classified as PBT or vPvB.

None known.

### **SECTION 13: DISPOSAL CONSIDERATIONS**

Results of PBT and vPvB assessment

13.1 Waste treatment methods

Other adverse effects

Mobility in soil

Do not empty into drains, dispose of this material and its container at hazardous or special waste collection point. Disposal should be in accordance with local, state or national legislation. Containers of this material may be hazardous when empty since they retain product residue. Containers must not be punctured or destroyed by burning, even when empty. Allocation of a waste code number, according to the European Waste Catalogue, should be carried out in agreement with the regional waste disposal company. Waste code: Fuel Oil (13 07 01)

IMDG/ADN

Limited Quantity: 5L

### **SECTION 14: TRANSPORT INFORMATION**

14.1	UN number	UN 3082	UN 3082	
14.2	Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS	ENVIRONMENTALLY HAZARDOUS	
		SUBSTANCE, LIQUID,	SUBSTANCE, LIQUID,	
		FUEL OIL, RESIDUAL	FUEL OIL, RESIDUAL	
14.3	Transport hazard class(es)	9	9 (N1, CMR, F)	
14.4	Packing group	III	III	
14.5	Environmental hazards	MILIEUGEVAARLIJK / ENVIRONMENTALLY HAZARDOUS/		
		UMWELTGEFÄHREND /DANGEREUX	( POUR/ L'ENVIRONNEMENT	
14.6	Special precautions for user	See Section: 2		
14.7	Transport in bulk according to Annex II of MARPOL	This product is being carried under t	he scope of MARPOL Annex 1. Special	
	73/78 and the IBC Code	Precautions: Refer to Chapter 7 'Hand	dling and Storage' for special precautions	
		which a user needs to be aware of, or	needs to comply with, in connection with	
		transport.		
14.8	Additional Information	ADR HIN: 90	EmS: F-A, S-F	
14.8	Additional Information	and the second s	EmS: F-A, S-F	

Tunnel Restriction Code: 3 E

Limited Quantity: 5L

ADR/RID

# **SECTION 15: REGULATORY INFORMATION**

15.1 Safety, health and environmental

Page: 7 of 25

Revision: 6.1 Date: 10.06.2019

#### ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



regulations/legislation specific for the substance or

mixture

Seveso

**15.1.1 EU regulations** Authorisations and/or Restrictions On Use

Annex XVII (Restrictions)

In accordance with REACH Annex XVII entry 30 (c) this substance is exempt

from Entry 28 and 29 of REACH Annex XVII as it is to be sold as a fuel in a

closed system.

Upper Tier: 25000 tonnes

Lower Tier: 2500 tonnes

15.1.2 National regulations

Germany Wassergefährdungsklasse (Germany). WGK number: 3

15.2 Chemical Safety Assessment A REACH chemical safety assessment (CSA) has been carried out. Refer to !

annexes for exposure scenarios detailing use specific exposure controls.

### **SECTION 16: OTHER INFORMATION**

Sections indicated with the following have been revised

Header and Section 1.3

Updated version and date. Please review SDS with care.

#### References:

Existing ECHA registration(s) for Fuel Oil, Residual (CAS No. 68476-33-5) and Chemical Safety Report.

This Safety Data Sheet was prepared in accordance with EC Regulation (EC) 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830.

#### **LEGEND**

LTEL Long Term Exposure Limit
STEL Short Term Exposure Limit
DNEL Derived No Effect Level

PNEC Predicted No Effect Concentration

PBT PBT: Persistent, Bioaccumulative and Toxic vPvB very Persistent and very Bioaccumulative

OECD Organisation for Economic Cooperation and Development

Training advice: Consideration should be given to the work procedures involved and the potential extent of exposure as they may determine whether a higher level of protection is required.

### **Disclaimers**

Information contained in this publication or as otherwise supplied to Users is believed to be accurate and is given in good faith, but it is for the Users to satisfy themselves of the suitability of the product for their own particular purpose. Vitol SA gives no warranty as to the fitness of the product for any particular purpose and any implied warranty or condition (statutory or otherwise) is excluded except to the extent that exclusion is prevented by law. Vitol SA accepts no liability for loss or damage (other than that arising from death or personal injury caused by defective product, if proved), resulting from reliance on this information. Freedom under Patents, Copyright and Designs cannot be assumed.

Annex to the extended Safety Data Sheet (eSDS)

See below -

Page: 8 of 25

Revision: 6.1 Date: 10.06.2019

ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



Fuel oil, residual

CAS No. 68476-33-5 EINECS No. 270-675-6

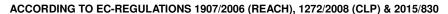
### **Summary of Parameters**

Physical parameters				
Vapour pressure (Pa)			Value used for exposure assessment = 2.0E+02	
Partition coefficient (Ic	og K <sub>ow</sub> )		1.99 – 18.02	
Aqueous solubility (m	g/l)		2.7E-12 – 2.0E+03 Value used for environmental exposure assessment = 7.3E+00	
Molecular weight			Not applicable	
Biodegradability			Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.	
Human Health (DNEL)				
	Short term	Inhalation (mg/m³)	4700	
Workers	Short term	Dermal (mg/kg bw/day)	Not defined	
Workers	1 T	Inhalation (mg/m³)	0.18	
	Long Term	Dermal (mg/kg bw/day)	0.065	
		Inhalation (mg/m³)	Not defined	
Consumer		Dermal (mg/kg bw/day)	Not defined	
		Oral (mg/kg bw/day)	0.015	

#### **Environmental Parameters (PNECs)**

Fuel oil, residual is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the environmental toxicity (HC5) of each group of components in the substance. These are used to estimate the environmental risk for the substance. Therefore individual environmental compartments PNECs are not available for this product.

Revision: 6.1 Date: 10.06.2019





#### **Contents**

Number	Title	Page:
Exposure scenario 1	Distribution of Fuel oil, residual	11
Exposure scenario 2	Formulation and (re)packing of Fuel oil, residual	15
Exposure scenario 3	Use of Fuel oil, residual as a Fuel (Industrial)	19
Exposure scenario 4	Use of Fuel oil, residual as a Fuel (Professional)	22

#### **Contributing Scenarios**

#### Workers

PROC1 Use in closed process, no likelihood of exposure

PROC2 Use in closed, continuous process with occasional controlled exposure

(Storage) Bulk product storage. (Sampling) Product sampling.

(Fuel filtering) Operation of solids filtering equipment.

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

(Maintenance) Equipment cleaning and maintenance.

PROC8b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

(Marine) Marine vessel or barge loading. (Road/Rail) Road tanker/rail car loading.

(Drum) Drum or batch transfers.

(Bulk) Bulk closed loading and unloading.

(Refuelling) Refuelling.

PROC15 Use as laboratory reagent.

PROC16 Using material as fuel sources, limited exposure to unburned product to be expected

#### Environment

ERC2 Formulation of preparations

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 thermo-plastics

ERC6d Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

ERC7 Industrial use of substances in closed systems

ERC9a Wide dispersive indoor use of substances in closed systems

ERC9b Wide dispersive outdoor use of substances in closed systems

Revision: 6.1 Date: 10.06.2019

ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



### Exposure Scenario 1 – Distribution of Fuel oil, residual

1.0 Contributing scenarios		
Sector of Use [SU]	SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites	
Process Category [PROC]	PROC1 PROC2 PROC2 (Storage) PROC2 (Sampling) PROC3 PROC8a (Maintenance) PROC8b (Marine) PROC8b (Road/Rail) PROC15	
Chemical Product Category [PC]	Not applicable	
Article Categories [AC]	Not applicable	
Environmental Release Categories [ERC]	ERC4 ERC5 ERC6a ERC6b ERC6c ERC6c	
Specific Environmental Release Categories [SPERC]	ESVOC SpERC 1.1b.v1	

STP ntage substance	e in the product up to 100 % (unless stated differently).	
ntage substance	e in the product up to 100 % (unless stated differently).	
ntage substance	e in the product up to 100 % (unless stated differently).	
ntage substance	e in the product up to 100 % (unless stated differently).	
	in the product up to 100 % (unless stated differently).	
C8a		
), PROC15	Covers daily exposures up to 8 hours (unless stated differently).	
age), PROC3, rine)	Covers exposure up to 1 - 4 hour(s)	
ad/Rail)	Covers exposure up to 15 min - 1 hour(s)	
C2 (Sampling)	Covers exposure up to 15 min	
pling)	Outdoor	
C's	Not defined (default = Indoor)	
Not defined		
ri	ine) Id/Rail) C2 (Sampling)	

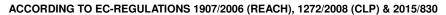
Assumes a good basic standard of occupational hygiene is implemented. Assumes activities are at ambient temperature (unless stated differently).

#### 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.

nood for non-bacoa noam oan oananoon	
Technical conditions of use	
PROC1, PROC2, PROC2 (Storage),	Handle substance within a closed system.

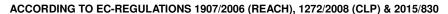
Revision: 6.1 Date: 10.06.2019





PROC3	İ						
			under containment or extract ventilation (Efficiency of at least 80%)				
			under extract ventilation. (Efficiency of at least 90 %).				
Organisational measures	•						
PROC2; PROC3	Sample via a close	ed loop or ot	her system to avoid exposure.				
PROC8b (Marine)	Transfer via enclos	sed lines. Cl	ear transfer lines prior to de-coupling.				
PROC8a (Maintenance)	Drain down and flu	ush system p	prior to equipment break-in or maintenance.				
PROC8a (Maintenance), PROC8b (Marine)	Retain drain down	s in sealed s	storage pending disposal or for subsequent recycle.				
PROC8b (Road/Rail)	Ensure material tra	ansfers are ı	under containment or extract ventilation				
Risk management measures related to hur	Risk management measures related to human health						
Respiratory protection	No special measu	res are requ	ired.				
PROC1, PROC2, P (Storage), PROC2 (Sampling), PROC3 PROC8b (Marine), (Road/Rail) PROC15		2 03,	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.(Efficiency of at least 90 %).  Wear suitable gloves tested to EN374. (Efficiency of at least 80 %).				
	PROC8a (Mainten		Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency of at least 75%)				
Eye Protection	No special measu	res are requ	ired.				
2.2 Control of environmental exposure							
Amounts used							
Fraction of EU tonnage used in region:		0.1					
Regional use tonnage (tons/year):		9.3E+06					
Fraction of Regional tonnage used locally (tor	ns/year):	2.0E-03					
Annual site tonnage (tons/year):		1.9E+04					
Maximum daily site tonnage (kg/day):		6.2E+04					
Environment factors not influenced by risk	k management						
Flow rate of receiving surface water (m³/d):		Not define	d (default = 18,000)				
Local freshwater dilution factor:		10					
Local marine water dilution factor:		100					
Operational conditions							
Emission days (days/year):		300					
Release fraction to air from process (initial rel RMM):	•	1.0E-04					
Release fraction to wastewater from process to RMM):		1.0E-06					
Release fraction to soil from process (initial re RMM):		1.0E-05					
Technical conditions and measures at pro							
Common practices vary across sites thus con							
Technical onsite conditions and measures							
			primarily ingestion). No wastewater treatment required.				
Treat air emission to provide a typical remova	•	90					
Treat onsite wastewater (prior to receiving wa provide the required removal efficiency of (%)	• ,	0					
If discharging to domestic sewage treatment prequired onsite wastewater removal efficiency	7 T	0					
Treat soil emission to provide a typical removal efficiency of (%):		Not defined					
Organisational measures to prevent/limit r							
Do not apply industrial sludge to natural soils.		cinerated, c	ontained or reclaimed.				
Conditions and measures related to munic							
Size of municipal sewage system/treatment p		2.0E+03					
Degradation effectiveness (%):		94.2					
Conditions and measures related to extern	al treatment of was	ste for disp	osal				
External treatment and disposal of waste sho	uld comply with appli	icable local a	and/or national regulations.				
Conditions and measures related to extern	al recovery of was	te					
External recovery and recycling of waste should comply with applicable local and/or national regulations.							
	Substance release quantities after risk management measures						
Release to waste water from process (mg/l):  Not defined							

Revision: 6.1 Date: 10.06.2019





Maximum allowable site tonnage (MSafe) based on release	8.0E+04
following total wastewater treatment removal (kg/d):	0.0E+04

3. Exposure estimation and reference to its source					
3.1 Human exposure prediction					
Exposure assessment (method/calculation model)	The ECETOC TRA tool has been used to estimate workplace exposures unless				
	otherwise indicated. (PROC1, PROC2, PROC2 (Sampling), PROC15)				
	The Advanced REACH Tool (ART) has been used to estimate workplace				
	exposures unless otherwise indicated. (PROC2 (Storage), PROC3, PROC8a				
	(Maintenance), PROC8b (Marine), PROC8b (Road/Rail)).				

	Inhalation		Dermal		Combined
Process Category [PROC]	Inhalation exposure (mg/m³)	Risk characterisation ratio (RCR)	Dermal exposure (mg/kg bw/day)	Risk characterisation ratio (RCR)	Risk characterisation ratio (RCR)
PROC1	0.01	0.04	0.03	0.57	0.61
PROC2	0.04	0.19	0.03	0.57	0.76
PROC2 (Storage)	0.04	0.21	0.03	0.57	0.78
PROC2 (Sampling)	0.04	0.19	0.03	0.57	0.76
PROC3	0.04	0.21	0.03	0.57	0.78
PROC8a (Maintenance)	0.00	0.01	0.05	0.83	0.85
PROC8b (Marine)	0.06	0.35	0.03	0.57	0.92
PROC8b (Road/Rail)	0.03	0.19	0.03	0.57	0.76
PROC15	0.05	0.28	0.01	0.10	0.38

### 3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Fuel oil, residual is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the environmental toxicity (HC5) of each group of components in the substance. These are used to estimate the environmental risk for the substance. Therefore individual environmental compartments PNECs are not available for this product.

Environmental exposure	STP	Freshwater	Marine water	Soil	Freshwater sediment	Marine sediment
Predicted Environmental Exposure (PEC)	1.9E-03 mg/l	1.9E-04 mg/l	1.9E-05 mg/l	6.2E-02 mg/kg ww	1.4E+00 mg/kg ww	3.7E-02 mg/kg ww
Risk characterisation ratio (RCR)	2.0E-03	7.6E-03	7.6E-04	3.3E-05	1.3E-02	9.9E-04

Human exposure prediction:

Route of Exposure	Exposure (μg/kg/Day)	Risk characterisation ratio (RCR)
Oral	2.0E+01	7.7E-01
Inhalation	1.6E-01	3.2E-03

4. Evaluation guidance to downstream user							
For scaling see	are managed to at least equivalent Available hazard data do not supp	Measures/Operational Conditions are adopted, then users should ensure that risks at levels.  Nort the need for a DNEL to be established for other health effects.  Ontrol technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-					
Exposure assessment instrument/tool/method	Worker	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. (PROC1, PROC2, PROC2 (Sampling), PROC15)  The Advanced REACH Tool (ART) has been used to estimate workplace					

Revision: 6.1 Date: 10.06.2019

## ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



	exposures unless otherwise indicated. (PROC2 (Storage), PROC3, PROC8a (Maintenance), PROC8b (Marine), PROC8b (Road/Rail)).
Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Revision: 6.1 Date: 10.06.2019

ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



### Exposure Scenario 2 - Formulation and (re)packing of Fuel oil, residual

1.0 Contributing scenarios					
Sector of Use [SU]	SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites SU10 Formulation [mixing] of preparations and/or re-packaging (excluding alloys)				
Process Category [PROC]	PROC1 PROC2 PROC2 (Storage) PROC2 (Sampling) PROC3 PROC8a (Maintenance) PROC8b (Marine) PROC8b (Road/Rail) PROC8b (Drum) PROC15				
Chemical Product Category [PC]	Not applicable				
Article Categories [AC]	Not applicable				
Environmental Release Categories [ERC]	ERC2				
Specific Environmental Release Categories [SPERC]	ESVOC SpERC 2.2.v1				

2.0 Operational conditions and risk management measures						
2.1 Control of worker exposure						
Product characteristics						
Physical form of product	Liquid					
Vapour pressure	<0.5 kPa @ STP					
Concentration of substance in product	Covers percentage substance	e in the product up to 100 % (unless stated differently).				
Human factors not influenced by risk m	anagement					
Potential exposure area	Not defined					
Frequency and duration of use	•					
	PROC1, PROC8a (Maintenance), PROC15	Covers daily exposures up to 8 hours (unless stated differently).				
Exposure duration per day	PROC2 (Storage), PROC3, PROC8b (Marine)	Covers exposure up to 1 - 4 hour(s)				
, ,	PROC8b (Road/Rail), PROC8b (Drum)	Covers exposure up to 15 min - 1 hour(s)				
	PROC2, PROC2 (Sampling)	Covers exposure up to 15 min				
Emission days (days/year):	300					
Other operational conditions affecting v	vorker exposure					
Area of use	All contributing scenarios Not defined (default = Indoor)					
Characteristics of the surroundings	Not defined					
General measures applicable to all activ	vities					

#### General measures applicable to all activities

Assumes a good basic standard of occupational hygiene is implemented. Assumes activities are at ambient temperature (unless stated differently).

## 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.

Technical conditions of use	
PROC1, PROC2, PROC3	Handle substance within a closed system.
PROC8b (Drum)	Ensure material transfers are under containment or extract ventilation. (Efficiency of at least 97%).
PROC15	Handle in a fume cupboard or under extract ventilation. (Efficiency of at least 90 %).
Organisational measures	
PROC2, PROC2 (Sampling)	Minimise the volume and frequency of sampling. Ensure dedicated sample points are provided.
PROC8b (Marine)	Transfer via enclosed lines. Clear transfer lines prior to de-coupling.

Page: 15 of 25

Revision: 6.1 Date: 10.06.2019

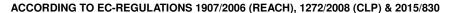
## ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



PROC8a (Maintenance)	Drain down and flush system prior to equipment break-in or maintenance.					
PROC8a (Maintenance), PROC8b (Marine)	Retain drain downs in sealed storage pending disposal or for subsequent recycle.					
PROC8b (Road/Rail), PROC8b (Drum)	Ensure material transfers are under containment or extract ventilation					
Risk management measures related to human health						
Respiratory protection No special measures are required.						
Hand and/or Skin protection	PROC1, PROC2, (Storage), PROC2 (Sampling), PROC PROC8b (Marine), (Road/Rail), PROC (Drum)	3, PROC8b	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.(Efficiency of at least 90 %).			
	PROC8a (Mainten	ance)	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency of at least 75%)			
	PROC15		Wear suitable gloves tested to EN374. (Efficiency of at least 80 %).			
Eye Protection	No special measur	es are requi	red.			
2.2 Control of environmental exposure						
Amounts used						
Fraction of EU tonnage used in region:		0.1				
Regional use tonnage (tons/year):		7.5E+06				
Fraction of Regional tonnage used locally (ton	s/year):	4.0E-03				
Annual site tonnage (tons/year):		3.0E+04				
Maximum daily site tonnage (kg/day):		1.0E+05				
Environment factors not influenced by risk	management					
Flow rate of receiving surface water (m³/d):		Not define	d (default = 18,000)			
Local freshwater dilution factor:		10				
Local marine water dilution factor:		100				
Operational conditions						
Emission days (days/year):		300				
Release fraction to air from process (after typi consistent with EU Solvent Emissions Directiv	e requirements):	1.0E-03				
Release fraction to wastewater from process ( to RMM):		2.0E-05				
Release fraction to soil from process (initial re RMM):	ease prior to	1.0E-04				
Technical conditions and measures at pro-						
Common practices vary across sites thus conservative process release estimates used.						
Technical onsite conditions and measures						
			orimarily ingestion). No wastewater treatment required.			
Treat air emission to provide a typical removal		0				
Treat onsite wastewater (prior to receiving war provide the required removal efficiency of (%):		81.3				
If discharging to domestic sewage treatment p	lant, provide the	0				
required onsite wastewater removal efficiency  Treat soil emission to provide a typical remova		Not defined				
Common practices vary across sites thus cons	• • •	Not defined				
Organisational measures to prevent/limit re		case estilla	uocu.			
Do not apply industrial sludge to natural soils.		cinerated co	ontained or reclaimed			
Conditions and measures related to munic			S. Carrotte of Footamion			
Size of municipal sewage system/treatment pl		2.0E+03				
Degradation effectiveness (%):	(/-	94.2				
Conditions and measures related to extern	al treatment of was	-	osal			
External treatment and disposal of waste shou						
Conditions and measures related to extern			•			
External recovery and recycling of waste should			nd/or national regulations.			
Substance release quantities after risk mai			J			
Release to waste water from process (mg/l):	_	Not defined				
Maximum allowable site tonnage (MSafe) bas following total wastewater treatment removal (		1.1E+05				
Tollowing total wastowater treatment removal (	lollowing total wastewater treatment removal (kg/a).					

Page: 16 of 25

Revision: 6.1 Date: 10.06.2019





3. Exposure estimation and reference to its source

3.1	Human	exposure	prediction	

Exposure assessment (method/calculation model)

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. (PROC1, PROC2, PROC2 (Sampling), PROC8b (Drum), PROC15)

The Advanced REACH Tool (ART) has been used to estimate workplace exposures unless otherwise indicated. (PROC2 (Storage), PROC3, PROC8a (Maintenance), PROC8b (Marine), PROC8b (Road/Rail)).

	Inha	lation	Der	mal	Combined
Process Category [PROC]	Inhalation exposure (mg/m³)	Risk characterisation ratio (RCR)	Dermal exposure (mg/kg bw/day)	Risk characterisation ratio (RCR)	Risk characterisation ratio (RCR)
PROC1	0.01	0.04	0.03	0.57	0.61
PROC2	0.04	0.19	0.03	0.57	0.76
PROC2 (Storage)	0.04	0.21	0.03	0.57	0.78
PROC2 (Sampling)	0.04	0.19	0.03	0.57	0.76
PROC3	0.04	0.21	0.03	0.57	0.78
PROC8a (Maintenance)	0.00	0.01	0.05	0.83	0.85
PROC8b (Marine)	0.06	0.36	0.03	0.57	0.92
PROC8b (Road/Rail)	0.03	0.20	0.03	0.57	0.76
PROC8b (Drum)	0.02	0.12	0.03	0.57	0.68
PROC15	0.05	0.28	0.01	0.10	0.38

#### 3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Fuel oil, residual is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the environmental toxicity (HC5) of each group of components in the substance. These are used to estimate the environmental risk for the substance. Therefore individual environmental compartments PNECs are not available for this product.

	nvironmental exposure	STP	Freshwater	Marine water	Soil	Freshwater sediment	Marine sediment
	Predicted nvironmental posure (PEC)	6.1E-02 mg/l	6.1E-03 mg/l	6.1E-04 mg/l	6.3E-02 mg/kg ww	1.5E+00 mg/kg ww	5.5E-02 mg/kg ww
_	Risk aracterisation ratio (RCR)	6.4E-02	2.4E-01	2.4E-02	5.3E-04	3.1E-01	3.1E-02

Human exposure prediction:

	Route of Exposure	Exposure (μg/kg/Day)	Risk characterisation ratio (RCR)
	Oral	2.1E+01	8.1E-01
ſ	Inhalation	6.6E+00	1.3E-01

4. Evaluation guidance to downstream user				
For scaling see	are managed to at least equivalen Available hazard data do not supp	easures/Operational Conditions are adopted, then users should ensure that risks t levels.  ort the need for a DNEL to be established for other health effects.  trol technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-		
Exposure assessment	Worker	The ECETOC TRA tool has been used to estimate workplace exposures unless		

Page: 17 of 25

Revision: 6.1 Date: 10.06.2019

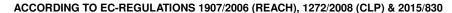
## ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



instrument/tool/method		otherwise indicated. (PROC1, PROC2, PROC2 (Sampling), PROC8b (Drum), PROC15)
		The Advanced REACH Tool (ART) has been used to estimate workplace exposures unless otherwise indicated. (PROC2 (Storage), PROC3, PROC8a
		(Maintenance), PROC8b (Marine), PROC8b (Road/Rail)).
	Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Page: 18 of 25

Revision: 6.1 Date: 10.06.2019





### Exposure Scenario 3 – Use of Fuel oil, residual as a Fuel (Industrial)

1.0 Contributing scenarios	
Sector of Use [SU]	SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites
	PROC1
	PROC2
	PROC2 (Fuel filtering)
	PROC2 (Storage)
Process Category [PROC]	PROC3
	PROC8a (Maintenance)
	PROC8b (Bulk)
	PROC8b (Drum)
	PROC16
Chemical Product Category [PC]	Not applicable
Article Categories [AC]	Not applicable
Environmental Release Categories [ERC]	ERC7
Specific Environmental Release Categories [SPERC]	ESVOC SpERC 7.12a.v1

2.0 Operational conditions and risk management measures				
2.1 Control of worker exposure				
Product characteristics				
Physical form of product	Liquid			
Vapour pressure	<0.5 kPa @ STP			
Concentration of substance in product	Covers percentage substance	e in the product up to 100 % (unless stated differently).		
Human factors not influenced by risk n	nanagement			
Potential exposure area	Not defined			
Frequency and duration of use				
	PROC1, PROC8a (Maintenance), PROC8b (Bulk), PROC16	Covers daily exposures up to 8 hours (unless stated differently).		
Exposure duration per day	PROC2 (Fuel filtering), PROC2 (Storage), PROC3  Covers exposure up to 1 - 4 hour(s)			
	PROC2, PROC8b (Drum)	Covers exposure up to 15 min - 1 hour(s)		
Emission days (days/year):	300			
Other operational conditions affecting	worker exposure			
Area of use	PROC8b (Bulk)	Outdoor		
	All other PROC's	Not defined (default = Indoor)		
Characteristics of the surroundings	Not defined			
Ganaral massuras applicable to all acti	vitios			

#### General measures applicable to all activities

Assumes a good basic standard of occupational hygiene is implemented. Assumes activities are at ambient temperature (unless stated differently).

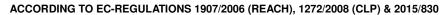
### General measures (carcinogens)

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.

Technical conditions of use	
PROC1, PROC2, PROC3	Handle substance within a closed system.
Organisational measures	
PROC2	Provide a good standard of controlled ventilation (10 to 15 air changes per hour).
PROC8b (Bulk)	Transfer via enclosed lines.
PROC8b (Drum), PROC2 (Fuel filtering),	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
PROC2 (Storage), PROC16	
PROC8a (Maintenance)	Retain drain downs in sealed storage pending disposal or for subsequent re

Page: 19 of 25

Revision: 6.1 Date: 10.06.2019

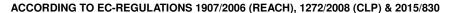




Risk management measures related to hur	nan health				
Respiratory protection	No special measu	res are requ	ired.		
Hand and/or Skin protection	PROC1, PROC2, PROC2 (Fuel filtering), PROC2 (Storage), PROC3, PROC8b (Bulk), PROC8b (Drum), PROC16		Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training (Efficiency of at least 90 %).		
	PROC8a (Maintenance)		Wear chemically resistant gloves (tested to EN374) in combination with specific activity training (Efficiency of at least 75 %).		
Eye Protection	No special measu	res are requ	ired.		
2.2 Control of environmental exposure					
Amounts used					
Fraction of EU tonnage used in region:		0.1			
Regional use tonnage (tons/year):		5.9E+06			
Fraction of Regional tonnage used locally (tor	s/year):	2.6E-01			
Annual site tonnage (tons/year):		1.5E+06			
Maximum daily site tonnage (kg/day):		5.0E+06			
Environment factors not influenced by risk	management	1			
Flow rate of receiving surface water (m³/d):		Not define	d (default = 18,000)		
Local freshwater dilution factor:		10			
Local marine water dilution factor:		100			
Operational conditions		,			
Emission days (days/year):		300			
Release fraction to air from process (initial rel RMM):	ease prior to	2.0E-04			
Release fraction to wastewater from process (initial release prior to RMM):		1.0E-06			
Release fraction to soil from process (initial re RMM):	lease prior to	0			
Technical conditions and measures at pro-	cess level (source)	to prevent	release		
Common practices vary across sites thus con	· · · · · · · · · · · · · · · · · · ·				
Technical onsite conditions and measures					
Risk from environmental exposure is driven by	humans via indirec	t exposure (	primarily ingestion). No wastewater treatment required.		
Treat air emission to provide a typical remova	l efficiency of (%):	95			
Treat onsite wastewater (prior to receiving wa	ter discharge) to	00.5			
provide the required removal efficiency of (%)	:	92.5			
If discharging to domestic sewage treatment prequired onsite wastewater removal efficiency		0			
Treat soil emission to provide a typical remove	al efficiency of (%):	Not defined			
Common practices vary across sites thus conservative process rel		lease estimates used.			
Organisational measures to prevent/limit r					
Do not apply industrial sludge to natural soils.		cinerated, c	ontained or reclaimed.		
Conditions and measures related to municipal sewage treatment plant					
Size of municipal sewage system/treatment plant (m³/d)			2.0E+03		
Degradation effectiveness (%)	Degradation effectiveness (%)		94.2		
Conditions and measures related to extern	al treatment of was	ste for disp	osal		
			tion emissions considered in regional exposure assessment. External		
treatment and disposal of waste should comp					
Substance release quantities after risk ma					
Release to waste water from process (mg/l)		Not defined			
Maximum allowable site tonnage (MSafe) bas	ed on release	5.4E+06			
following total wastewater treatment removal	(kg/d):	J.4L+00			

3. Exposure estimation and reference to its source	
3.1 Human exposure prediction	
Exposure assessment (method/calculation model)	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. (PROC1, PROC2, PROC16)  The Advanced REACH Tool (ART) has been used to estimate workplace exposures unless otherwise indicated. (PROC2 (Storage), PROC2 (Fuel

Revision: 6.1 Date: 10.06.2019





filtering), PROC3, PROC8a (Maintenance), PROC8b (Bulk), PROC8b (Drum))

	Inhalation		Dermal		Combined
Process Category [PROC]	Inhalation exposure (mg/m³)	Risk characterisation ratio (RCR)	Dermal exposure (mg/kg bw/day)	Risk characterisation ratio (RCR)	Risk characterisation ratio (RCR)
PROC1	0.01	0.04	0.03	0.57	0.61
PROC2	0.03	0.17	0.03	0.57	0.73
PROC2 (Fuel filtering)	0.04	0.21	0.03	0.57	0.78
PROC2 (Storage)	0.04	0.21	0.03	0.57	0.78
PROC3	0.04	0.21	0.03	0.57	0.78
PROC8a (Maintenance)	0.00	0.01	0.05	0.83	0.85
PROC8b (Bulk)	0.06	0.36	0.03	0.57	0.92
PROC8b (Drum)	0.03	0.19	0.03	0.57	0.76
PROC16	0.01	0.06	0.03	0.57	0.62

## 3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Fuel oil, residual is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the environmental toxicity (HC5) of each group of components in the substance. These are used to estimate the environmental risk for the substance. Therefore individual environmental compartments PNECs are not available for this product.

Environmental exposure	STP	Freshwater	Marine water	Soil	Freshwater sediment	Marine sediment
Predicted Environmental Exposure (PEC)	1.5E-01 mg/l	1.5E-02 mg/l	1.5E-03 mg/l	6.3E-02 mg/kg ww	1.8E+00 mg/kg ww	4.6E-02 mg/kg ww
Risk characterisation ratio (RCR)	1.6E-01	6.1E-01	6.1E-02	3.0E-04	7.7E-01	7.7E-02

### Human exposure prediction:

Route of Exposure	Exposure (μg/kg/Day)	Risk characterisation ratio (RCR)
Oral	2.2E+01	8.7E-01
Inhalation	3.4E+00	6.6E-02

4. Evaluation guidance to downstream user				
For scaling see	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 support the need for a DNEL to be established for other health effects.  Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).			
Exposure assessment instrument/tool/method	Worker	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. (PROC1, PROC2, PROC16)  The Advanced REACH Tool (ART) has been used to estimate workplace exposures unless otherwise indicated. (PROC2 (Storage), PROC2 (Fuel filtering), PROC3, PROC8a (Maintenance), PROC8b (Bulk), PROC8b (Drum))		
	Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.		

Revision: 6.1 Date: 10.06.2019

ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830



### Exposure Scenario 4 – Use of Fuel oil, residual as a Fuel (Professional)

1.0 Contributing scenarios	
Sector of Use [SU]	SU22 Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Process Category [PROC]	PROC1 PROC2 PROC2 (Storage) PROC3 PROC8a (Maintenance) PROC8b (Bulk) PROC8b (Drum/batch transfers) PROC8b (Refuelling) PROC16
Chemical Product Category [PC]	Not applicable
Article Categories [AC]	Not applicable
Environmental Release Categories [ERC]	ERC9a ERC9b
Specific Environmental Release Categories [SPERC]	ESVOC SpERC 9.12b.v1

2.0 Operational conditions and risk management measures						
2.1 Control of worker exposure						
Product characteristics						
Physical form of product	Liquid					
Vapour pressure	<0.5 kPa @ STP					
Concentration of substance in product	Covers percentage substance	e in the product up to 100 % (unless stated differently).				
Human factors not influenced by risk m	anagement					
Potential exposure area	Not defined					
Frequency and duration of use	Frequency and duration of use					
	PROC1, PROC8a (Maintenance), PROC16	Covers daily exposures up to 8 hours (unless stated differently).				
	PROC2 (Storage)	Covers exposure up to 1 - 4 hour(s)				
Exposure duration per day	PROC2, PROC8b (Bulk), PROC8b (Drum), PROC8b (Refuelling)	Covers exposure up to 15 min - 1 hour(s)				
	PROC3	Covers exposure up to 15 min				
Exposure duration (days/year)	365					
Other operational conditions affecting v	vorker exposure					
Area of use	All PROC's	Not defined (default = Indoor)				
Characteristics of the surroundings	haracteristics of the surroundings Not defined					
Caparal manayea applicable to all activities						

### General measures applicable to all activities

Assumes a good basic standard of occupational hygiene is implemented. Assumes activities are at ambient temperature (unless stated differently).

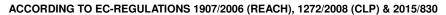
### General measures (carcinogens)

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.

Technical conditions of use			
PROC1, PROC2, PROC3 Handle substance within a closed system.			
Organisational measures			
PROC2, PROC3, PROC8b (Bulk), PROC8b (Drum)	Provide a good standard of controlled ventilation (10 to 15 air changes per hour).		
PROC2 (Storage), PROC8a (Maintenance), PROC16	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).		
PROC8b (Bulk), PROC8b (Drum)	Ensure material transfers are under containment or extract ventilation. Clear transfer lines prior to		

Page: 22 of 25

Revision: 6.1 Date: 10.06.2019

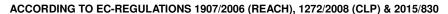




	de-coupling.				
PROC8b (Bulk), PROC8b (Drum), PROC8a (Maintenance)	Retain drain downs in sealed storage pending disposal or for subsequent recycle.				
Risk management measures related to hun	nan health				
Respiratory protection	No special measures are required.				
Hand and/or Skin protection	PROC1, PROC2 ( PROC3, PROC8b PROC8b (Drum), (Refuelling),	(Bulk), PROC8b	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training (Efficiency of at least 90 %).		
	PROC2, PROC8a (Maintenance)		Wear chemically resistant gloves (tested to EN374) in combination with specific activity training (Efficiency of at least 95 %).		
Eye Protection	No special measu	res are requ	ired.		
2.2 Control of environmental exposure					
Amounts used					
Fraction of EU tonnage used in region:		0.1			
Regional use tonnage (tons/year):		1.7E+06			
Fraction of Regional tonnage used locally (ton	s/year):	5.0E-04			
Annual site tonnage (tons/year):	• /	8.5E+02			
Maximum daily site tonnage (kg/day):		2.3E+03			
Environment factors not influenced by risk	management				
Flow rate of receiving surface water (m³/d):	g	Not define	d (default = 18,000)		
Local freshwater dilution factor:		10	a (adiadit – 10,000)		
Local marine water dilution factor:		100			
Operational conditions		100			
Emission days (days/year):		365			
	o (regional only):	1.0E-05			
Release fraction to air from wide dispersive use (regional only): Release fraction to wastewater from wide dispersive use:		1.0E-03			
Release fraction to soil from wide dispersive u		1.0E-05			
Technical conditions and measures at prod	release				
Common practices vary across sites thus cons					
Technical onsite conditions and measures					
			primarily ingestion). No wastewater treatment required.		
Treat air emission to provide a typical removal		Not applic			
Treat onsite wastewater (prior to receiving water discharge) to					
provide the required removal efficiency of (%):		0			
If discharging to domestic sewage treatment p					
required onsite wastewater removal efficiency		0			
Treat soil emission to provide a typical removal efficiency of (%):		Not defined			
Common practices vary across sites thus conservative process release					
Organisational measures to prevent/limit re	· · · · · · · · · · · · · · · · · · ·		****		
Do not apply industrial sludge to natural soils.		cinerated. c	ontained or reclaimed.		
Conditions and measures related to munic					
Size of municipal sewage system/treatment plant (m³/d):		2.0E+03			
Degradation effectiveness (%):		94.2			
Conditions and measures related to external treatment of waste					
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External					
treatment and disposal of waste should comply with applicable local and/or national regulations.					
Conditions and measures related to external treatment of waste for disposal					
This substance is consumed during use and no waste of the substance is generated.					
Substance release quantities after risk management measures					
Release to waste water from process (mg/l):	ragement measure	Not define	d		
Maximum allowable site tonnage (MSafe) based on release					
following total wastewater treatment removal (		3.0E+03			
onoming total mactoriator troutinorit romoval (ngra).					

3. Exposure estimation and reference to its source	
3.1 Human exposure prediction	
Exposure assessment (method/calculation model)	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. (PROC1, PROC2, PROC3, PROC16).  The Advanced REACH Tool (ART) has been used to estimate workplace

Revision: 6.1 Date: 10.06.2019





exposures unless otherwise indicated. (PROC2 (Storage), PROC8a (Maintenance), PROC8b (Bulk), PROC8b (Drum) and PROC8b (Refuelling))

	Inhalation  Inhalation  exposure (mg/m³)  Risk characterisation ratio (RCR)		Dermal		Combined
Process Category [PROC]			Dermal Risk characterisation (mg/kg bw/day) ratio (RCR)		Risk characterisation ratio (RCR)
PROC1	0.01	0.06	0.03	0.57	0.62
PROC2	0.06	0.33	0.02	0.28	0.62
PROC2 (Storage)	0.04	0.21	0.03	0.57	0.78
PROC3	0.03	0.17	0.03	0.57	0.73
PROC8a (Maintenance)	0.01	0.05	0.05	0.83	0.88
PROC8b (Bulk)	0.03	0.19	0.03	0.57	0.76
PROC8b (Drum)	0.03	0.19	0.03	0.57	0.76
PROC8b (Refuelling)	0.03	0.19	0.03	0.57	0.76
PROC16	0.01	0.06	0.03	0.57	0.62

# 3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Fuel oil, residual is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the environmental toxicity (HC5) of each group of components in the substance. These are used to estimate the environmental risk for the substance. Therefore individual environmental compartments PNECs are not available for this product.

Environmental exposure	STP	Freshwater	Marine water	Soil	Freshwater sediment	Marine sediment
Predicted Environmental Exposure (PEC)	7.2E-06 mg/l	1.1E-04 mg/l	7.3E-07 mg/l	6.2E-02 mg/kg ww	1.4E+00 mg/kg ww	3.6E-02 mg/kg ww
Risk characterisation ratio (RCR)	7.5E-06	4.7E-03	6.2E-05	5.7E-05	3.5E-03	4.1E-05

### Human exposure prediction:

Route of Exposure	Exposure (μg/kg/Day)	Risk characterisation ratio (RCR)
Oral	2.0E+01	7.7E-01
Inhalation	1.2E-01	2.3E-03

4. Evaluation guidance to downstream user				
For scaling see	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 support the need for a DNEL to be established for other health effects.  Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).			
Exposure assessment instrument/tool/method	Worker	The ECETOC TRA tool has been used to estimate workplace exposures un otherwise indicated. (PROC1, PROC2, PROC3, PROC16).  The Advanced REACH Tool (ART) has been used to estimate workplexposures unless otherwise indicated. (PROC2 (Storage), PRO (Maintenance), PROC8b (Bulk), PROC8b (Drum) and PROC8b (Refuelling))		
	Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.		

Revision: 6.1 Date: 10.06.2019

ACCORDING TO EC-REGULATIONS 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830

