SAFETY DATA SHEET
Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

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

1.1. Product identifier

Product name Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

Product number ID 10530

Internal identification 170243, 170244

REACH registration number 01-2119474894-22-0010

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

Identified uses Manufacture of substance Distribution of substance Formulation & (re)packing of substances and mixtures Use as an intermediate Use as a fuel

Uses advised against Uses in coatings : Professional
Road and construction applications : Professional

1.3. Details of the supplier of the safety data sheet

Supplier Neste Oyj
Keilaranta 21, Espoo, P.O.B. 95, FIN-00095 NESTE, FINLAND
Tel. +358 10 45811
SDS@neste.com (chemical safety)

1.4. Emergency telephone number

National emergency telephone number +358 800 147 111, +358 9 471 977, Poison Information Centre

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)

Physical hazards Not Classified

Health hazards Acute Tox. 4 - H332 Carc. 1B - H350 Repr. 2 - H361d STOT RE 2 - H373

Environmental hazards Aquatic Acute 1 - H400 Aquatic Chronic 1 - H410

2.2. Label elements

Hazard pictograms

Signal word Danger

Hazard statements 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.
H410 Very toxic to aquatic life with long lasting effects.

Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

Precautionary statements P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P273 Avoid release to the environment.
P308+P313 IF exposed or concerned: Get medical advice/ attention.

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

Contains Fuel oil, residual

2.3. Other hazards

Other hazards Combustible liquid. Mainly non-volatile. Unloading gases (Hydrogen sulphide (H2S)., Hydrocarbons.) : Irritating to eyes. Irritating to respiratory system. High concentrations can depress the central nervous system. Contact with hot product can cause serious thermal burns.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Fuel oil, residual		**~ 100%**
CAS number: 68476-33-5	EC number: 270-675-6	REACH registration number: 01-2119474894-22
M factor (Acute) = 1	M factor (Chronic) = 1	

Classification
Acute Tox. 4 - H332
Carc. 1B - H350
Repr. 2 - H361d
STOT RE 2 - H373
Aquatic Acute 1 - H400
Aquatic Chronic 1 - H410

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Other information A petroleum product., Substance of Unknown or Variable composition, Complex reaction products or Biological materials (UVCB).

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation Obtain medical attention if oil mist is inhaled (risk of chemicals pneumonitis). Unloading gases (Hydrogen sulphide (H2S)., Hydrocarbons.) : Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. If breathing stops, provide artificial respiration. For breathing difficulties, oxygen may be necessary. Get medical attention.

Ingestion Do not induce vomiting. Get medical attention if symptoms are severe or persist.

Skin contact Remove contaminated clothing. Wash skin thoroughly with soap and water or use an approved skin cleanser. Do not use the following: Solvent. Continue to rinse for at least 10 minutes. Get medical attention if irritation persists after washing.

Eye contact Rinse immediately with plenty of water. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

General information Repeated exposure may cause skin dryness or cracking. Oil mist: May cause eye and respiratory system irritation. Unloading gases (Hydrogen sulphide (H2S)., Hydrocarbons.) : Causes eye irritation. Irritating to respiratory system. High concentrations can depress the central nervous system.

4.3. Indication of any immediate medical attention and special treatment needed

Notes for the doctor Treat symptomatically. Hydrogen sulphide (H2S). : May cause nausea, headache, dizziness and intoxication. Drowsiness.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media Foam, carbon dioxide or dry powder.

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture

Specific hazards Containers can burst violently or explode when heated, due to excessive pressure build-up.

Hazardous combustion products Sulphurous gases (SOx). Sulphuric acid (H2SO4). Hydrogen sulphide (H2S). Carbon monoxide (CO).

5.3. Advice for firefighters

Protective actions during firefighting Cool containers exposed to heat with water spray and remove them from the fire area if it can be done without risk. Prevent fire extinguishing water from contaminating surface water or the ground water system.

Special protective equipment for firefighters Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For emergency responders Keep unnecessary and unprotected personnel away from the spillage. Eliminate all ignition sources if safe to do so.

6.2. Environmental precautions

Environmental precautions Avoid release to the environment. Stop leak if safe to do so. Avoid the spillage or runoff entering drains, sewers or watercourses. Contain spillage with sand, earth or other suitable non-combustible material. Inform the relevant authorities if environmental pollution occurs (sewers, waterways, soil or air). Risk of soil and ground water contamination.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up Immediately start clean-up of the liquid and contaminated soil. Allow hot product solidify first (if there is no risk of spreading into the environment). Solid product can be taken up. Stains can be cleaned with a hydrocarbon solvent. Pay attention to the fire and health hazards caused by the product. Wear adequate protective equipment at all operations.

6.4. Reference to other sections

Reference to other sections For personal protection, see Section 8. For waste disposal, see Section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

Usage precautions Eliminate all sources of ignition. Take precautionary measures against static discharges. Unloading gases : Avoid inhalation of vapours. (Hydrogen sulphide (H2S)., Hydrocarbons.) Provide adequate ventilation. Oil mist: Avoid inhalation of vapours and contact with skin and eyes. Use personal protective equipment and/or local ventilation when needed. Wash hands and any other contaminated areas of the body with soap and water before leaving the work site. Product is usually handled heated. Handling and storage temperature must not exceed the flash point. If there is a risk of contact with hot product, all protective equipment worn should be suitable for use with high temperatures. During tank operations follow special instructions (risk of oxygen displacement, hydrogen sulfide and hydrocarbons).

7.2. Conditions for safe storage, including any incompatibilities

Storage precautions Flammable liquid storage. Can be stored heated. Store in a demarcated bunded area to prevent release to drains and/or watercourses. Change contaminated thermal insulation material (autoignition hazard). Store away from the following materials: Oxidising agents. Use containers made of the following materials: Carbon steel. Stainless steel.

7.3. Specific end use(s)

Specific end use(s) Not known.

SECTION 8: Exposure controls/Personal protection

8.1. Control parameters

Occupational exposure limits

Oil mist: 5 mg/m3 (8h) HTP 2020/FIN.
Hydrogen sulfide: 5 ppm (8h), 7 mg/m3 (8h), 10 ppm (15 min), 14 mg/m3 (15 min) HTP 2020/FIN, EU OELV (EC/2009/161).

Fuel oil, residual (CAS: 68476-33-5)

DNEL Workers - Inhalation; Short term systemic effects: 4700 mg/m³, (15 min), Aerosol
Workers - Inhalation; Long term systemic effects: 0,18 mg/m³, (8h), Aerosol
Workers - Dermal; Long term systemic effects: 0,065 mg/kg

PNEC - Oral; 66,7 mg/kg
(food, secondary poisoning)

8.2. Exposure controls

Appropriate engineering controls All handling should only take place in well-ventilated areas. Use personal protective equipment and/or local ventilation when needed. If there is a risk of contact with hot product, all protective equipment worn should be suitable for use with high temperatures. Handle in accordance with good industrial hygiene and safety practice.

Eye/face protection Tight-fitting safety glasses. Face shield when needed.

Hand protection Thick, thermally insulated protective gloves. It is recommended that gloves are made of the following material: Polyvinyl chloride (PVC). Nitrile rubber. Change protective gloves regularly. Protective gloves according to standards EN 374 and EN 407.

Other skin and body protection Protective clothing when needed. If there is a risk of contact with hot product, all protective equipment worn should be suitable for use with high temperatures.

Respiratory protection Filter device/full mask Combination filter, type A2/P3. (B2) Filter device could be used maximum 2 hours at a time. Filter devices must not be used in conditions where the oxygen level is low (< 19 vol.-%). At high concentrations a breathing apparatus must be used (self-contained or fresh air hose breathing apparatus). Filter must be changed often enough. Respirators according standards EN 136 and EN 140.

Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

Environmental exposure controls	Take precautions against leakage by constructing collecting pools and sewerage systems as well as by surfacing the loading and unloading stations.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	Liquid.
Colour	Black.
Odour	Strong. Characteristic.
Odour threshold	-
pH	-
Melting point	Pour point < 30°C (ISO 3016)
Initial boiling point and range	150... > 750°C
Flash point	≥ 65°C
Flammability (solid, gas)	-
Upper/lower flammability or explosive limits	Lower flammable/explosive limit: ~ 1 % Upper flammable/explosive limit: ~ 6 %
Vapour pressure	< 1 kPa @ 38°C
Vapour density	-
Relative density	≤ 0,99 @ 15/4°C
Solubility(ies)	The product has poor water-solubility.
Partition coefficient	log Kow: 4 - > 6
Auto-ignition temperature	> 400°C
Decomposition Temperature	-
Viscosity	Kinematic viscosity ≥ 140 mm2/s @ 50°C
Explosive properties	Not considered to be explosive.
Oxidising properties	Does not meet the criteria for classification as oxidising.

9.2. Other information

Other information	Not known.

SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity	There are no known reactivity hazards associated with this product.

10.2. Chemical stability

Stability	Stable at normal ambient temperatures and when used as recommended.

10.3. Possibility of hazardous reactions

Possibility of hazardous reactions	No potentially hazardous reactions known.

10.4. Conditions to avoid

Conditions to avoid	Keep away from heat, sparks and open flame.

Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

10.5. Incompatible materials

Materials to avoid Oxidising agents.

10.6. Hazardous decomposition products

Hazardous decomposition products Hydrogen sulphide (H2S). Combustion ash contains inorganic nickel and vanadium compounds, which are hazardous to health.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Toxicological effects Harmful if inhaled.

Acute toxicity - inhalation

ATE inhalation (dusts/mists mg/l) 1.5

Skin corrosion/irritation

Skin corrosion/irritation Repeated exposure may cause skin dryness or cracking. Based on available data the classification criteria are not met. (OECD 404)

Serious eye damage/irritation

Serious eye damage/irritation Based on available data the classification criteria are not met. (EC B.5)

Respiratory sensitisation

Respiratory sensitisation Based on available data the classification criteria are not met.

Skin sensitisation

Skin sensitisation Based on available data the classification criteria are not met. (OECD 406)

Germ cell mutagenicity

Genotoxicity - in vitro Based on available data the classification criteria are not met. (OECD 471, 476)

Genotoxicity - in vivo Based on available data the classification criteria are not met. (OECD 475, EC B.12)

Carcinogenicity

Carcinogenicity May cause cancer. (OECD 451)

Reproductive toxicity

Reproductive toxicity - fertility Based on available data the classification criteria are not met.

Reproductive toxicity - development Suspected of damaging the unborn child. (EPA OTS 798.4900)

Specific target organ toxicity - single exposure

STOT - single exposure No adverse effects known.

Specific target organ toxicity - repeated exposure

STOT - repeated exposure May cause damage to organs through prolonged or repeated exposure. (EPA OPPTS 870.3250)

Aspiration hazard

Aspiration hazard Based on available data the classification criteria are not met.

General information Especially fresh product may contain traces of highly toxic hydrogen sulphide, which irritates severely eyes and respiratory tract. High concentrations can depress the central nervous system. The product contains traces of nickel and vanadium compounds, which are hazardous to health.

Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

Toxicological information on ingredients.

Fuel oil, residual

Acute toxicity - oral	
Notes (oral LD_{50})	LD_{50} 4320 - 5270 mg/kg, Oral, Rat (OECD 401)
Acute toxicity - dermal	
Notes (dermal LD_{50})	LD_{50} > 2000 mg/kg, Dermal, Rabbit (EC B.3, OECD 434)
Acute toxicity - inhalation	
Notes (inhalation LC_{50})	LC_{50} 4100 mg/m³, Inhalation, Rat (EPA OTS 798.1150)
ATE inhalation (dusts/mists mg/l)	1.5

SECTION 12: Ecological information

12.1. Toxicity

Toxicity Very toxic to aquatic life with long lasting effects.

Ecological information on ingredients.

Fuel oil, residual

Acute aquatic toxicity	
LE(C)$_{50}$	0.1 < L(E)C50 ≤ 1
M factor (Acute)	1
Acute toxicity - fish	LL_{50}, 96 hours: 79 mg/l, Oncorhynchus mykiss (Rainbow trout) WAF (OECD 203)
Acute toxicity - aquatic invertebrates	EL50, 48 hours: 0,22 mg/l, Daphnia magna WAF (OECD 202)
Acute toxicity - aquatic plants	EL50, 72 hours: 0,32 mg/l, Pseudokirchneriella subcapitata WAF (OECD 201) NOELR, 72 hours: 0,05 mg/l, Pseudokirchneriella subcapitata WAF (EPA-600/9-018)
Acute toxicity - microorganisms	LL_{50}, 72 hours: > 1000 mg/l, Micro-organisms (wastewater sludge), Tetrahymena pyriformis NOEL, 72 hours: 14,9 mg/l, Micro-organisms (wastewater sludge), Tetrahymena pyriformis Heavy fuel oil (QSAR)
Chronic aquatic toxicity	
M factor (Chronic)	1
Chronic toxicity - fish early life stage	NOEL, 28 days: 0,1 mg/l, Oncorhynchus mykiss (Rainbow trout) Heavy fuel oil (QSAR)
Chronic toxicity - aquatic invertebrates	NOEL, 21 days: 0,27 mg/l, Daphnia magna Heavy fuel oil (QSAR)

12.2. Persistence and degradability

Stability (hydrolysis) Not relevant.

Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

Biodegradation The product is slowly degradable.
Lightest hydrocarbons are volatile.

12.3. Bioaccumulative potential

Bioaccumulative potential Possibly bioaccumulative.

Partition coefficient log Kow: 4 - > 6

12.4. Mobility in soil

Mobility The product is insoluble in water. Mainly non-volatile. The product contains substances which are bound to particulate matter and are retained in soil.

12.5. Results of PBT and vPvB assessment

Results of PBT and vPvB assessment This product does not contain any substances classified as PBT or vPvB.

12.6. Other adverse effects

Other adverse effects Product causes fouling, and direct contact produces harmful effects e.g. to birds and vegetation. Adsorbed hydrocarbon residues can be harmful to sediment organisms.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Disposal methods Dispose of waste to licensed waste disposal site in accordance with the requirements of the local Waste Disposal Authority. When handling waste, the safety precautions applying to handling of the product should be considered. Care should be taken when handling emptied containers that have not been thoroughly cleaned or rinsed out. Product residues retained in emptied containers can be hazardous.

SECTION 14: Transport information

14.1. UN number

UN No. (ADR/RID) 3082

14.2. UN proper shipping name

Proper shipping name (ADR/RID) UN 3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (FUEL OIL)

14.3. Transport hazard class(es)

ADR/RID class 9

14.4. Packing group

ADR/RID packing group III

14.5. Environmental hazards

Environmentally hazardous substance/marine pollutant
MARINE POLLUTANT

14.6. Special precautions for user

Hazard Identification Number (ADR/RID) 90

Tunnel restriction code (-)

14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code

Fuel Oil 180 1% ...380 1%, Marine; Neste heavy fuel oil Bunker (FO 180 1%,...,380 1%)

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	No

SECTION 15: Regulatory information

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

EU legislation	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (as amended). Commission Regulation (EU) No 2015/830 of 28 May 2015. Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures (as amended).

15.2. Chemical safety assessment

A chemical safety assessment has been carried out.

SECTION 16: Other information

Abbreviations and acronyms used in the safety data sheet	DNEL = Derived No-Effect Level PNEC = Predicted No-Effect Concentration NOEL = No Observed Effect Level VAK = Vaarallisten Aineiden Kuljetus; Finnish Transport Legislation WAF = Water Accommodated Fraction
Key literature references and sources for data	Concawe Report no. 13/17, Chemical Safety Report Heavy Fuel Oil Components (HFO) ; CAS-number 68476-33-5, Fuel oil, residual, 2018.
Revision comments	Exposure scenarios NOTE: Lines within the margin indicate significant changes from the previous revision.
Revision date	15/06/2021
Supersedes date	01/08/2018
SDS number	5684
Hazard statements in full	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. H400 Very toxic to aquatic life. H410 Very toxic to aquatic life with long lasting effects.
Use Descriptor Codes, Industrial uses	Manufacture of substance, (SU NA; PROC 1, 2, 3, 8a, 8b, 15; ERC 1) Use as an intermediate, (SU 8, 9; PROC 1, 2, 3, 8a, 8b, 15; ERC 6a) Distribution of substance, (SU NA; PROC 1, 2, 3, 8a, 8b, 15; ERC 4, 5, 6a, 6b, 6c, 6d, 7) Formulation & (re)packing of substances and mixtures, (SU NA; PROC 1, 2, 3, 8a, 8b, 15; ERC 2) Use as a fuel, (SU NA; PROC 1, 2, 3, 8a, 8b, 16; ERC 7)
Use Descriptor Codes, Professional uses	Use as a fuel, (SU NA; PROC 1, 2, 3, 8a, 8b, 16; ERC 9a, 9b)

Exposure scenario
Use of Substance as Intermediate - Industrial

Identification

Product name	Fuel oil, residual
CAS number	68476-33-5
EC number	270-675-6
Version number	2018
Es reference	ES01b

1. Title of exposure scenario

Main title	Use of Substance as Intermediate - Industrial
Process scope	Use of substance as an intermediate (not related to Strictly Controlled Conditions). Includes recycling/recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).
Sector of use	SU8 Manufacture of bulk, large-scale chemicals (including petroleum products) SU9 Manufacture of fine chemicals

Environment

Environmental release category	ERC6a Use of intermediate
SPERC	ESVOC SPERC 6.1a.v1

Worker

Process category	PROC1 Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC8a Transfer of substance or mixture (charging and discharging) at non-dedicated facilities PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC15 Use as laboratory reagent.

2. Conditions of use affecting exposure (Industrial - Environment 1)

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Fraction of EU tonnage used in region: 0.1
Regional use tonnage: 1.8E+06 tonnes/year
Fraction of Regional tonnage used locally: 8.3E-03
Annual site tonnage: 1.5E+04 tonnes
Maximum daily site tonnage: 5.0E+04 kg

Frequency and duration of use

Continuous release.
Emission days: 300 days/year

Use of Substance as Intermediate - Industrial

Other given operational conditions affecting environmental exposure

Emission factor - air	Release fraction to air from process (initial release prior to RMM): 1.0E-04
Emission factor - water	Release fraction to wastewater from process (initial release prior to RMM): 9.9E-07
Emission factor - soil	Release fraction to soil from process (initial release prior to RMM): 0.001

Environmental factors not influenced by risk management measures

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

Risk management measures

Good practice	Common practices vary across sites, thus conservative process release estimates used.
	Risk from environmental exposure is driven by terrestrial secondary poisoning.
STP details	Not applicable as there is no release to wastewater. Estimated substance removal from wastewater via domestic sewage treatment: 94.2% Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 94.2% Maximum allowable site tonnage (Msafe), based on release following total wastewater treatment removal: 7.3E+04 kg/day Assumed domestic sewage treatment plant flow (m³/day): 2000.

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

Air	Treat air emission to provide a typical removal efficiency of 80%.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required. Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%): ≥ 0.0. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ 0.0%. Prevent discharge of undissolved substance to or recover from onsite waste water.
Soil	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to external treatment of waste for disposal

Waste treatment	This substance is consumed during use and no waste of the substance is generated.

Conditions and measures related to external recovery of waste

Recovery method	This substance is consumed during use and no waste of the substance is generated.

2. Conditions of use affecting exposure (Workers - Health 1)

Product characteristics

Physical state	Liquid
Vapour pressure	Vapour pressure < 0.5 kPa at STP.
Concentration details	Covers percentage substance in the product up to 100% (unless stated differently).

Frequency and duration of use

	Covers daily exposures up to 8 hours (unless stated differently).

Other given operational conditions affecting workers exposure

Setting	Assumes a good basic standard of occupational hygiene is implemented.
Temperature	Operation is carried out at elevated temperature (> 20°C above ambient temperature).

Use of Substance as Intermediate - Industrial

Organisational measures to prevent/limit releases, dispersion and exposure

Organisational measures 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.

Risk management measures

Use of Substance as Intermediate - Industrial

General exposures (closed systems)
Handle substance within a closed system.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Process sampling
Outdoor.
Handle substance within a closed system.
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 15 minutes.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Bulk product storage
Store substance within a closed system.
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Laboratory activities
Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.
Wear suitable gloves tested to EN374.
.
Marine vessel/barge (un)loading.
Avoid carrying out activities involving exposure for more than 4 hours.
Transfer via enclosed lines.
Clear transfer lines prior to de-coupling.
Retain drain-downs in sealed storage pending disposal or for subsequent recycle.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Road tanker/rail car loading.
Ensure material transfers are under containment or extract ventilation.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Equipment cleaning and maintenance
Drain down and flush system prior to equipment break-in or maintenance.
Wear chemically-resistant gloves (tested to EN374) in combination with specific activity training.
Retain drain-downs in sealed storage pending disposal or for subsequent recycle.

3. Exposure estimation (Environment 1)

Assessment method

Used Petrorisk model. (Hydrocarbon Block Method)

Risk-driving RCR - air compartment driven 6.9E-01
Risk-driving RCR - water compartment driven 1.1E-02

4. Guidance to check compliance with the exposure scenario (Environment 1)

Use of Substance as Intermediate - Industrial

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 onsite 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).

3. Exposure estimation (Health 1)

Assessment method

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

Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Qualitative approach used to conclude safe use.

4. Guidance to check compliance with the exposure scenario (Health 1)

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.

Exposure scenario
Distribution of Substance - Industrial

Identification

Product name	Fuel oil, residual
CAS number	68476-33-5
EC number	270-675-6
Version number	2018
Es reference	ES01a

1. Title of exposure scenario

Main title	Distribution of Substance - Industrial
Process scope	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading distribution and associated laboratory activities.
Sector of use	NA

Environment

Environmental release category	ERC4 Use of non-reactive processing aid at industrial site (no inclusion into or onto article) ERC5 Use at industrial site leading to inclusion into/onto article ERC6a Use of intermediate ERC6b Use of reactive processing aid at industrial site (no inclusion into or onto article) ERC6c Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article) ERC6d Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article) ERC7 Use of functional fluid at industrial site
SPERC	ESVOC SPERC 1.1b.v1

Worker

Process category	PROC1 Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC8a Transfer of substance or mixture (charging and discharging) at non-dedicated facilities PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC15 Use as laboratory reagent.

2. Conditions of use affecting exposure (Industrial - Environment 1)

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Distribution of Substance - Industrial

Fraction of EU tonnage used in region: 0.1
Regional use tonnage: 9.3E+06 tonnes/year
Fraction of Regional tonnage used locally: 2.0E-03
Annual site tonnage: 1.9E+04 tonnes
Maximum daily site tonnage: 6.2E+04 kg

Frequency and duration of use

Continuous release.
Emission days: 300 days/year

Other given operational conditions affecting environmental exposure

Emission factor - air	Release fraction to air from process (initial release prior to RMM): 1.0E-03
Emission factor - water	Release fraction to wastewater from process (initial release prior to RMM): 1.0E-06
Emission factor - soil	Release fraction to soil from process (initial release prior to RMM): 0.00001

Environmental factors not influenced by risk management measures

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

Risk management measures

Good practice	Common practices vary across sites, thus conservative process release estimates used.
	Risk from environmental exposure is driven by terrestrial secondary poisoning.
STP details	Not applicable as there is no release to wastewater. Estimated substance removal from wastewater via domestic sewage treatment: 94.2% Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 94.2% Maximum allowable site tonnage (Msafe), based on release following total wastewater treatment removal: 8.9E+04 kg/day Assumed domestic sewage treatment plant flow (m³/day): 2000.

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

Air	Treat air emission to provide a typical removal efficiency of 90%.
Water	No wastewater treatment required. Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%): ≥ 0.0. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of 0.0%.
Soil	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to external treatment of waste for disposal

Waste treatment	External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Recovery method	External recovery and recycling of waste should comply with applicable local and/or national regulations.

2. Conditions of use affecting exposure (Workers - Health 1)

Product characteristics

Physical state	Liquid

Distribution of Substance - Industrial

Vapour pressure Vapour pressure < 0.5 kPa at STP.

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

Frequency and duration of use

Covers daily exposures up to 8 hours (unless stated differently).

Other given operational conditions affecting workers exposure

Setting Assumes a good basic standard of occupational hygiene is implemented.

Temperature Assumes use at not more than 20°C above ambient temperature, unless stated differently.

Organisational measures to prevent/limit releases, dispersion and exposure

Organisational measures 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.

Risk management measures

Distribution of Substance - Industrial

Process sampling
Outdoor.
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 15 minutes.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
General exposures (closed systems)
Handle substance within a closed system.
Avoid carrying out activities involving exposure for more than 4 hours.
Sample via a closed loop or other system to avoid exposure.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Bulk product storage
Store substance within a closed system.
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Product sampling
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 15 minutes.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Laboratory activities
Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.
Wear suitable gloves tested to EN374.
.
Marine vessel/barge (un)loading.
Avoid carrying out activities involving exposure for more than 4 hours.
Transfer via enclosed lines.
Clear transfer lines prior to de-coupling.
Retain drain-downs in sealed storage pending disposal or for subsequent recycle.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Road tanker/rail car loading.
Ensure material transfers are under containment or extract ventilation.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Equipment cleaning and maintenance
Drain down and flush system prior to equipment break-in or maintenance.
Wear chemically-resistant gloves (tested to EN374) in combination with specific activity training.
Retain drain-downs in sealed storage pending disposal or for subsequent recycle.

3. Exposure estimation (Environment 1)

Distribution of Substance - Industrial

Assessment method

Used Petrorisk model. (Hydrocarbon Block Method)

Maximum Risk Characterisation Ratios for air emissions 7.0E-01
Maximum Risk Characterisation Ratios for wastewater emissions 1.3E-02

4. Guidance to check compliance with the exposure scenario (Environment 1)

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 onsite 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).

3. Exposure estimation (Health 1)

Assessment method

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

Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Qualitative approach used to conclude safe use.

4. Guidance to check compliance with the exposure scenario (Health 1)

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.

Exposure scenario
Formulation & (Re)packing of Substances and Mixtures - Industrial

Identification

Product name	Fuel oil, residual
CAS number	68476-33-5
EC number	270-675-6
Version number	2018
Es reference	ES02

1. Title of exposure scenario

Main title	Formulation & (Re)packing of Substances and Mixtures - Industrial
Process scope	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities.
Sector of use	NA

Environment

Environmental release category	ERC2 Formulation into mixture
SPERC	ESVOC SPERC 2.2.v1

Worker

Process category	PROC1 Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC8a Transfer of substance or mixture (charging and discharging) at non-dedicated facilities PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC15 Use as laboratory reagent.

2. Conditions of use affecting exposure (Industrial - Environment 1)

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Fraction of EU tonnage used in region: 0.1
Regional use tonnage: 7.5E+06 tonnes/year
Fraction of Regional tonnage used locally: 4.0E-03
Annual site tonnage: 3.0E+04 tonnes
Maximum daily site tonnage: 100 tonnes

Frequency and duration of use

Continuous release.
Emission days: 300 days/year

Formulation & (Re)packing of Substances and Mixtures - Industrial

Other given operational conditions affecting environmental exposure

Emission factor - air	Release fraction to air from process (after typical onsite RMMs consistent with EU Solvent Emissions Directive requirements): 2.5E-03
Emission factor - water	Release fraction to wastewater from process (initial release prior to RMM): 9.5E-06
Emission factor - soil	Release fraction to soil from process (initial release prior to RMM): 0.0001

Environmental factors not influenced by risk management measures

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

Risk management measures

Good practice	Common practices vary across sites, thus conservative process release estimates used.
	Risk from environmental exposure is driven by terrestrial secondary poisoning.
STP details	Not applicable as there is no release to wastewater. Estimated substance removal from wastewater via domestic sewage treatment: 94.2% Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 94.2% Maximum allowable site tonnage (Msafe), based on release following total wastewater treatment removal: 1.1E+05 kg/day Assumed domestic sewage treatment plant flow (m³/day): 2000.

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

Air	Treat air emission to provide a typical removal efficiency of 0%.
Water	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%): ≥ 60.9. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of 0.0%. Prevent discharge of undissolved substance to or recover from onsite waste water. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.
Soil	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to external treatment of waste for disposal

Waste treatment	External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Recovery method	External recovery and recycling of waste should comply with applicable local and/or national regulations.

2. Conditions of use affecting exposure (Workers - Health 1)

Product characteristics

Physical state	Liquid
Vapour pressure	Vapour pressure < 0.5 kPa at STP.
Concentration details	Covers percentage substance in the product up to 100% (unless stated differently).

Frequency and duration of use

Covers daily exposures up to 8 hours (unless stated differently).

Other given operational conditions affecting workers exposure

Formulation & (Re)packing of Substances and Mixtures - Industrial

Setting	Assumes a good basic standard of occupational hygiene is implemented.
Temperature	Assumes use at not more than 20°C above ambient temperature, unless stated differently.

Organisational measures to prevent/limit releases, dispersion and exposure

Organisational measures	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.

Risk management measures

Formulation & (Re)packing of Substances and Mixtures - Industrial

General exposures (closed systems)
Process sampling
Handle substance within a closed system.
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 15 minutes.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
General exposures (closed systems)
Handle substance within a closed system.
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Bulk product storage
Store substance within a closed system.
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Product sampling
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 15 minutes.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Laboratory activities
Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.
Wear suitable gloves tested to EN374.
.
Marine vessel/barge (un)loading.
Transfer via enclosed lines.
Avoid carrying out activities involving exposure for more than 4 hours.
Clear transfer lines prior to de-coupling.
Retain drain-downs in sealed storage pending disposal or for subsequent recycle.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Road tanker/rail car loading.
Ensure material transfers are under containment or extract ventilation.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Drum/batch transfers
Ensure material transfers are under containment or extract ventilation.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
, or:
Ensure operation is undertaken outdoors.
Avoid carrying out activities involving exposure for more than 1 hour.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Equipment cleaning and maintenance

Formulation & (Re)packing of Substances and Mixtures - Industrial

Drain down and flush system prior to equipment break-in or maintenance.
Wear chemically-resistant gloves (tested to EN374) in combination with specific activity training.
Retain drain-downs in sealed storage pending disposal or for subsequent recycle.

3. Exposure estimation (Environment 1)

Assessment method

Used Petrorisk model. (Hydrocarbon Block Method)

Maximum Risk Characterisation Ratios for air emissions 7.0E-01
Maximum Risk Characterisation Ratios for wastewater emissions 1.5E-01

4. Guidance to check compliance with the exposure scenario (Environment 1)

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 onsite 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).

3. Exposure estimation (Health 1)

Assessment method

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

Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Qualitative approach used to conclude safe use.

4. Guidance to check compliance with the exposure scenario (Health 1)

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.

Exposure scenario
Use as a Fuel - Industrial

Identification

Product name	Fuel oil, residual
CAS number	68476-33-5
EC number	270-675-6
Version number	2018
Es reference	ES12a

1. Title of exposure scenario

Main title	Use as a Fuel - Industrial
Process scope	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.
Sector of use	NA

Environment

Environmental release category	ERC7 Use of functional fluid at industrial site
SPERC	ESVOC SPERC 7.12a.v1

Worker

Process category	PROC1 Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC8a Transfer of substance or mixture (charging and discharging) at non-dedicated facilities PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC16 Use of fuels

2. Conditions of use affecting exposure (Industrial - Environment 1)

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Fraction of EU tonnage used in region: 0.1
Regional use tonnage: 5.9E+06 tonnes/year
Fraction of Regional tonnage used locally: 2.6E-01
Annual site tonnage: 1.5E+06 tonnes
Maximum daily site tonnage: 5000 tonnes

Frequency and duration of use

Continuous release.
Emission days: 300 days/year

Other given operational conditions affecting environmental exposure

Use as a Fuel - Industrial

Emission factor - air	Release fraction to air from process (initial release prior to RMM): 2.0E-04
Emission factor - water	Release fraction to wastewater from process (initial release prior to RMM): 1.9E-07
Emission factor - soil	Release fraction to soil from process (initial release prior to RMM): 0

Environmental factors not influenced by risk management measures

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

Risk management measures

Good practice	Common practices vary across sites, thus conservative process release estimates used.
	Risk from environmental exposure is driven by terrestrial secondary poisoning.
STP details	Not applicable as there is no release to wastewater. Estimated substance removal from wastewater via domestic sewage treatment: 94.2% Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 94.2% Maximum allowable site tonnage (Msafe), based on release following total wastewater treatment removal: 7.2E+06 kg/day Assumed domestic sewage treatment plant flow (m³/day): 2000.

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

Air	Treat air emission to provide a typical removal efficiency of 95%.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required. Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%): ≥ 61.1. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of 0.0%.
Soil	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to external treatment of waste for disposal

Waste treatment	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 recovery of waste

Recovery method	This substance is consumed during use and no waste of the substance is generated.

2. Conditions of use affecting exposure (Workers - Health 1)

Product characteristics

Physical state	Liquid
Vapour pressure	Vapour pressure < 0.5 kPa at STP.
Concentration details	Covers percentage substance in the product up to 100% (unless stated differently).

Frequency and duration of use

	Covers daily exposures up to 8 hours (unless stated differently).

Other given operational conditions affecting workers exposure

Setting	Assumes a good basic standard of occupational hygiene is implemented.
Temperature	Assumes use at not more than 20°C above ambient temperature, unless stated differently.

Use as a Fuel - Industrial

Organisational measures to prevent/limit releases, dispersion and exposure

Organisational measures 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.

Risk management measures

Use as a Fuel - Industrial

General exposures (closed systems)
Handle substance within a closed system.
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
General exposures (closed systems)
Product sampling
Handle substance within a closed system.
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 1 hour.
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Bulk closed unloading
Outdoor.
Transfer via enclosed lines.
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Drum/batch transfers
Ensure material transfers are under containment or extract ventilation.
, or:
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Avoid carrying out activities involving exposure for more than 1 hour.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Operation of solids filtering equipment
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Bulk product storage
Store substance within a closed system.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Use as a fuel
(closed systems)
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Equipment cleaning and maintenance
Drain down and flush system prior to equipment break-in or maintenance.
Wear chemically-resistant gloves (tested to EN374) in combination with specific activity training.
Retain drain-downs in sealed storage pending disposal or for subsequent recycle.

Use as a Fuel - Industrial

3. Exposure estimation (Environment 1)

Assessment method

Used Petrorisk model. (Hydrocarbon Block Method)

Maximum Risk Characterisation Ratios for air emissions 6.9E-01
Maximum Risk Characterisation Ratios for wastewater emissions 1.5E-01

4. Guidance to check compliance with the exposure scenario (Environment 1)

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 onsite 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).

3. Exposure estimation (Health 1)

Assessment method

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

Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Qualitative approach used to conclude safe use.

4. Guidance to check compliance with the exposure scenario (Health 1)

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.

Exposure scenario
Use as a Fuel - Professional

Identification

Product name	Fuel oil, residual
CAS number	68476-33-5
EC number	270-675-6
Version number	2018
Es reference	ES12b

1. Title of exposure scenario

Main title	Use as a Fuel - Professional
Process scope	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.
Sector of use	NA

Environment

Environmental release category	ERC9a Widespread use of functional fluid (indoor) ERC9b Widespread use of functional fluid (outdoor)
SPERC	ESVOC SPERC 9.12b.v1

Worker

Process category	PROC1 Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC8a Transfer of substance or mixture (charging and discharging) at non-dedicated facilities PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC16 Use of fuels

2. Conditions of use affecting exposure (Industrial - Environment 1)

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Fraction of EU tonnage used in region: 0.1
Regional use tonnage: 1.7E+06 tonnes/year
Fraction of Regional tonnage used locally: 5.0E-04
Annual site tonnage: 8.5E+02 tonnes
Maximum daily site tonnage: 2.3E+03 kg

Frequency and duration of use

Continuous release.
Emission days: 365 days/year

Other given operational conditions affecting environmental exposure

Use as a Fuel - Professional

Emission factor - air	Release fraction to air from wide dispersive use (regional only): 1.0E-04
Emission factor - water	Release fraction to wastewater from wide dispersive use: 7.0E-10
Emission factor - soil	Release fraction to soil from wide dispersive use (regional only): 0.00001

Environmental factors not influenced by risk management measures

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

Risk management measures

Good practice	Common practices vary across sites, thus conservative process release estimates used. Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion).
STP details	Not applicable as there is no release to wastewater. Estimated substance removal from wastewater via domestic sewage treatment: 94.2% Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 94.2.% Maximum allowable site tonnage (Msafe), based on release following total wastewater treatment removal: 3.8E+03 kg/day Assumed domestic sewage treatment plant flow (m³/day): 2000.

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

Air	Treat air emission to provide a typical removal efficiency of N/A%.
Water	No wastewater treatment required. Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%): ≥ 0.0. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of 0.0%.
Soil	Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to external treatment of waste for disposal

Waste treatment	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 recovery of waste

Recovery method	This substance is consumed during use and no waste of the substance is generated.

2. Conditions of use affecting exposure (Workers - Health 1)

Product characteristics

Physical state	Liquid
Vapour pressure	Vapour pressure < 0.5 kPa at STP.
Concentration details	Covers percentage substance in the product up to 100% (unless stated differently).

Frequency and duration of use

Covers daily exposures up to 8 hours (unless stated differently).

Other given operational conditions affecting workers exposure

Setting	Assumes a good basic standard of occupational hygiene is implemented.
Temperature	Assumes use at not more than 20°C above ambient temperature, unless stated differently.

Use as a Fuel - Professional

Organisational measures to prevent/limit releases, dispersion and exposure

Organisational measures 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.

Risk management measures

Use as a Fuel - Professional

General exposures (closed systems)
Product sampling
Handle substance within a closed system.
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 1 hour.
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).
Wear chemically-resistant gloves (tested to EN374) in combination with specific activity training.
.
General exposures (closed systems)
Handle substance within a closed system.
Sample via a closed loop or other system to avoid exposure.
Avoid carrying out activities involving exposure for more than 1 hour.
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Bulk closed unloading
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
Avoid carrying out activities involving exposure for more than 1 hour.
, or:
Ensure material transfers are under containment or extract ventilation.
.
Drum/batch transfers
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
Avoid carrying out activities involving exposure for more than 1 hour.
, or:
Ensure material transfers are under containment or extract ventilation.
.
Refuelling
Ensure material transfers are under containment or extract ventilation.
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
Avoid carrying out activities involving exposure for more than 1 hour.
.
Use as a fuel
(closed systems)
Wear chemically-resistant gloves (tested to EN374) in combination with ‘basic’ employee training.
.
Equipment cleaning and maintenance
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Wear chemically-resistant gloves (tested to EN374) in combination with specific activity training.
Drain down and flush system prior to equipment break-in or maintenance.
Retain drain-downs in sealed storage pending disposal or for subsequent recycle.
Clear spills immediately.

3. Exposure estimation (Environment 1)

Use as a Fuel - Professional

Assessment method	Used Petrorisk model. (Hydrocarbon Block Method) Maximum Risk Characterisation Ratios for air emissions 5.6E-01 Maximum Risk Characterisation Ratios for wastewater emissions 3.2E-03

4. Guidance to check compliance with the exposure scenario (Environment 1)

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 onsite 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).

3. Exposure estimation (Health 1)

Assessment method	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Qualitative approach used to conclude safe use.

4. Guidance to check compliance with the exposure scenario (Health 1)

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.