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

1.1 Product identifier

Product name:	Fuel Oil
Synonym:	Fuel Oil (all types)
CAS Number:	68476-33-5
EC Number:	270-675-6
Index Number:	649-024-00-9
REACh Registration Number:	01-2119474894-22-XXXX

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

COMMON USE: heating fuel and other industrial uses

IDENTIFIED USES IN THE CHEMICAL SAFETY REPORT: description of Identified Uses

Life cycle:

***Formulation or re-packing*:** Formulation & (re)packing of substances and mixtures (GEST2_I)

Uses at industrial sites: Distribution of substance (GEST1A_I), Use as a fuel (GEST12_I)

Widespread uses by professional workers: Use as a fuel (GEST12_I)

Uses advised against: The Professional Uses of HFO substances in coatings and road and construction applications are advised against. A qualitative assessment of the hazards and potential exposure of HFO substances concluded that these uses cannot be considered safe due to their hazard classification for CMR properties. Therefore, for reasons of protection of human health, these uses are no longer supported in the registration dossier.

See Annex for a complete list of uses and use descriptors, for which an ES is provided.

1.3 Details of the supplier of the safety data sheet

Company name:	Q8 Quaser s.r.l.
Address:	Via dell'Oceano Indiano, 13
City / Nation:	00144 – Roma (Italia)
Telephone:	+39 06-520881
Competent Technician E-mail:	schede@q8.it

1.4 Emergency telephone number

Italy:	Centro Antiveleni Ospedale Niguarda (Milano), +39 02.66101029
Foreign countries:	Contact the closest Poisons Information Centre

SECTION 2: HAZARDS IDENTIFICATION

Physico-chemical hazards:	Non-hazardous substance according to the criteria for classification of Annex I to Part 2 of Regulation 1272/2008.
Human health hazard:	The substance is harmful by inhalation, and prolonged exposure through inhalation can cause serious damage to health. May cause skin dryness or cracking in the case of repeated exposure. May cause cancer. Suspected of damaging the fetus.
Environmental hazard:	The substance is highly toxic to aquatic life with long-term effects in the aquatic environment.

2.1 Classification of the substance or mixture

Acute Tox. 4:	H332
Carc. 1B:	H350
Repr. 2:	H361d
STOT RE 2:	H373 *(blood, thyme, liver)*
Aquatic Acute 1:	H400
Aquatic Chronic 1:	H410

For full text of H-phrases see Section 16.

2.2 Label elements

Hazard pictogram(s):

Signal word: DANGER

Hazard statement(s):
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 (blood, thyme, liver)
H410 - Very toxic to aquatic life with long lasting effects
EU H066 - Repeated exposure may cause skin dryness or cracking

Precautionary statement(s):
Prevention:
P201 - Obtain special instructions before use
P260 - Do not breathe dust/fume/ gas/mist/vapours/spray
P273 - Avoid release to the environment
P280 - Wear protective gloves/protective clothing/eye protection/face protection
Response:
P308+313 - IF exposed or concerned: Get medical advice/attention.
Disposal:
P501 - Dispose of contents/container in accordance with local / regional / national / international regulation

Other Information: None.

2.3 Other hazards

There is a risk of thermal burns in case of direct contact with skin or eyes, because normally the product is stored or handled at high temperature.

A potential risk may be the development of hydrogen sulfide (poison gas) when the product is stored or handled at elevated temperatures. When present, hydrogen sulphide may accumulate in tanks or in confined spaces with danger for

operators that need to access it. In this case, overexposure can cause respiratory irritation, dizziness, nausea, unconsciousness and death.

Any substance, in case of accidents involving pipelines under pressure or otherwise, may be accidentally injected into the skin, even without external damage. In this case it is necessary to conduct as soon as the injured to hospital for treatment.

According to Annex XIII of REACH, the product does not meet the criteria for classification as PBT or vPvB.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Component	Identifier	Concentration	Classification accordig to Reg. (CE) 1272/2008
UVCB SUBSTANCE: FUEL OIL, RESIDUAL *("The liquid product from various refinery streams, usually residues. The composition is complex and varies with the source of the crude oil")*	CAS Number: 68476-33-5 EINECS Number: 270-675-6 INDEX Number: 649-024-00-9 Registration Number: 01-2119474894-22-XXXX	100 %	Acute Tox. 4: H332 Carc. 1B: H350 Repr. 2: H361d STOT RE 2: H373 Aquatic Acute 1: H400 Aquatic Chronic 1: H410

3.2 Mixtures

Not applicable.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

Eye contact: Remove contact lenses, if present and easy to do so. Rinse cautiously with water for several minutes. Continue rinsing. Seek medical attention if skin irritation, swelling or redness develops and persists.

In case of eye contact with hot product, flood with water to dissipate heat. Immediately obtain specialist medical assessment and treatment for the casualty.

Skin contact: Remove contaminated clothing, contaminated footwear and dispose of safely. Wash affected area with soap and water. Never use gasoline, kerosene or other solvents for washing of contaminated skin. If irritation, blurred vision or swelling occurs and persists, obtain medical advice from a specialist.

For minor thermal burns, cool the burn. Hold the burned area under cold running water for at least five minutes, or until the pain subsides. Body hypothermia must be avoided. Do not put ice on the burn. DO NOT attempt to remove portions of clothing glued to burnt skin but cut round them.

When using high-pressure equipment, injection of product can occur. If high-pressure injuries occur, immediately seek professional medical attention. Do not wait for symptoms to develop.

Swallowing /aspiration: Do not give anything by mouth to an unconscious person. If vomiting occurs, the head should be kept low so that the vomit does not enter the lungs (aspiration).

Inhalation: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.

If casualty is unconscious and not breathing, ensure that there is no obstruction to breathing and give artificial respiration by trained personnel. If necessary, give external cardiac massage and obtain medical advice.

If the casualty is conscious and breathing, place in the recovery position. Administer oxygen if necessary.

If there is any suspicion of inhalation of H_2S (hydrogen sulphide) rescuers must wear breathing apparatus, belt and safety rope, and follow rescue procedures. Send patient to hospital. Immediately begin artificial respiration if breathing has ceased. Administer oxygen if necessary.

4.2 Most important symptoms and effects, both acute and delayed

May cause skin irritation, slight eye irritation. Inhalation of fumes or oil mists produced at high temperatures may cause irritation of the respiratory tract. Contact with hot product may cause severe thermal burns. Ingestion: few or no symptoms expected. If any, nausea and diarrhoea might occur.

4.3 Indication of any immediate medical attention and special treatment needed

Seek medical attention in all cases of serious burns.

SECTION 5: FIREFIGHTING MEASURE

5.1 Extinguishing media

Suitable extinguishing media: Small fires: Sand or earth, carbon dioxide, foam (trained personnel only), dry chemical powder.

Large fires: foam (trained personnel only), water fog (trained personnel only). Other inert gases (subject to regulations).

Unsuitable extinguishing media: Do not use direct water jets on the burning product, they could cause splattering and spread the fire. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

5.2 Special hazards arising from the substance or mixture

Incomplete combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates, gases, including CO (carbon monoxide), H_2S (hydrogen sulfide), SOx (sulphur oxides), H_2SO_4 (sulfuric acid) unidentified organic and inorganic compounds.

5.3 Advice for firefighters

In case of a large fire or in confined or poorly ventilated spaces, wear full fire resistant protective clothing and self contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

For non emergency personnel:

Stop or contain leak at the source, if safe to do so. Avoid direct contact with released material. Stay upwind. In case of large spillages, alert occupants in downwind areas. Keep non-involved personnel away from the area of spillage. Alert emergency personnel. Except in case of small spillages, the feasibility of any actions should always be assessed and advised, if possible, by a trained, competent person in charge of managing the emergency. Eliminate all ignition sources if safe to do so (e.g. electricity, sparks, fires, flares). In those cases when the presence of dangerous amounts of H2S in the leaked/spilled product is suspected or proved, additional or special actions may be warranted, including access restrictions, use of special protection equipment, procedures and personnel training. If required, notify relevant authorities according to all applicable regulations.

For emergency personnel:

Small spillages: normal antistatic working clothes are usually adequate.

Large spillages: full body suit of chemically resistant and antistatic material. If necessary heat resistant and insulated. Work gloves providing adequate chemical resistance, specifically to aromatic hydrocarbons. Gloves made of PVA are not water-resistant, and are not suitable for emergency use. If contact with hot product is possible or anticipated, gloves should be heat-resistant and thermally insulated. Work helmet. Chemical resistant antistatic non-skid safety shoes or boots. Goggles and /or face shield, if splashes or contact with eyes is possible or anticipated. Respiratory protection: a half or full-face respirator with filter(s) for organic vapours (and when applicable for H_2S) or a Self Contained Breathing Apparatus (SCBA) can be used according to the extent of spill and predictable amount of exposure. If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBA's should be used

6.2 Environmental precautions

Prevent product from entering sewers, rivers or other bodies of water.

6.3 Methods and material for containment and cleaning up

Spillages to the ground: If necessary dike the product with dry earth, sand or similar non-combustible materials. Let hot product cool down naturally. Large spillages may be cautiously covered with foam, if available, to limit fire risk. Do not use direct jets. When inside buildings or confined spaces, ensure adequate ventilation. Absorb spilled product with suitable non-combustible materials. If it is necessary to store any contaminated materials for safe disposal, only suitable containers (airtight, labelled, sealed, waterproof, earthed and bonded) should be used. In case of soil contamination, remove contaminated soil and treat in accordance with local regulations.

Spillages to the water: Product less dense than water. In case of small spillages in closed waters (i.e. ports) contain product with floating barriers or other equipment. Collect spilled product by absorbing with specific floating absorbents. If possible, large spillages in open waters should be contained with floating barriers or other mechanical means. If this not possible, control the spreading of the spillage, and collect the product by skimming or other suitable mechanical means. The use of dispersants should be advised by an expert, and, if required, approved by local authorities. Product which is denser than water will sink to the bottom, and usually no intervention will be feasible. If possible, collect the product and contaminated materials with

mechanical means, and store/dispose of according to relevant regulations. In special situations (to be assessed on case-by case basis, according to expert judgement and local conditions), excavations of trenches on the bottom to collect the product, or burying the product with sand may be a feasible option

Recommended measures are based on the most likely spillage scenarios for this material; however, local conditions (wind, air temperature, wave/current direction and speed) may significantly influence the choice of appropriate actions.

6.4 Reference to other sections

For more information on personal protective equipment, refer to "SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION".

6.5 Other information

Concentration of H_2S in tank headspaces may reach hazardous values, especially in case of prolonged storage. This situation is especially relevant for those operations which involve direct exposure to the vapours in the tank.

Spillages of limited amounts of product, especially in the open air when vapours will be usually quickly dispersed, are dynamic situations, which will presumably limit the exposure to dangerous concentrations. As H2S has a density greater than ambient air, a possible exception may regard the build-up of dangerous concentrations in specific spots, like trenches, depressions or confined spaces. In all these circumstances, however, the correct actions should be assessed on a case-by-case basis.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

Obtain special instructions before use.

Ensure that all relevant regulations regarding handling and storage facilities of flammable products are followed. Take precautionary measures against static electricity. Ground/bond containers, tanks and transfer/receiving equipment. The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Where applicable, implement the provisions on the prevention of fire and explosive atmospheres.

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

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.

Use only outdoors or in a well-ventilated area.

Use adequate personal protective equipment as needed. Do not use compressed air for filling, discharging, or handling operations. Prevent the risk of slipping. For more information regarding protective equipment and operational conditions see Exposure scenarios. Avoid release to the environment.

7.1.2 Advice on general occupational hygiene

Do not breathe fume/ mist/ vapours. Avoid contact with skin. Keep away from food and beverages. Do not eat, drink or smoke when using this product. Wash the hands thoroughly after handling. Do not reuse contaminated clothing. Contaminated materials should not be allowed to accumulate in the workplaces and should never be kept inside the pockets. Ensure that proper housekeeping measures are in place.

7.2 Conditions for safe storage, including any incompatibilities

Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation. Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills. Cleaning, inspection and maintenance of internal structure of storage tanks must be done only by properly equipped and qualified personnel as defined by national, local or company regulations. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulphide (H_2S) and flammability.

Store separately from oxidising agents.

Recommended materials for containers, or container linings use mild steel, stainless steel. For containers, or container linings use materials specifically approved for use with this product. Some synthetic materials may be unsuitable for containers or container linings depending on the material specification and intended use. Compatibility should be checked with the manufacturer.

If the product is supplied in containers, keep only in the original container or in a suitable container for this kind of product. Store in a well-ventilated place.

Keep containers tightly closed and properly labelled.

Empty containers may contain combustible product residues. Do not weld, solder, drill, cut or incinerate empty containers, unless they have been properly cleaned.

7.3 Specific end use(s)

See attached Exposure Scenarios

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Occupational exposure limit values:

Component	Occupational exposure limit values	Reference
MINERAL OIL	TLV®-TWA: Exposure should be kept as low as possible (low and mildly refined mineral oil) *Polycyclic aromatic hydrocarbons (Benzo[a]pyrene, Benzo[a]anthracene, Benzo[b]fluoranthene): I Exposure should be kept as low as possible*	ACGIH 2019

Occupational exposure limit values (atmospheric contaminants):

Component	Occupational exposure limit values	Reference
HYDROGEN SULFIDE	Limit Values (8 h): 5 ppmv 7 mg/m^3 Limit Values: 10 ppmv (short term) 14 mg/m^3	D.Lgs 81/08 e s.m.i.
	TLV®-TWA: 1 ppm TLV®-STEL: 5 ppm	ACGIH 2019

Monitoring procedures: refer to relevant legislation and in any case to the good industrial heath practices in the work place.

DNEL (Derived No Effect Level) / DMEL (Derived Minimum Effect Level):

	DNEL Workers				DNEL General Population			
Exposure Route	Long-term, local effects	Long-term, systemic effects (b)	Acute, local effects	Acute, systemic effects	Long-term, local effects	Long-term, systemic effects (e)	Acute, local effects	Acute, systemic effects
oral	n.a.	n.a.	n.a.	n.a.	n.a.	0,015 mg/kg /24 h	n.a.	n.a.
dermal	Note (a) for 13-wk exposure Note (c) for chronic exposures (dermal carcinogen)	0,065 mg/kg /8 h	Note (a)	Note (a)	Note (d)	Note (d)	Note (d)	Note (d)
inhalation	Note (a)	0,12 mg/m3 /8 h aerosol	Note (a)	4700 mg/m3 /15 min aerosol	Note (d)	Note (d)	Note (d)	Note (d)

Note a: No hazard identified for this route (data available)

Note b: Long-term systemic effects include non-reproductive effects and developmental/reproductive effects. Lowest DNEL is shown.

Note c: No-threshold effect and/or no dose-response information available

Note d: No DNEL needed since no exposure expected

Nota e: Long-term systemic effects include developmental/reproductive effects. Lowest DNEL is shown.

PNEC(S) (Predicted No Effect Concentration):

PNEC(S) Water, Sediment and Soil: Substance is a hydrocarbon UVCB: The hydrocarbon block method is used for environmental risk assessment (see REACH guidance, R7, app.13-1). A PNEC cannot be derived for UVCBs, therefore, the risk assessment on the library of representative constituents uses HC5 from the Target Lipid Model (TLM). Following Final Decisions issued by ECHA, a review of the TLM has been conducted that led to a revised TLM-model and the new results are used in this dossier. For full details refer to the following Appendixes attached in IUCLID Section 13: PETRORISK – ProductLibrary tab, PAH Phototoxicity, PNEC HC5, TLM Validation, PETROTOX Verification and NOS Heterocyclics.

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Minimize exposure to fume/ mist/ vapours. Where hot product is handled in confined spaces, effective local ventilation must be provided. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulphide (H_2S) and flammability.

8.2.2 Individual protection measures

Eye/face protection: In the absence of containment system, if splashing is likely, full head and face protection (protective shield and/or safety goggles (EN 166)) should be used.

Skin protection: **i) Hand protection:** In the absence of containment systems and in case of possible contact with the skin, use gloves with hydrocarbon-resistant high cuffs, felt-lined, and insulated if necessary. Supposedly adequate materials: nitrile, PVC or PVA (polyvinyl alcohol) with an index of protection against chemical agents at least equal to 5 (breakthrough time> 240 minutes). Neoprene or natural rubber (latex) do not have adequate characteristics of strength. Use gloves in accordance with the conditions and limits set by the manufacturer. In the case, refer to UNI EN 374. Gloves must be periodically inspected and changed in case of wear, perforations or contaminations.

ii) Other: Wear protective clothing for operations with hot material: heat resistant coveralls (with trousers legs over boots and sleeves over cuffs of gloves), heat resistant heavy duty antiskid boots (e. g. leather) (EN 943-13034-14605). Resistant to chemicals.

In case of contamination of the clothes, clean and replace them immediately.

Respiratory protection: Approved respiratory protection equipment shall be used in spaces where hydrogen sulphide may accumulate: full face mask with cartridge/filter type “B” (grey for inorganic vapours including H2S) or self-contained breathing apparatus (SCBA) (EN 529). If exposure levels cannot be determined or estimated with adequate confidence, or an oxygen deficiency is possible, only SCBA’s should be used.

Thermal hazards: See previous *Skin protection*.

8.2.3 Controlli dell'esposizione ambientale

Avoid release to the environment. Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills. Onsite wastewater treatment required. Prevent discharge of undissolved substance to or recover from onsite wastewater. Do not apply industrial sludge to natural soils. Sludge generated by the industrial water treatment should be incinerated, contained or reclaimed.

8.3 Other information

For more information on personal protective equipment and operating conditions, refer to attached Exposure Scenarios.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) *Appearance*	Blackish viscous liquid
b) *Odour*	Petroleum odor
c) *Odour threshold*	Not available
d) *pH*	Not applicable
e) *Melting point/freezing point*	< 30° C
f) *Initial boiling point and boiling range*	150-750°C (range)
g) *Flash point*	> 60°C
h) *Evaporation rate*	Not applicable
i) *Flammability (solid, gas)*	Not applicable
j) *Upper/lower flammability or explosive limits*	Not applicable
k) *Vapour pressure*	0.02-0.79 kPa @ 120°C (MW = 330-500)
l) *Vapour density*	
m) *Density*	840-1100 kg/m^3
n) *Solubility(ies)*	Water solubility not applicable: substance is a hydrocarbon UVCB
o) *Partition coefficient: n-octanol/water*	Not applicable: substance is a hydrocarbon UVCB
p) *Auto-ignition temperature*	> 220 °C
q) *Decomposition temperature*	Not applicable
r) *Viscosity*	> 20.5 mm^2/s @ 40°C
s) *Explosive properties*	Non explosive, there are no chemical groups associated with explosive properties in the molecules (Ref. Column 2 of REACH Annex VII)
t) *Oxidising properties*	Non oxidising, on the basis of its chemical structure, the substance is incapable of reacting exothermically with combustible materials (Ref. Column 2 of REACH Annex VII)

9.2 Other information

The methods of analysis for the characteristics, which correspond to those recognized nationally and internationally, are set mostly in the technical specifications of the product.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

The mixture does not present additional dangers of reactivity than those reported in the next subtitle.

10.2 Chemical stability

This substance is stable in relation to its intrinsic properties.

10.3 Possibility of hazardous reactions

Contact with strong oxidizers (peroxides, chromates, etc.) may cause a fire hazard. A mixture with nitrates or other strong oxidisers (e.g. chlorates, perchlorates, liquid oxygen) may create an explosive mass. Sensitivity to heat, friction or shock cannot be assessed in advance..

10.4 Conditions to avoid

Store separately from oxidising agents.

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking

Avoid Static Electricity.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

The mixture does not decompose when used for its intended uses.

SECTION 11: TOXICOLOGICAL INFORMATION

Toxicokinetics, metabolism and distribution

No *in vivo* experimental data were located on the absorption, distribution, metabolism or elimination of substances in the Heavy Fuel Oil category.
Physicochemical considerations suggest that uptake across skin is possible but will be relatively low since only around 2% of the hydrocarbon blocks present have a log Pow <5. This is supported by results from animal acute dermal toxicity testing, where no mortality and only limited (gross) systemic changes were recorded. This indicates that uptake by undamaged skin was limited; or that the absorbed hydrocarbon components were of low inherent toxicity.
It can be suggest that uptake across the lung is low because of results from a rat acute inhalation toxicity study (where no grossly observable systemic changes were found at necropsy) combined with the low water solubility of substances in the Heavy Fuel Oil category. With regard to uptake after ingestion, modelled information indicates that the majority of hydrocarbon substances present in Heavy Fuel Oil Components have a predicted log Pow of >5 suggesting that uptake by micellar solubilisation is possible.

11.1 Information on toxicological effects

a) Acute toxicity

Acute Oral Toxicity:

The acute oral toxicity of Heavy Fuel Oil Components following gavage administration has been assessed in a number of GLP-compliant studies. All studies have shown signs of reversible intoxication and lethargy immediately after dosing, intestinal irritation and/or altered gut function (reduced stool production etc) with occasional changes in the gross appearance of liver, kidney, lung etc at necropsy.

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

Acute Inhalation Toxicity:

To assess the acute toxicity by inhalation of products of the Heavy Fuel Oil category has a number of studies in rats (LD50 studies limit or multi group). The methods used are EPA OTS 798.1150.
These findings support classification Acute Tox. 4, H332 (Harmful if inhaled).

Acute Dermal Toxicity:
The acute dermal toxicity of samples belonging to the category of the Heavy Fuel Oil category has been evaluated in a series of studies conducted mainly in rabbits. These studies revealed a acute dermal LD50 greater than 2 g / kg, which does not involve any classification.

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

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
Oral			
RAT ORAL (gavage) OECD Guideline 401 (Acute Oral Toxicity)	LD50: 5270 mg/kg (male) LD50: 4320 mg/kg/ (female)	Key Study CAS 64741-62-4 Reliable with restriction	API, American Petroleum Institute (1982)
Inhalation			
RAT EPA OTS 798.1150 (Acute inhalation toxicity)	LC50 4 h: 4500 mg/m^3 (female) LC50 4 h: 4100 mg/m^3 (male)	Key Study CAS 64741-62-4 Reliable with restriction	ARCO, Atlantic Richfield Company (1987)
Dermal			
RABBIT EU Method B.3 (Acute Toxicity Dermal)	LD50 > 2000 mg/kg (male/female)	Key Study CAS 68476-33-5 Reliable with restriction	ARCO, Atlantic Richfield Company (1987)

(b) Skin corrosion/irritation

The dermal irritation potential of Heavy Fuel Oil Components toward intact and abraded skin has been investigated in a large number of studies conducted mainly in rabbits. The conclusions of these studies indicate a potential to evoke no more than moderate skin irritation, with no evidence of injuries in depth (corrosion).

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

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
RABBIT EU Method B.4 (Acute Toxicity: Dermal Irritation / Corrosion)	Primary dermal irritation index: 2.6 very mild and well-defined erythema, edema variable	Weight of evidence CAS 68476-33-5 Reliable with restriction	ARCO, Atlantic Richfield Company (1986)

(c) Serious eye damage/irritation

The dermal irritation potential of Heavy Fuel Oil Components toward eye has been investigated in a large number of studies conducted mainly in rabbits.

None of the samples tested elicited more than transient, fully reversible eye irritation. Based on available data, the classification criteria are not met.

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
RABBIT EU Method B.5 (Acute Toxicity: Eye Irritation / Corrosion)	Not irritating	Weight of evidence CAS 68476-33-5 Reliable with restriction	ARCO, Atlantic Richfield Company (1986)

(d) Respiratory or skin sensitization

Respiratory system:

This endpoint is not a REACH requirement and no data are available for this endpoint but these substances are not expected to cause respiratory sensitisation. No classification is required.

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

Skin sensitization:

The skin sensitisation potential of Heavy Fuel Oil Components has been investigated in a large number of studies (annex V method B.6 (skin sensitisation); Buehler method).

Results obtained from these studies indicate no obvious potential for the induction or elicitation of dermal sensitisation. Based on available data, the classification criteria are not met.

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
GUINEA PIG Equivalent or similar to EU Method B.6 (Skin Sensitisation)	not sensitising	Weight of evidence CAS 68476-33-5 Reliable with restriction	ARCO, Atlantic Richfield Company (1986)
GUINEA PIG Equivalent or similar to EU Method B.6 (Skin Sensitisation)	not sensitising	Weight of evidence CAS 68476-33-5 Reliable with restriction	ARCO, Atlantic Richfield Company (1988)

(e) Germ cell mutagenicity

The mutagenicity potential of Heavy Fuel Oil Components has been investigated in a large number of in vivo and in vitro studies. The majority of the studies showed no consistent evidence of mutagenic activity.

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

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
In vitro Ames Test S. typhimurium TA98	Positive >10000 µg/plate	Key Study CAS 64741-62-4 Reliable with restriction	API, American Petroleum Institute (1986)
In vivo Micronucleus assay (chromosome aberration) mouse (CD-1) male/female Oral: gavage 0, 188, 375, 750 or 1500 mg/kg/ bw/d (nominal conc.) Equivalent or similar to EU Method B.12	Negative Test results: Genotoxicity: negative (male/female); toxicity: no effects	Key Study CAS 64741-62-4 Reliable without restriction	Przygoda, R.T, McKee, R.H.,Amoroso, M.A. and Freeman JJ (1999)
Micronucleus assay (chromosome aberration) mouse (CD-1) male/female intraperitoneal 0, 188, 375, 750 or 1500 mg/kg/ bw/d (nominal conc.) 0, 750, 1500 or 3000 mg/kg/ bw/d	Negative Test results: Genotoxicity: negative (in both studies) (male/female); toxicity: no effects	Key Study CAS 64741-62-4 Reliable without restriction	Przygoda, R.T, McKee, R.H.,Amoroso, M.A. and Freeman JJ (1999)

(nominal conc.) Equivalent or similar to EU Method B.12			

(f) Carcinogenicity

Positive results obtained from several studies that, along with chemical (PAH) analysis, indicate that straight-run and cracked Heavy Fuel Oils Components are carcinogenic. Classification Carc. 1B, H350 (May cause cancer) is appropriate.

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
MOUSE 50 ul applied twice weekly to mouse skin over a lifetime No guidance available.	Strongly carcinogenic for the skin LOAEC: 1% (Clear, significant increase in histologically diagnosed malignant skin tumours following lifetime treatment) NOAEL: 0.1% (Modest, biologically questionable increase in the incidence of benign skin tumours)	Key Study CAS 64741-62-4 Reliable with restriction	API, American Petroleum Institute (1989)

(g) Reproductive toxicity

Effects on fertility:

Overall there were no adverse effects on reproductive parameters in either sex following repeated dermal application.

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

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
RAT 0, 0.1, 1, 10, 50, 250 mg/kg/ bw/d Dermal 6 h/d EPA OTS 798.4700 (Reproduction and fertility effects)	NOAEL: 50 mg/kg (Decreased body weight gain (male)) NOAEL: 250 mg/kg (No adverse effects on male reproductive organ weights, sperm/spermatic parameters or functional fertility at the highest dose tested (male))	Supporting study CAS 64741-62-4 Reliable without restriction	ARCO, Atlantic Richfield Company (1992)

Effects on fertility/Developmental toxicity:

Results of developmental toxicity testing indicate alterations in foetal and pup development, which sometimes occurred in the presence of maternal toxicity. Thus, classification of Heavy Fuel Components with Repr. 2, H361d (Suspected of damaging the unborn child) is considered appropriate.

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
RAT 0, 0.05, 1, 10, 50, 250 mg/kg mg/kg/ bw/d Dermal 6 h/d EPA OTS 798.4900 (Prenatal Developmental Toxicity Study)	NOAEL: 0.05 mg/kg (maternal toxicity, Decreased net body weight, decreased net body weight gain, decreased food consumption, vaginal discharge) NOAE:L 0.05 mg/kg (developmental toxicity, Decreased gravid uterine weight, increased resorptions,	Key Study CAS 64741-62-4 Reliable without restriction	Hoberman, AM, Christian, MS, Lovre, S, Roth, R and Koschier, F. (1995)

	decreased live litter size, decreased foetal weight)		
RAT 0, 50, 333, 1000 mg/kg bw/d Dermal 6 h/d	NOAEL: 333 mg/kg (maternal toxicity, Decreased body weight gain, increased length of gestation) NOAEL: 333 mg/kg (developmental toxicity, Decreased pup body weight on post-natal day 0 and post-natal day 4)	Key Study CAS 64741-45-3 Reliable with restriction	ARCO, Atlantic Richfield Company (1994)

(h) STOT-single exposure

Data not available.

(i) STOT-repeated exposure

Oral: In accordance with column 2 of REACH Annex VIII (8.6.1) and Annex VIII (8.6.2), repeated dose testing should be by an appropriate route. Results are available from repeated dose dermal testing which meet this requirement. No oral exposure is anticipated making testing via this route unnecessary

Dermal: The following effects were observed for cutaneous administration: changes in haematological and clinical chemistry parameters and organ weights were recorded after treatment with Heavy Fuel Oil Components. alterations in serum cholesterol and blood urea nitrogen were recorded following administration of higher dermal doses accompanied by red cell, platelet, liver and thymus effects at lower treatment levels. There is evidence to indicate that Heavy Fuel Oil Components have a potential to cause systemic alterations following repeated dermal exposure. Thus, classification STOT RE 2, H373 (May cause damage to organs through prolonged or repeated exposure) is appropriate.

Inhalation: In accordance with column 2 of REACH Annex VIII (8.6.1) and Annex VIII (8.6.2), repeated dose testing should be by an appropriate route. Results are available from repeated dose dermal testing which meet this requirement. The low vapour pressure of heavy fuel components makes testing via inhalation unnecessary.

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
RAT applied neat: 0, 1, 10, 50 mg/kg/ bw/d applied diluted in acetone: 0, 0.01, 0.1, 1, 10, 50 mg/kg/ bw/d occluded contact 6 h, 5 d/wk for 4 wk (daily)	NOAEL systemic toxicity (applied neat): 10 mg/kg bw/day (male) (Decreased body weight, decreased haematological parameters, clinical chemistry effects, organ weight changes) NOAEL: systemic toxicity (applied neat): 1 mg/kg bw/day (female) (Increased serum potassium, increased relative liver weight) LOAEL: local effects (applied neat): 1mg/kg bw/day (male/female) (Sporadic very slight erythema, eschar and dry skin) NOAEL: systemic toxicity (applied in acetone): 1mg/kg bw/day (male) (Decreased haematological parameters, increased relative liver weight) NOAEL: systemic toxicity (applied in acetone): 1mg/kg bw/day (female) (Increased relative liver weight)	Key Study CAS 64741-62-4 Reliable with restriction	ARCO, Atlantic Richfield Company (1993)

	LOAEL: local effects (applied in acetone): 0,01mg/kg bw/day (male/female) (e Sporadic very slight erythema, eschar and dry skin)		

(j) Aspiration hazard

There is no further information.

Other Information

The substance has moderate potential to cause photoirritation.

SECTION 12: ECOLOGICAL INFORMATION

On the basis of ecological information below and on the basis of the criteria set by the regulations on hazardous substances, fuel oil is dangerous for the environment: Aquatic Chronic 1, H410 (Very toxic to aquatic life with long lasting effects).

12.1 Toxicity

The following is a summary of the more representative study of the registration dossier.

Method	Results	Remarks	Reference
Aquatic Toxicity			
Short-term Invertebrates Daphnia magna OECD Guideline 202	EL50 48h: 0.22 mg/l	Key Study CAS 64741-61-3 Reliable without restriction	EMBSI (2012a)
Long-term Invertebrates Daphnia magna QSAR modeled data	NOAEL 21d: 0.27 mg/l	Key Study Heavy Fuel Oil Reliable with restriction	Redman et al. (2010b)
Algae Growth Inhibition OECD Guideline 201	ErL50 72h: 0.32 mg/l NOEL 0.05 m/l	Supporting Study CAS 64741-61-3 Reliable without restriction	EMBSI (2012b)
Short-term Fish Pimephales promelas OECD Guideline 203	LL50 96h: 79 mg/l	Key Study CAS 68476-33-5 Reliable without restriction	EMBSI (2008b)
Long-term Fish QSAR modeled data	NOEL 28d: 0.1 mg/l	Key Study Heavy Fuel Oil Reliable with restriction	Redman et al. (2010b)
Tetrahymena pyriformis QSAR modeled data	LL50 72h >1000 mg/l NOEL: 14.91 mg/l	Key Study Heavy Fuel Oil Reliable with restriction	Redman et al. (2010b)
Terrestrial compartment			
Birds Long term/oral/22 weeks	NOAEL: 20.000 mg/kg	Key Study Reliable with restriction	Stubblefield et al. (1995)

Anas platyrhynchos OECD Guideline 206			

12.2 Persistence and degradability

Abiotic degradation

Hydrolisis: the available data and available weight of evidence demonstrate that heavy fuel oils are resistant to hydrolysis because they lack a functional group that is hydrolytically reactive. Therefore, this fate process will not contribute to a measurable degradative loss of these substances from the environment

Photolysis in air: substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substance and are not appropriate for this complex substance.

Photolysis in water and soil: this substance contains hydrocarbon molecules that absorb UV light below 290 nm, a range of UV light that does not reach the earth's surface due to the stratospheric ozone layer. Therefore, this substance does not have the potential to undergo photolysis in water and soil, and this fate process will not contribute to a measurable degradative loss of this substance from the environment.

Biotic degradation:

Water/sediments/soil: substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substance and are not appropriate for this complex substance

12.3 Bioaccumulative potential

Substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.

12.4 Mobility in soil

Partition coefficient Koc: Substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.

12.5 Results of PBT and vPvB assessment

Comparison with the criteria in Annex XIII of REACH

Persistence Assessment: An evaluation of representative hydrocarbon structures indicate some structures meet the Persistent (P) or very Persistent (vP) criteria.

Bioaccumulation Assessment: An evaluation of representative hydrocarbon structures indicate NO structures meet the very Bioaccumulative (vB) criterion but some structures meet the Bioaccumulative (B) criterion.

Toxicity Assessment: For representative hydrocarbons structures that were found to meet the P and B criteria, a toxicity evaluation was performed. No structures relevant to petroleum substances were found to meet the toxicity criterion except anthracene which has been confirmed as a PBT substance. Anthracene is not present in this substance at greater than 0.1%, therefore, this substance is not considered a PBT/vPvB.

12.6 Other adverse effects

No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Do not dispose the product, either new or used, by discharging into sewers, tunnels, lakes or water courses.

Dispose wastes and contaminated packaging according to local regulations.

European Waste Catalogue code(s) (Decision 2001/118/CE): 13 07 01*. These codes can be given only as a suggestion, according to the original composition of the product, and its intended (foreseeable) use(s).

The final user (producer of the waste) has the responsibility for the attribution of the most suitable code, according to the actual use(s) of the material, contaminations or alterations. The product does not contain halogenated compounds.

Disposal of emptied containers: do not dispose the containers in the environment. Dispose in accordance with local regulations.

Do not cut, weld, bore, burn or incinerate emptied containers, unless they have been cleaned and declared safe.

SECTION 14: TRANSPORT INFORMATION

CASE A – PRODUCT LOADED OR SHIPPED AT A TEMPERATURE GREATER THAN THE FLASH POINT:

14.1 UN number

UN 3256

14.2 UN proper shipping name

Italian:	LIQUIDO TRASPORTATO A CALDO, INFIAMMABILE, N.A.S. (olio combustibile)
English:	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.(heating oil)

14.3 Transport hazard class(es)

Road transport (ADR):	Class: 3 Subsidiary risks: -
Railway transport (RID):	Class: 3 Subsidiary risks: -
Inland waterways transport (ADN):	Class: 3 Subsidiary risks: N1, N2, N3, CMR, F o S
Sea transport (IMDG):	Class: 3 Subsidiary risks: -
Air transport (IATA):	Class: 3 Subsidiary risks: -

14.4 Packing group

PG: III

14.5 Environmental hazards

Road transport (ADR):	Dangerous for the environment
Railway transport (RID):	Dangerous for the environment
Inland waterways transport (ADN):	Dangerous for the environment

Sea transport (IMDG):	Marine Pollutant (P)
Air transport (IATA):	Dangerous for the environment

14.6 Special precautions for user

Transportation, including loading and unloading, must be performed by personnel who have received the necessary training required by the relevant modal regulations concerning the transport of dangerous goods.
During loading and unloading apply safety measures required by section 7.1 and individual protection measures required by section 8.2.2 of this SDS.
Road tanker/rail car loading: Ensure that the transfer of material takes place under conditions of containment or extraction ventilation.
Loading or unloading to and from boats/barges: Transfer through closed lines. Do not perform activities that involve the possibility of exposure for a period longer than 4 hours. Drain the transfer lines before decoupling. Keep drains in sealed containers awaiting the subsequent disposal or recycling.

General additional information

Mark and labeling:	WARNING LABEL N. 3 + MARK OF ENVIRONMENTAL HAZARD (+ MARK OF HOT GOOD if the transportation temperature is higher than 100 °C)

Additional information on raod transport (ADR)

Tunnel restriction code:	(D/E)
Hazard Identification Number (tank):	30
High Consequence Dangerous Goods (HCDG):	NO

Additional information on railway transport (RID)

Hazard Identification Number (tank):	30
High Consequence Dangerous Goods (HCDG):	NO

Additional information on internal waterways transport (ADN)

Hazard Identification Number (tank):	30
High Consequence Dangerous Goods (HCDG):	NO

Additional information on sea transport (IMDG)

Emergency measures on board:	EmS F-E, S-D

Additional information on air transport (IATA)
Emergency measures in case of aircraft accidents: ERG Code 3L

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

Not applicable (refer to Annex I of MARPOL Convention).

CASE B – PRODUCT LOADED OR SHIPPED AT A TEMPERATURE LOWER THAN THE FLASH POINT BUT GREATER THAN 100°C:

14.1 UN number

UN 3257

14.2 UN proper shipping name

Italian: LIQUIDO TRASPORTATO A CALDO, N.A.S. (olio combustibile)
English: ELEVATED TEMPERATURE LIQUID, N.O.S.(heating oil)

14.3 Transport hazard class(es)

Road transport (ADR):
Class: 9
Subsidiary risks: -

Railway transport (RID):
Class: 9
Subsidiary risks: -

Inland waterways transport (ADN):
Class: 9
Subsidiary risks: N1, N2, N3, CMR, F o S

Sea transport (IMDG):
Class: 9
Subsidiary risks: -

Air transport (IATA):
Class: 9
Subsidiary risks: -

14.4 Packing group

PG: III

14.5 Environmental hazards

Road transport (ADR): Dangerous for the environment

Railway transport (RID): Dangerous for the environment

Inland waterways transport (ADN): Dangerous for the environment

Sea transport (IMDG): Marine Pollutant (P)

Air transport (IATA): Dangerous for the environment

14.6 Special precautions for user

Transportation, including loading and unloading, must be performed by personnel who have received the necessary training required by the relevant modal regulations concerning the transport of dangerous goods.
During loading and unloading apply safety measures required by section 7.1 and individual protection measures required by section 8.2.2 of this SDS.
Road tanker/rail car loading: Ensure that the transfer of material takes place under conditions of containment or extraction ventilation.
Loading or unloading to and from boats/barges: Transfer through closed lines. Do not perform activities that involve the possibility of exposure for a period longer than 4 hours. Drain the transfer lines before decoupling. Keep drains in sealed containers awaiting the subsequent disposal or recycling.

General additional information
Mark and labeling: WARNING LABEL N. 9 + MARK OF ENVIRONMENTAL HAZARD + MARK OF HOT GOOD

Additional information on raod transport (ADR)

Tunnel restriction code: (D)
Hazard Identification Number (tank): 99
High Consequence Dangerous Goods (HCDG): NO

Additional information on railway transport (RID)
Hazard Identification Number (tank): 99
High Consequence Dangerous Goods (HCDG): NO

Additional information on internal waterways transport (ADN)
Hazard Identification Number (tank): 99
High Consequence Dangerous Goods (HCDG): NO

Additional information on sea transport (IMDG)
Emergency measures on board: EmS F-A, S-P

Additional information on air transport (IATA)
Emergency measures in case of aircraft accidents: ERG Code 9L

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

Not applicable (refer to Annex I of MARPOL Convention).

CASE C – PRODUCT LOADED OR SHIPPED AT A TEMPERATURE LOWER THAN THE FLASH POINT AND LOWER THAN 100°C:

14.1 UN number

UN 3082

14.2 UN proper shipping name

Italian: MATERIA PERICOLOSA PER L'AMBIENTE, LIQUIDA, N.A.S. (olio combustibile)
English: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.(heating oil)

14.3 Transport hazard class(es)

Road transport (ADR):
Class: 9
Subsidiary risks: -

Railway transport (RID):
Class: 9
Subsidiary risks: -

Inland waterways transport (ADN):
Class: 9
Subsidiary risks: N1, N2, CMR, F o S

Sea transport (IMDG):
Class: 9
Subsidiary risks: -

Air transport (IATA):
Class: 9
Subsidiary risks: -

14.4 Packing group

PG: III

14.5 Environmental hazards

Road transport (ADR):	Dangerous for the environment
Railway transport (RID):	Dangerous for the environment
Inland waterways transport (ADN):	Dangerous for the environment
Sea transport (IMDG):	Marine Pollutant (P)
Air transport (IATA):	Dangerous for the environment

14.6 Special precautions for user

Transportation, including loading and unloading, must be performed by personnel who have received the necessary training required by the relevant modal regulations concerning the transport of dangerous goods.
During loading and unloading apply safety measures required by section 7.1 and individual protection measures required by section 8.2.2 of this SDS.
Road tanker/rail car loading: Ensure that the transfer of material takes place under conditions of containment or extraction ventilation.
Loading or unloading to and from boats/barges: Transfer through closed lines. Do not perform activities that involve the possibility of exposure for a period longer than 4 hours. Drain the transfer lines before decoupling. Keep drains in sealed containers awaiting the subsequent disposal or recycling.

General additional information
Mark and labeling: WARNING LABEL N. 9 + MARK OF ENVIRONMENTAL HAZARD

Additional information on raod transport (ADR)
Tunnel restriction code: (--)
Hazard Identification Number (tank): 90
High Consequence Dangerous Goods (HCDG): NO

Additional information on railway transport (RID)
Hazard Identification Number (tank): 90
High Consequence Dangerous Goods (HCDG): NO

Additional information on internal waterways transport (ADN)
Hazard Identification Number (tank): 90
High Consequence Dangerous Goods (HCDG): NO

Additional information on sea transport (IMDG)
Emergency measures on board: EmS F-A, S-F

Additional information on air transport (IATA)
Emergency measures in case of aircraft accidents: ERG Code 9L

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

Not applicable (refer to Annex I of MARPOL Convention).

SECTION 15: REGULATORY INFORMATION

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

Authorisations according to REACH Regulation (Title VII):
Product not subject to authorisation.

Restrictions according to REACH Regulation (Title VIII):
Product subject to restrictions: entry 3 (dangerous liquid substances/mixtures), Appendix 2 - entry 28 (substances classified as carcinogen category 1B)

Other European Regulation and National Legislation

- Directive 2012/18/UE and italian D. Lgs. 105/2015, on the control of major-accident hazards involving dangerous substances.
  Seveso category:
  Annex 1, part 1: category E1- hazardous to the aquatic environment in Category Acute 1 or Chronic 1
  Annex 1 part 2: category 34- Petroleum products and alternative fuels

- Directive 98/24/EC and Italian D. Lgs. 81/2008 e s.m.i., on the protection of the health and safety of workers from the risks related to chemical agents at work

- Italian D. Lgs. 152/2006 e s.m.i., on waste disposal

15.2 Chemical safety assessment

Chemical safety assessment has been carried out for components of the mixture.

SECTION 16: OTHER INFORMATION

Revision Index:

First issue date: 01/12/2010

Revision Number: 01
Revision Date: 20/05/2016
Grounds for review: Deletion of classification according to Directive 67/548/CEE and related references
Addition of new precautionary statement P210 and P273
Deletion of Note H
Section 8 updated
Section 12 updated
Section 14 updated
Section 15, subsection 15.1 updated
Exposure scenarios updated
Exposure scenario deleted: Uses in Coatings

Revision Number: 02
Revision Date: 15/05/2017
Grounds for review: Section 14.6, Case C (tunnel restriction)

Revision Number: 03

Revision Date: 27/10/2017
Grounds for review: Section 1.2 updated

Revision Number: 04
Revision Date: 15/02/2018
Grounds for review: Section 14 updated

Revision Number: 05
Revision Date: 29/07/2019
Grounds for review: Section 1 updated
Section 8 updated
Section 11 updated
Exposure scenarios updated

Legend to abbreviations and acronyms

ACGIH	=	American Conference of Governmental Industrial Hygienists
API	=	American Petroleum Institute
CSR	=	Chemical Safety Report
DNEL=	Derived No Effect Level	
DMEL	=	Derived Minimum Effect Level
EC50	=	Effective Concentration, 50%
EL50	=	Effective Load, 50%
Klimisch	=	Criterion for the evaluation of the method reliability
LC50	=	Lethal Concentration, 50%
LD50	=	Lethal Dose, 50%
LL50	=	Lethal Load, 50%
NOAEC	=	No Observed Adverse Effect Concentration
NOAEL	=	No Observed Adverse Effect Level
NOEL	=	No Observed Effect Level
OECD	=	Organisation for Economic Co-operation and Development
PNEC	=	Predicted No Effect Concentration
PBT	=	Persistent, Bioaccumulative and Toxic
STOT	=	Tossicità specifica per organi bersaglio
(STOT) RE	=	Specific target organ toxicity — repeated exposure
(STOT) SE	=	Specific target organ toxicity — single exposure
TLV®TWA	=	Threshold Limit Value – time-weighted average
TLV®STEL	=	Threshold Limit Value – short-term exposure limit
UVCB	=	Unknown or Variable composition, Complex reaction products or Biological materials
vPvB	=	very Persistent and very Bioaccumulative
P	=	Persistent
vP	=	very Persistent
B	=	Bioaccumulative
vB	=	very Bioaccumulative

Key literature references and sources for data

Registration Dossier.
CRS 2016
CRS 2017
CSR 2018

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008
Experimental data.

Full text of appropriate statements

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
H400:	Very toxic to aquatic life
H410:	Very toxic to aquatic life with long lasting effects
EU H066:	Repeated exposure may cause skin dryness or cracking

Hazard Classes

Acute Tox. 4:	Acute toxicity, Category 4
Carc. 1B:	Carcinogenicity, Category 1B
Repr. 2:	Reproductive toxicity, Category 2
STOT RE 2:	Specific target organ toxicity — repeated exposure, Category 2
Aquatic Chronic 1:	Hazardous to the aquatic environment, Category 1
Aquatic Acute 1:	Hazardous to the aquatic environment, Category 1

Advice on workers training
Properly traine workers potentially exposed to this substance on the basis of the contents of this safety data sheet

To the best of our knowledge, the information contained herein is accurate. This information is intended to describe the product for the purposes of health, safety and environmental requirements only and it should not therefore be construed as guaranteeing any specific property of the product. The information and recommendations are offered for the user's consideration and examination. It is the user's responsibility to satisfy itself that the product is suitable for the intended use. Uses not listed in this document are not recommended unless an assessment is completed.

ANNEX 1

EXPOSURE SCENARIOS

INDEX

- **FUEL OIL**

Identified use name	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (spERC)
1. Distribution of substance	Industrial	n.a.	n.a.	1, 2, 3, 8a, 8b, 15	4, 5, 6a, 6b, 6c, 6d, 7	ESVOC SpERC 1.1b.v1
2. Formulation & (re)packing of substances and mixtures	Formulation	n.a.	n.a.	1, 2, 3, 8a, 8b, 15	2	ESVOC SpERC 2.2.v1
3. Use as a fuel	Industrial	n.a.	n.a.	1, 2, 3, 8a, 8b, 16	7	ESVOC SpERC 7.12a.v1
4. Use as a fuel	Professional	n.a.	n.a.	1, 2, 3, 8a, 8b, 16	9a, 9b	ESVOC SpERC 9.12b.v1

1. Distribution of substance – Industrial Sector

Section 1 Exposure Scenario	
Title	
Distribution of substance	
Use Descriptor	
Sector(s) of Use	NA
Process Categories	1, 2, 3, 8a, 8b, 15
Environmental Release Categories	4, 5, 6a, 6b, 6c, 6d, 7
Specific Environmental Release Category	ESVOC SpERC 1.1b v1
Processes, tasks, activities covered	
Bulk 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, and associated laboratory activities. Excludes emissions during transport.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour Pressure (kPa)	Liquid, vapour pressure <0.5 kPa at STP. OC3.
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) G13
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) G2
Other Operational Conditions Affecting Exposure	Assumes use at not more than 20°C above ambient temperatures, unless stated differently. G15. Assumes a good basic standard of occupational hygiene is implemented G1
Contributing Scenarios	**Specific Risk Management Measures and Operating Conditions**
General measures (carcinogens) G18	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 scenarios; clear up spills immediately and dispose of wastes 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. G20
CS2 Process sampling. + OC9 Outdoor	Sample via a closed loop or other system to avoid exposure E8. Avoid carrying out activities involving exposure for more than 15 minutes OC26. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS15 General exposures (closed systems).	Handle substance within a closed system E47. Avoid carrying out activities involving exposure for more than 4 hours OC28. Sample via a closed loop or other system to avoid exposure E8. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS85 Bulk product storage.	Store substance within a closed system E84. Avoid carrying out activities involving exposure for more than 4 hours OC28. Wear chemically resistant gloves(tested to EN374) in combination with 'basic' employee training PPE16.
CS137 Product sampling	Sample via a closed loop or other system to avoid exposure E8. Avoid carrying out activities involving exposure for more than 15 minutes OC26. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS36 Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure E12. Wear suitable gloves tested to EN374 PPE15.
CS510_Marine vessel/barge (un)loading	Avoid carrying out activities involving exposure for more than 4 hours OC28. Transfer via enclosed lines E52. Clear transfer lines prior to de-coupling E39. Retain drain downs in sealed

	storage pending disposal or for subsequent recycle ENVT4. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS511 Road tanker/Railcar loading	Ensure material transfers are under containment or extract ventilation E66. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS39 Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance E55. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training PPE17. Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4.
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0,1
Regional use tonnage (tonnes/year)	9.3e+06
Fraction of Regional tonnage used locally	2.0e-03
Annual site tonnage (tonnes/year)	1.9e+04
Maximum daily site tonnage (kg/day)	6.2e+04
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	1.0e-3
Release fraction to wastewater from process (initial release prior to RMM)	1.0e-6
Release fraction to soil from process (initial release prior to RMM)	0.00001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by humans via indirect exposure [TCR1j]. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9]	
Treat air emission to provide a typical removal efficiency of (%)	90
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater [STP1].	
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 (M_{safe}) based on release following total wastewater treatment removal (kg/d)	8.9e+04
Assumed domestic sewage treatment plant flow (m3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.[ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Section 3 Exposure Estimation	
3.1 Health	
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. G21.	

3.2 Environment
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 4 Guidance to check compliance with the Exposure Scenario
4.1 Health
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. G22. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. G23. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. G33. Available hazard data do not support the need for a DNEL to be established for other health effects. G36. Risk Management Measures are based on qualitative risk characterisation. G37.
4.2 Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	7e-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	1.3e-02

2. Formulation & (re)packing of substances and mixtures – Industrial Sector

Section 1 Exposure Scenario	
Title	
Formulation & (re)packing of substances and mixtures	
Use Descriptor	
Sector(s) of Use	NA
Process Categories	1, 2, 3, 8a, 8b, 15
Environmental Release Categories	2
Specific Environmental Release Category	ESVOC SpERC 2.2 v1
Processes, tasks, activities covered	
Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tablettting, compression, pelletization, extrusion, large and small scale packing, maintenance, sampling and associated laboratory activities.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour Pressure (kPa)	Liquid, vapour pressure <0.5 kPa at STP. OC3.
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) G13
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) G2
Other Operational Conditions Affecting Exposure	Assumes use at not more than 20°C above ambient temperatures, unless stated differently. G15. Assumes a good basic standard of occupational hygiene is implemented G1
Contributing Scenarios	**Specific Risk Management Measures and Operating Conditions**
General measures (carcinogens) G18	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 scenarios; clear up spills immediately and dispose of wastes 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. G20
CS15 General exposures (closed systems). + CS2 Process sampling.	Handle substance within a closed system E47. Sample via a closed loop or other system to avoid exposure E8. Avoid carrying out activities involving exposure for more than 15 minutes OC26. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS15 General exposures (closed systems).	Handle substance within a closed system E47. Avoid carrying out activities involving exposure for more than 4 hours OC28. Sample via a closed loop or other system to avoid exposure E8. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS85 Bulk product storage.	Store substance within a closed system E84. Avoid carrying out activities involving exposure for more than 4 hours OC28. Wear chemically resistant gloves(tested to EN374) in combination with 'basic' employee training PPE16.
CS137 Product sampling	Sample via a closed loop or other system to avoid exposure E8. Avoid carrying out activities involving exposure for more than 15 minutes OC26. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS36 Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure E12. Wear suitable gloves tested to EN374 PPE15.
CS510_Marine vessel/barge	Avoid carrying out activities involving exposure for more than 4 hours OC28. Transfer via

(un)loading	enclosed lines E52. Clear transfer lines prior to de-coupling E39. Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS511 Road tanker/Railcar loading	Ensure material transfers are under containment or extract ventilation E66. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS8 Drum/batch transfers	Ensure material transfers are under containment or extract ventilation E66. Provide a general ventilation (not less than 3 to 5 air changes per hour) E11, or G9; Ensure operation is undertaken outdoors. E69. Avoid carrying out activities involving exposure for more than 1 hour OC27. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS39 Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance E55. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training PPE17. Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4.

Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	7.5e6
Fraction of Regional tonnage used locally	4e-3
Annual site tonnage (tonnes/year)	3.0e4
Maximum daily site tonnage (kg/day)	1.0e5
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	2.5e-3
Release fraction to wastewater from process (initial release prior to RMM)	9.5e-6
Release fraction to soil from process (initial release prior to RMM)	0.0001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion). [TCR1j] Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9].	
Treat air emission to provide a typical removal efficiency of (%)	0.0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	60.9
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater [STP1].	
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 (M_{safe}) based on release following total wastewater treatment removal (kg/d)	1.1e5
Assumed domestic sewage treatment plant flow (m3/d)	2000

Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.[ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Section 3 Exposure Estimation	
3.1 Health	
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. G21.	
3.2 Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].	
Section 4 Guidance to check compliance with the Exposure Scenario	
4.1 Health	
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. G22. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. G23. A Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. G33. Available hazard data do not support the need for a DNEL to be established for other health effects. G36. Risk Management Measures are based on qualitative risk characterisation. G37.	
4.2 Environment	
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].	
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	7E-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	1.5E-01

3. Use as a fuel – Industrial Sector

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	NA
Process Categories	1, 2, 3, 8a, 8b, 16
Environmental Release Categories	7
Specific Environmental Release Category	ESVOC SpERC 7.12a.v1
Processes, tasks, activities covered	
Covers the use as a fuel or in fuels (or fuel additives and additive components) and includes activities associated with its transfer, use, equipment maintenance and handling of waste..	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour Pressure (kPa)	Liquid, vapour pressure <0.5 kPa at STP. OC3.
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) G13
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) G2
Other Operational Conditions Affecting Exposure	Assumes use at not more than 20°C above ambient temperatures, unless stated differently. G15. Assumes a good basic standard of occupational hygiene is implemented G1
Contributing Scenarios	**Specific Risk Management Measures and Operating Conditions**
General measures (carcinogens) G18	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 scenarios; clear up spills immediately and dispose of wastes 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. G20
CS15 General exposures (closed systems).	Handle substance within a closed system E47. Avoid carrying out activities involving exposure for more than 4 hours OC28. Sample via a closed loop or other system to avoid exposure E8. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS15 General exposures (closed systems). + CS137 Product sampling.	Handle substance within a closed system E47. Sample via a closed loop or other system to avoid exposure E8. Avoid carrying out activities involving exposure for more than 1 hour OC27. Provide a good standard of controlled ventilation (10 to 15 air changes per hour) E40. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS502 Bulk closed unloading + OC9 Outdoor	Transfer via enclosed lines E52. Avoid carrying out activities involving exposure for more than 4 hours OC28. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS8 Drum/batch transfers	Ensure material transfers are under containment or extract ventilation E66. , or (G9): Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) E11. Avoid carrying out activities involving exposure for more than 1 hour OC27. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS 117 Operation of solids filtering	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) E11.

equipment	Avoid carrying out activities involving exposure for more than 4 hours OC28. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS85 Bulk product storage.	Store substance within a closed system E84. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) E11. Avoid carrying out activities involving exposure for more than 4 hours OC28. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
GEST_12I Use as a fuel. CS 107 (closed system)	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS39 Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance E55. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training PPE17. Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4.

Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	5.9e+06
Fraction of Regional tonnage used locally	2.6e-01
Annual site tonnage (tonnes/year)	1.5e-06
Maximum daily site tonnage (kg/day)	5e+06
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	2e-04
Release fraction to wastewater from process (initial release prior to RMM)	1.9e-05
Release fraction to soil from process (initial release prior to RMM)	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion) [TCR1j] If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9].	
Treat air emission to provide a typical removal efficiency of (%)	95
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	61.1
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater [STP1].	
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 (M_{Safe}) based on release following total wastewater treatment removal (kg/d)	7.2e+06
Assumed domestic sewage treatment plant flow (m3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls [ETW1]. Combustion emissions considered in regional exposure assessment [ETW2]. External treatment and disposal of waste should comply with applicable local and/or national	

regulations.[ETW3]
Conditions and measures related to external recovery of waste
This substance is consumed during use and no waste of the substance is generated. [ERW3]
Section 3 Exposure Estimation
3.1 Health
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. G21.
3.2 Environment
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 4 Guidance to check compliance with the Exposure Scenario
4.1 Health
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. G22. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. G23. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. G33. Available hazard data do not support the need for a DNEL to be established for other health effects. G36. Risk Management Measures are based on qualitative risk characterisation. G37.
4.2 Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Maximum Risk Characterisation Ratio for Air Emissions RCRair	6.9E-00
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	1.5E-01

4. Use as a fuel – Professional Sector

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	NA
Process Categories	1, 2, 3, 8a, 8b, 16
Environmental Release Categories	9a, 9b
Specific Environmental Release Category	ESVOC SpERC 9.12b.v1
Processes, tasks, activities covered	
Covers the use as a fuel or in fuels (or fuel additives and additive components) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour Pressure (kPa)	Liquid, vapour pressure <0.5 kPa at STP. OC3.
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) G13
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) G2
Other Operational Conditions Affecting Exposure	Assumes use at not more than 20°C above ambient temperatures, unless stated differently. G15. Assumes a good basic standard of occupational hygiene is implemented G1
Contributing Scenarios	**Specific Risk Management Measures and Operating Conditions**
General measures (carcinogens) G18	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 scenarios; clear up spills immediately and dispose of wastes 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. G20
CS15 General exposures (closed systems). + CS137 Product sampling.	Handle substance within a closed system E47. Sample via a closed loop or other system to avoid exposure E8. Avoid carrying out activities involving exposure for more than 1 hour OC27. Provide a good standard of controlled ventilation (10 to 15 air changes per hour) E40. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS15 General exposures (closed systems).	Handle substance within a closed system E47. Sample via a closed loop or other system to avoid exposure E8. Avoid carrying out activities involving exposure for more than 1 hour OC27. Provide a good standard of controlled ventilation (10 to 15 air changes per hour) E40. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS502 Bulk closed unloading	Provide a good standard of controlled ventilation (10 to 15 air changes per hour) E40. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16. Avoid carrying out activities involving exposure for more than 1 hour OC27. , or G9: Ensure material transfers are under containment or extract ventilation E66.
CS8 Drum/batch transfers	Provide a good standard of controlled ventilation (10 to 15 air changes per hour) E40. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16. Avoid carrying out activities involving exposure for more than 1 hour OC27. , or G9: Ensure

	material transfers are under containment or extract ventilation E66.
CS507 Refuelling	Ensure material transfers are under containment or extract ventilation E66. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16. Avoid carrying out activities involving exposure for more than 1 hour OC27.
GEST_12I Use as a fuel. CS 107 (closed system)	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS39 Equipment cleaning and maintenance	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) E11. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training PPE17. Drain down system prior to equipment break-in or maintenance E65. Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4. Clear spills immediately C&H13.

Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	1.7e+06
Fraction of Regional tonnage used locally	5.0e-04
Annual site tonnage (tonnes/year)	8.5e+02
Maximum daily site tonnage (kg/day)	2.3e+03
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional use only) [OOC7]	1.0e-4
Release fraction to wastewater wide dispersive use [OOC8]	7e-10
Release fraction to soil from wide dispersive use (regional use only) [OOC9]	0.00001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by humans via indirect exposure [TCR1j]. No wastewater treatment required [TCR6].	
Treat air emission to provide a typical removal efficiency of (%)	N/A
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	0.0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater [STP1].	
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 (M_{Safe}) based on release following total wastewater treatment removal (kg/d)	3.8e+03
Assumed domestic sewage treatment plant flow (m3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls [ETW1]. Combustion emissions considered in regional exposure assessment [ETW2]. External treatment and disposal of waste should comply with applicable local and/or national	

regulations.[ETW3]
Conditions and measures related to external recovery of waste
This substance is consumed during use and no waste of the substance is generated. [ERW3]
Section 3 Exposure Estimation
3.1 Health
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. G21.
3.2 Environment
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 4 Guidance to check compliance with the Exposure Scenario
4.1 Health
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. G22. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. G23. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. G33. Available hazard data do not support the need for a DNEL to be established for other health effects. G36. Risk Management Measures are based on qualitative risk characterisation. G37.
4.2 Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Maximum Risk Characterisation Ratio for Air Emissions RCRair	5.6E-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	3.2E-03