SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

SDS # : 30236

MARINE FUELS

Date of the previous version: 2014-03-20 **Revision Date:** 2015-01-15 **Version** 2.06

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

1.1. Product identifier

Product name **MARINE FUELS**
Other names MARINE RESIDUAL FUELS - IFO, Fuel from 30cst to 700 cst, Fuel HS, Fuel LS
Substance/mixture Mixture

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

Identified uses Fuel used in marine applications : diesel engines and boilers.

1.3. Details of the supplier of the safety data sheet

Supplier

TOTAL Marine Fuels Pte Ltd
250 North Bridge Road
#37-02 Raffles City Tower
Singapore 179101
Tel: +65 6849 5266
Fax: +65 6337 9483

For further information, please contact:

Contact Point HSE
E-mail Address rm.mkefr-fds@total.com

1.4. Emergency telephone number

In France : - PARIS : Hôpital Fernand Widal 200, rue du Faubourg Saint-Denis 75475 Paris Cédex 10 , Tel : 01.40.05.48.48. - MARSEILLE : Hopital Salvator, 249 bd Ste Marguerite 13274 Marseille cedex 5, Tel : 04.91.75.25.25. - LYON : Hopital Edouard Herriot, 5 place d'Arsonvol, 69437 Lyon cedex 3, Tel : 04.72.11.69.11. - NANCY : Hopital central, 29 Av du Mal De Lattre de Tassigny, 54000 Nancy, Tel : 03.83.32.36.36 ou le SAMU : Tel (15)

Section 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008
For the full text of the H-Statements mentioned in this Section, see Section 2.2.

Acute inhalation toxicity - vapor - Category 4 - H332
Carcinogenicity - Category 1B - H350
Reproductive toxicity - Category 2 - H361d
Specific target organ systemic toxicity (repeated exposure) - Category 2 - H373

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Acute aquatic toxicity - Category 1 - H400
Chronic aquatic toxicity - Category 1 - H410

DIRECTIVE 67/548/EEC or 1999/45/EC
For the full text of the R-phrases mentioned in this Section, see Section 16

Classification
Carc. cat. 2;R45 - Repr. cat. 3;R63 - Xn;R20 - Xn;R48/21 - R66 - N;R50-53

2.2. Label elements

Labelled according to REGULATION (EC) No 1272/2008

Signal Word
DANGER

Hazard Statements
H350 - May cause cancer
H332 - Harmful if inhaled
H361d - Suspected of damaging the unborn child
H373 - May cause damage to organs through prolonged or repeated exposure in contact with skin
H410 - Very toxic to aquatic life with long lasting effects

Precautionary Statements
P201 - Obtain special instructions before use
P260 - Do not breathe dust or mist
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P331 - Do NOT induce vomiting
P501 - Dispose of contents/ container to an approved incineration plant.
P273 - Avoid release to the environment

Supplemental Hazard Statements
EUH066 - Repeated exposure may cause skin dryness or cracking

Contains Fuel oil, residual

2.3. Other hazards

Physical-Chemical Properties In the presence of hot spots, there is a special risk of fire or explosion under certain conditions involving accidental release of vapor or leaks of product under pressure.

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Properties Affecting Health

Contact with hot product will cause thermal burns.
Vapors or mists are irritating for mucous membranes, notably in the eyes.
Hydrogen sulphide can accumulate in the head space of storage tanks containing this product and can reach potentially hazardous concentrations.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixture

Chemical nature

A complex and variable combination of paraffinic, cyclic and aromatic hydrocarbons having a carbon number range predominantly of C15 to C50 and boiling in the range of approximately 150°C to 750°C. They may contain sulphurated derivatives and organic acids. This product contains polycyclic aromatic hydrocarbons (PAH), some of which are considered carcinogens.

Chemical Name	EC-No	REACH registration No	CAS-No	Weight %	Classification (Dir. 67/548)	Classification (Reg. 1272/2008)
Fuel oil, residual	270-675-6	01-2119474894-22	68476-33-5	> 99	Xn;R20-48/21 Carc.cat.2;R45 Repr.Cat.3;R63 N;R50-53 R66	Carc. 1B (H350) Repr. 2 (H361d) Acute Tox. 4 (H332) STOT RE 2 (H373) Aquatic Acute 1 (H400) Aquatic chronic 1 (H410)

Additional information

Hydrogen sulphide can accumulate in the head space of storage tanks containing this product and can reach potentially hazardous concentrations
Contains multi-purposes additives to boost performance

For the full text of the R-phrases mentioned in this Section, see Section 16.
For the full text of the H-Statements mentioned in this Section, see Section 16.

Section 4: FIRST AID MEASURES

4.1. Description of first-aid measures

General advice

IN CASE OF SERIOUS OR PERSISTENT CONDITIONS, CALL A DOCTOR OR EMERGENCY MEDICAL CARE.
If there is any suspicion of inhalation of H2S. Rescuers must wear breathing apparatus, belt and safety rope, and follow rescue procedures.

Eye contact

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If irritation, blurred vision or swelling occurs and persists. Obtain medical advice from a specialist.
In case of contact with the hot product, COOL THE EYE IMMEDIATELY AND COPIOUSLY WITH COLD WATER for 10 minutes, keeping the eye open if possible. Take the person to a specialised medical centre.

Skin contact	Immediately remove all stained or splashed clothing that is not adhering to the skin. Remove as much as possible by wiping. If necessary, use a fatty substance of animal or vegetable origin. Never use gasoline, kerosene or other solvents for washing of contaminated skin. Wash affected area with soap and water. Seek medical attention if skin irritation, swelling or redness develops and persists. When using high-pressure equipment, injection of product can occur. If high-pressure injuries occur, immediately seek professional medical attention. For minor thermal burns. Hold the burned area under cold running water for at least five minutes, or until the pain subsides. Do not puncture blisters. DO NOT attempt to remove portions of clothing glued to burnt skin but cut round them. Seek medical attention in all cases of serious burns. In this case, the casualty should be sent immediately to hospital.
Inhalation	In case of exposure to intense concentrations of vapours, fumes or spray, transport the person away from the contaminated zone, keep warm and allow to rest. Immediately begin artificial respiration if breathing has ceased. Call a physician immediately. If there is any suspicion of inhalation of H2S. Rescuers must wear breathing apparatus, belt and safety rope, and follow rescue procedures. If not breathing, give artificial respiration. Provision of oxygen may help. Remove casualty to fresh air as quickly as possible.
Ingestion	Do NOT induce vomiting. Give nothing to drink. Never give anything by mouth to an unconscious person. Consult a physician.
Protection of First-aiders	CAUTION! First aid personnel must be aware of personal risk during rescue!. Use personal protective equipment. See Section 8 for more detail.

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

Eye contact	Vapor may cause irritation. Risk of burns (if the product is hot).
Skin contact	Prolonged or repeated contact may dry skin and cause irritation. Risk of burns (if the product is hot).
Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system. Causes headache, drowsiness or other effects to the central nervous system. Risk of hydrogen sulphide intoxication (H2S).
Ingestion	Few or no symptoms expected. If any, nausea and diarrhoea might occur.

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	In the case of thermal burns. DO NOT attempt to remove portions of clothing glued to burnt skin but cut round them. Treat symptomatically.

Section 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media

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Suitable Extinguishing Media	Extinguishing media - large fires: Foam (specifically trained person only). Water fog (trained personnel only). Extinguishing media - small fires: Carbon dioxide (CO_2). Dry powder. Sand or earth. 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

Special Hazard	Incomplete combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates, gases, including carbon monoxide. unidentified organic and inorganic compounds. If sulphur compounds are present in appreciable amounts, combustion products may include also H2S and SOx (sulfur oxides) or sulfuric acid.

5.3. Advice for fire-fighters

Special protective equipment for fire-fighters	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.
Other information	Do not allow run-off from fire fighting to enter drains or water courses.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

General Information	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. If required, notify relevant authorities according to all applicable regulations. When the presence of dangerous amounts of H2S around the spilled product is suspected or proved. additional or special actions may be warranted to determine controls appropriate to local circumstances. Evacuate non-essential personnel. Avoid direct contact with released material. Stop or contain leak at the source, if safe to do so. Avoid contact with skin, eyes and inhalation of vapors. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Ensure adequate ventilation, especially in confined areas. For personal protection see section 8.
Advice for non-emergency personnel	Do not touch or walk through spilled material. Evacuate personnel to safe areas. Ensure adequate ventilation. For personal protection see section 8.

Advice for emergency responders	Ensure the application of strict rules of hygiene by the personnel exposed to the risk of contact with the product. Use personal protective equipment. In case of: Small spillages: normal antistatic working clothes are usually adequate. For personal protection see section 8. Large spillages: full body suit of chemically resistant and antistatic material. Work gloves (preferably gauntlets) providing adequate chemical resistance. Remarks:. 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. Antistatic non-skid safety shoes or boots. if necessary heat-resistant. Goggles and/or face shield, if splashes or contact with eyes is possible or anticipated. A half or full-face respirator with filter(s) for organic vapours (and when applicable: for H2S). If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBA's should be used.

6.2. Environmental precautions

General Information	The product should not be allowed to enter drains, water courses or the soil. Solidified product may clog drains and sewers. If necessary, Consult an expert. Local authorities should be advised if significant spillages cannot be contained.

6.3. Methods and materials for containment and cleaning up

Methods for Containment	control the spreading of the spillage. Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see Section 13). Ensure adequate ventilation, especially in confined areas. Large spillages may be cautiously covered with foam, if available, to limit fire risk.
Methods for cleaning up	Let hot product cool down naturally. Collect free product with suitable means. Use mechanical means such as pumps, skimmers and absorbent materials. Pick up and transfer to properly labeled containers. Cleaning with high pressure washers. or. Wash off with warm water. Wear respiratory protection. In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations. Transfer recovered product and other materials to suitable tanks or containers and store/dispose according to relevant regulations. In case of spillage in the water: Product less dense than water. In case of small spillages in closed waters . contain product with floating barriers or other equipment. Collect spilled product by absorbing with specific floating absorbents. control the spreading of the spillage. If possible, large spillages in open waters should be contained with floating barriers or other mechanical means, 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. Collect recovered product and other materials in suitable tanks or containers for recovery or safe disposal. 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.

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6.4. Reference to other sections

Personal Protective Equipment See Section 8 for more detail.

Waste treatment See section 13.

Other information 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. For this reason, local experts should be consulted when necessary. Local regulations may also prescribe or limit actions to be taken. Cut off the electric power supply if this operation causes no sparks in the area containing vapors from the product.
Concentration of H2S 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 products, especially in the open air when vapours will be usually quickly dispersed, are dynamic situations, which presumably do not entail 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

Advice on safe handling Handle in accordance with good industrial hygiene and safety practice.
Hydrogen sulphide can accumulate in the head space of storage tanks containing this product and can reach potentially hazardous concentrations. Wear personal protective equipment. Refer to Section 8.
Take precautionary measures against static electricity.
The inspection, cleaning and maintenance of storage containers require the application of strict procedures and must be entrusted to qualified personnel (internal or external).
Avoid splash filling of bulk volumes when handling hot liquid product. Keep the temperature of the product as low as possible to minimise the release of fumes. Never check the tank level by using a naked flame.
Do not smoke. Avoid breathing vapors or mists. Ensure adequate ventilation. Vapors may form explosive mixtures with air.
Avoid contact with skin, eyes and clothing. Wear suitable protective clothing.
Do not use compressed air for filling, discharging, or handling operations.

Technical measures Prevent the formation of vapors, mists and aerosols. Ensure adequate ventilation.
Do not use compressed air for filling, discharging, or handling operations.
Design installations to avoid spills and splashes of hot product. Take all necessary precautions to prevent water from entering the containers, tanks, transfer lines etc...
Keep away from food, drink and animal feedingstuffs.

Prevention of fire and explosion	Handle away from any source of ignition (open flame and sparks) and heat (hot manifolds or casings). Take precautionary measures against static discharges. Do not heat the pumps or pipes using an open flame. Ground/bond containers, tanks and transfer/receiving equipment. Never weld any container or empty pipe that has not been degassed. Do not use compressed air for filling, discharging or handling. OPERATE ONLY ON COLD AND DEGASSED TANKS IN VENTILATED PREMISES (TO AVOID RISK OF EXPLOSION).
Hygiene measures	Ensure the application of strict rules of hygiene by the personnel exposed to the risk of contact with the product. Avoid contact with skin, eyes and clothing. Use personal protective equipment as required. Remove as much as possible by wiping. If small amount of product only comes into contact with the skin, remove with vegetable oil. White oil, lukewarm paraffin or a suitable soap recommended for this purpose may also be used. Do not use abrasives, solvents or fuels. Do not put product contaminated rags into workwear pockets. Do not eat, drink or smoke when using this product. Change contaminated clothes at the end of working shift. Wash hands before breaks and immediately after handling the product. Gloves must be periodically inspected and changed in case of wear, perforations or contaminations. Avoid breathing vapors, mist or gas.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions	Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content and flammability. If sulphur compounds are suspected to be present in the product, check the atmosphere for H2S content. Use adequate personal protective equipment as needed. Take precautionary measures against static discharges. Ensure all equipment is electrically grounded before beginning transfer operations. Storage installations should be designed with adequate bunds so as to prevent ground or water pollution in case of leaks or spills. Do not remove the hazard labels of the containers (even if they are empty). Store the packed products (drums, samples, cans ...) in properly ventilated rooms, away from damp, heat and any potential source of ignition. Lines used for the product and pump devices are to be insulated and equipped with a heating device. Keep containers tightly closed and properly labelled. Keep preferably in the original container. Otherwise reproduce all indication of the regulation label on the new container. Store separately from oxidising agents. Do not weld, solder, drill, cut or incinerate empty containers, unless they have been properly cleaned. Empty containers may contain combustible product residues. Store in accordance with the particular national regulations.
Materials to Avoid	Strong oxidizing agents. Strong acids. Halogens.
Packaging material	Use only containers, seals, pipes, etc... made in a material suitable for use with aromatic hydrocarbons. heat resistant. Recommended materials for containers, or container linings use mild steel, stainless steel. 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.
Further information	Ensure that all relevant regulations regarding handling and storage facilities of flammable products are followed.

7.3. Specific end uses

Specific use(s) See exposure scenarios.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits Hydrogen sulphide (EU): OEL = 7 mg/m³, 5ppm (8 h), 14 mg/m³, 10ppm (short-time)

Other constituents required for disclosure

Legend See section 16

DNEL Worker (Industrial/Professional)

Chemical Name	Short term, systemic effects	Short term, local effects	Long term, systemic effects	Long term, local effects
Fuel oil, residual 68476-33-5	4700 mg/m³/15min (aerosol - inhalation)		0.12 mg/m³/8h (aerosol - inhalation)	0.065 mg/kg/8h (dermal)

DNEL Consumer

Chemical Name	Short term, systemic effects	Short term, local effects	Long term, systemic effects	Long term, local effects
Fuel oil, residual 68476-33-5			0.015 mg/kg/24h (oral)	

Predicted No Effect Concentration (PNEC)

Chemical Name	Water	Sediment	Soil	Air	STP	Oral
Fuel oil, residual 68476-33-5						66.7 mg/kg food

8.2. Exposure controls

Occupational Exposure Controls

Engineering Measures Ensure adequate ventilation. Do not enter empty storage tanks until measurements of available oxygen have been carried out. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.

Personal Protective Equipment

General Information Protective engineering solutions should be implemented and in use before personal protective equipment is considered.
Use personal protective equipment in good condition.

Respiratory protection	For rescue and maintenance work in storage tanks use self-contained breathing apparatus. The use of breathing apparatus must comply strictly with the manufacturer's instructions and the regulations governing their choices and uses. Maintain adequate ventilation. Do not breathe vapors, mist or gas. In an emergency or for exceptional short-lasting jobs in an atmosphere polluted by the product, it is necessary to wear protective respiratory equipment. 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).
Eye Protection	Work helmet with neck cloth. Tightly fitting safety goggles. or. Face-shield.
Skin and body protection	Wear single use overwall. Hydocarbon resistant clothing. Protective shoes or boots. Rubber or plastic boots. Coverall (with trousers legs over boots).
Hand Protection	Hydrocarbon-proof gloves. Nitrile rubber. Neoprene gloves. Wear suitable gloves tested to EN374. Gloves anti-heat for the liquefied product (EN 407, level 1).

Environmental exposure controls

General Information	The product should not be allowed to enter drains, water courses or the soil.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	viscous
Color	brown dark green or dark brown black
Physical State @20°C	viscous
Other relevant operational conditions of use	liquid @ > 50 °C
Odor	Hydrocarbon-like

Property	Values	Remarks	Method
pH		Not applicable	
Boiling point/boiling range	**160 - 750 °C**		EN 15199
	320 - 1382 °F		EN 15199
Flash point	**> 60 °C**		ASTM D 93
	> 140 °F		ASTM D 93
Evaporation rate		No information available	
Flammability Limits in Air			
upper	5 %		
Lower	0.5 %		
Vapor Pressure	< 1 kPa @ 150 °C		EN 13016-1
Vapor Pressure			
Vapor density	> 5		
Density	950 - 1050 kg/m³	@ 15 °C	
Water solubility		Not applicable	

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Solubility in other solvents		Soluble in many common organic solvents	
logPow		Not applicable	
Autoignition temperature	**> 380 °C**		DIN 51794
	> 716 °F		DIN 51794
Viscosity, kinematic	30 - 700 mm2/s	@ 50 °C	ISO 3104

Explosive properties	Not considered explosive based on chemical structure and oxygen balance considerations
Oxidizing Properties	This product is not considered oxidising based on chemical structure considerations
Possibility of hazardous reactions	None under normal processing

9.2. Other information

Pour point < 30 °C

Section 10: STABILITY AND REACTIVITY

10.1. Reactivity

General Information No information available.

10.2. Chemical stability

Stability Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Hazardous Reactions None under normal processing.

10.4. Conditions to Avoid

Conditions to Avoid Take precautionary measures against static discharges. Keep away from open flames, hot surfaces and sources of ignition.

10.5. Incompatible Materials

Materials to Avoid Strong oxidizing agents. Strong acids. Halogens.

10.6. Hazardous Decomposition Products

Hazardous Decomposition Products None under normal use.

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute toxicity Local effects Product Information

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General Information The acute toxicity has been adequately characterised in a large number of GLP-compliant guideline investigations following oral, dermal or inhalation exposure. Findings from an acute inhalation study support classification.

Skin contact Samples of the substance have been tested in skin irritation studies. There was no evidence of skin corrosion. This substance does not meet the EU criteria for classification. Prolonged or repeated contact may dry skin and cause irritation. Risk of burns (if the product is hot).

Eye contact None of the samples tested showed more than minimal redness and swelling, which resolved quickly. This substance does not meet the EU criteria for classification. Vapor may cause irritation. Risk of burns (if the product is hot).

Inhalation . Inhalation of vapors in high concentration may cause irritation of respiratory system. Causes headache, drowsiness or other effects to the central nervous system. Risk of hydrogen sulphide intoxication (H2S).

Ingestion . Few or no symptoms expected. If any, nausea and diarrhoea might occur.

Acute toxicity - Component Information

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Fuel oil, residual	LD50 > 5000 mg/kg bw (rat - OECD 401)	LD50 > 2000 mg/kg bw (rabbit - OECD 434)	CL50 (4h) 4.1 mg/l (males) 4.3 mg/l (females) (aerosol - rat)

Sensitization

Sensitization There are no reports available to indicate that the substance has the potential to cause skin and respiratory sensitisation.

Specific effects

Carcinogenicity Positive results obtained from mouse skin painting studies and from an initiation/promotion assay indicate that these components are carcinogenic.

Chemical Name	European Union
Fuel oil, residual 68476-33-5	Carc. 1B (H350)

Mutagenicity The mutagenic potential of the substance has been extensively studied in a range of in-vivo and in-vitro assays. The majority of the studies showed no evidence of mutagenic activity.

Germ Cell Mutagenicity The weight of evidence from in vivo and in vitro mutagenic studies indicates that this substance does not meet the criteria for classification under regulation.

Reproductive toxicity These components do not specifically target the reproductive system on male and female rats.

Developmental Toxicity The available data indicate that these components adversely affect fœtal development.

Chemical Name	European Union
Fuel oil, residual 68476-33-5	Repr. 2 (H361d)

Repeated Dose Toxicity

Target Organ Effects (STOT)

Target Organ Effects (STOT) Acute exposure studies show no evidence of systemic toxicity.

Specific target organ systemic toxicity (repeated exposure) Repeated exposure may cause skin dryness or cracking. There is evidence to indicate that these components have a potential to cause systemic alterations following repeated dermal exposure.

Other information

Other information Not relevant.

Section 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

Acute aquatic toxicity - Product Information

Acute aquatic toxicity - Component Information

Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates	Toxicity to fish	Toxicity to microorganisms
Fuel oil, residual 68476-33-5	EL50 (72h) 0.75 mg/l (Pseudokirchnerella subcapitata - QSAR Petrotox)	EL50 (48h) 2 mg/l (Daphnia magna - OECD 202)	LL50 (96h) 79 mg/l (Oncorhynchus mykiss - OECD 203)	

Chronic aquatic toxicity - Product Information

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Chronic aquatic toxicity - Component Information

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Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates	Toxicity to fish	Toxicity to microorganisms
Fuel oil, residual 68476-33-5		NOEL (21d) 0.27 mg/l (Daphnia magna - QSAR Petrotox)	NOEL (14/28d) 0.1 mg/l (Oncorhynchus mykiss - QSAR Petrotox)	

Effects on terrestrial organisms
No information available.

12.2. Persistence and degradability

General Information
Substance is a UVCB. Standard tests for this endpoint are not appropriate.

12.3. Bioaccumulative potential

Product Information Substance is a UVCB. Standard tests for this endpoint are not appropriate.

logPow Not applicable

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Component Information No information available.

12.4. Mobility in soil

Mobility				
Method	Compartment	Result	(%)	Remarks
Percent distribution in media (Calculation according to Mackay, Level III)	Soil		67.81	
Percent distribution in media (Calculation according to Mackay, Level III)	Sediment		27.63	
Percent distribution in media (Calculation according to Mackay, Level III)	Air		4.55	
Percent distribution in media (Calculation according to Mackay, Level III)	Water		0.01	

Soil Given its physical and chemical characteristics, the product generally shows low soil mobility.

Air Loss by evaporation is limited.

Water The product floats or settles, depending on its density.

12.5. Results of PBT and vPvB assessment

PBT and vPvB assessment Anthracene is not present in this substance at greater than 0.1% (CONCAWE 2010). No other representative hydrocarbon structure were found to meet the PBT/vPvB criteria. This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).

12.6. Other adverse effects

General Information No information available.

Section 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues / Unused Products Dispose of in accordance with the European Directives on waste and hazardous waste. Dispose of contents/container to an approved incineration plant.

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

EWC Waste Disposal No. According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used.

Section 14: TRANSPORT INFORMATION

Note If transported at ambient temperature (samples): not covered by transport regulation.

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ADR/RID

UN/ID No	UN3256
Proper shipping name	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.
Proper shipping name	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.
Hazard class	3
Packing Group	III
ADR/RID-Labels	3
Classification Code	F2
Special Provisions	274, 560
Tunnel Restriction Code	(D/E)
ADR Hazard Id (Kemmler Number)	30
Description	UN3256, Elevated temperature liquid, flammable, n.o.s (Fuel oil, residual), 3, III, (D/E)
Excepted Quantity	E0
Limited quantity	0

IMDG/IMO

UN/ID No	UN3256
Proper shipping name	Elevated temperature liquid, flammable, n.o.s.
Hazard class	3
Packing Group	III
EmS No.	F-E, S-D
Description	UN3256, Elevated temperature liquid, flammable, n.o.s. (Fuel oil, residual), 3, III
Special Provisions	274
Excepted Quantity	E0
Limited quantity	0

ICAO/IATA

Forbidden

ADN

UN/ID No	UN3256
Proper shipping name	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.
Proper shipping name	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.
Hazard class	3
Packing Group	III
Classification Code	F2
Special Provisions	274, 560
Description	UN3256, Elevated temperature liquid, flammable, n.o.s (Fuel oil, residual), 3, III
Excepted Quantity	E0
Limited quantity	0
Ventilation	VE01

Section 15: REGULATORY INFORMATION

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

SDS # : 30236

MARINE FUELS

Revision Date: 2015-01-15 **Version** 2.06

European Union

REACH
This substance has been registered according to Regulation (EU) No. 1907/2006 (REACH).

Further information

15.2. Chemical Safety Assessment

Chemical Safety Assessment See exposure scenarios

Section 16: OTHER INFORMATION

Full text of R-phrases referred to under sections 2 and 3
R45 - May cause cancer
R63 - Possible risk of harm to the unborn child
R20 - Harmful by inhalation
R66 - Repeated exposure may cause skin dryness or cracking
R48/21 - Harmful: danger of serious damage to health by prolonged exposure in contact with skin
R50/53 - Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Full text of H-Statements referred to under sections 2 and 3
H332 - Harmful if inhaled
H350 - May cause cancer in contact with skin
H373 - May cause damage to organs through prolonged or repeated exposure in contact with skin
H361d - Suspected of damaging the unborn child
H400 - Very toxic to aquatic life
H410 - Very toxic to aquatic life with long lasting effects

Abbreviations, acronyms
GLP = Good Laboratory Practice
bw = body weight
bw/day = body weight/day

Legend Section 8
TWA: Time Weight Average
STEL: Short Time Exposure Limit

+	Sensitizer	*	Skin designation
**	Hazard Designation	C:	Carcinogen
M:	Mutagen	R:	Toxic to reproduction

Revision Date: 2015-01-15
Revision Note (M)SDS sections updated: 14.

Further information Other uses than these listed under section 1.2 may have been foreseen for the substance(s) contained in the product. Please contact us if your use is not listed under section 1.2

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

SDS # : 30236

MARINE FUELS

Revision Date: 2015-01-15 **Version** 2.06

This safety data sheet serves to complete but not to replace the technical product sheets. The information contained herein is given in good faith and is accurate to the best of knowledge at the date indicated above.It is understood by the user that any use of the product for purposes other than those for which it was designed entails potential risk.The information given herein in no way dispenses the user from knowing and applying all provisions regulating his activity.The user bears sole liability for the precautions required when using the product.The regulatory texts indicated herein are intended to aid the user to fulfil his obligations. This list is not to be considered complete and exhaustive.It is the user's responsibility to ensure that he is subject to no other obligations than those mentioned.

End of the safety data sheet

ES08004
Version 1.0
Trade name / designation Heavy Fuel Oil

1. Exposure scenario

Formulation & (re)packing of substances and mixtures, Industrial.

Use Descriptor
Sector of use
SU3 - Industrial Manufacturing (all)
SU10 - Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

Process Category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC15 - Use as a laboratory reagent

Environmental Release Category
ERC2 - Formulation of mixtures
Specific Environmental Release Category
ESVOC SpERC 2.2.v1.

Processes, tasks, activities covered
Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Product characteristics
Substance is complex UVCB. Predominantly hydrophobic.

Fraction of EU tonnage used in region: 0.1
Regional use tonnage (tonnes/year): 1.1E+7
Fraction of Regional tonnage used locally: 2.6E-3
Annual site tonnage (tonnes/year): 3.0E+4
Maximum daily site tonnage (kg/day): 1.0+5

Frequency and duration of use Continuous release
Emission Days (days/year): 300

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

Release fraction to air from process (initial release prior to RMM): 2.2E-3
Release fraction to wastewater from process (initial release prior to RMM): 5.0E-6
Release fraction to soil from process (initial release prior to RMM): 0.0001

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

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Risk from environmental exposure is driven by humans via indirect exposure
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required
Prevent discharge of undissolved substance to or recover from onsite wastewater
Treat air emission to provide a typical removal efficiency of (%): 0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%): >=54
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%): >=0

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Estimated substance removal from wastewater via domestic sewage treatment (%): 88.8
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 88.8
Maximum allowable site tonnage (MSafe) (kg/d): 1.1E+5
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.

Conditions and measures related to external recovery of waste
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Remarks
Additional information on the basis for the allocation of the identified OCs (operating conditions) and RMMs (Risk Management Measures) is contained in Petrorisk file

2.2. Control of exposure - Workers / Consumers

Product characteristics
Physical State
Liquid, vapour pressure < 0.5 kPa at STP
Concentration of substance in product
Covers percentage substance in the product up to 100 % (unless stated differently).
Frequency and duration of use
Covers daily exposures up to 8 hours (unless stated differently)
Other operational conditions affecting exposure
Assumes use at not more than 20°C above ambient temperature, unless stated differently. Assumes a good basic standard of occupational hygiene is implemented.

2.2a. Control of worker exposure	
Contributing Scenarios	**Operational conditions and risk management measures.**
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing 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.
General exposures (closed systems)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Avoid carrying out activities involving exposure for more than 4 hours. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
General exposures (closed systems) Process sampling	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Avoid carrying out activities involving exposure for more than 15 minutes. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Bulk product storage	Store substance within a closed system. Avoid carrying out activities involving exposure for more than 4 hours. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Wear suitable gloves tested to EN374.
Marine vessel/barge (un)loading	Transfer via enclosed lines. Avoid carrying out activities involving exposure for more than 4 hours. Clear transfer lines prior to de-coupling. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Road tanker/rail car loading	Ensure material transfers are under containment or extract ventilation. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Product sampling	Sample via a closed loop or other system to avoid exposure. Avoid carrying out operation for more than 15 minutes. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Drum/batch transfers	Ensure material transfers are under containment or extract ventilation. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Or. Ensure operation is undertaken outdoors. Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

2.2b. Control of consumer exposure	
Product Category(ies)	**Operational conditions and risk management measures.**
Not applicable	

3. Exposure estimation and references

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

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

4. Guidance for Downstream User to check compliance with the Exposure scenario

Health
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Risk Management Measures are based on qualitative risk characterisation.

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

ES08005
Version 1.0
Trade name / designation Heavy Fuel Oil

1. Exposure scenario

Uses in Coatings, Industrial.

Use Descriptor
Sector of use
SU3 - Industrial Manufacturing (all)

Process Category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC15 - Use as a laboratory reagent

Environmental Release Category
ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
Specific Environmental Release Category
ESVOC SpERC 4.3a.v1.

Processes, tasks, activities covered
Covers the use in coatings (paints, inks, adhesives, etc) within closed or contained systems including incidental exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application activities and film formation) and equipment cleaning, maintenance and associated laboratory activities.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Product characteristics
Substance is complex UVCB. Predominantly hydrophobic.

Fraction of EU tonnage used in region: 0.1
Regional use tonnage (tonnes/year): 1.0E+2
Fraction of Regional tonnage used locally: 1
Annual site tonnage (tonnes/year): 1.0E+2
Maximum daily site tonnage (kg/day): 5.0+3

Frequency and duration of use Continuous release
Emission Days (days/year): 20

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

Release fraction to air from process (initial release prior to RMM): 0.98
Release fraction to wastewater from process (initial release prior to RMM): 2.0E-5
Release fraction to soil from process (initial release prior to RMM): 0

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

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Risk from environmental exposure is driven by humans via indirect exposure
No wastewater treatment required
Prevent discharge of undissolved substance to or recover from onsite wastewater
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 of (%): >=0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%): >=0

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Estimated substance removal from wastewater via domestic sewage treatment (%): 88.8
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 88.8
Maximum allowable site tonnage (MSafe) (kg/d): 1.1E+5
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.

Conditions and measures related to external recovery of waste
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Remarks
Additional information on the basis for the allocation of the identified OCs (operating conditions) and RMMs (Risk Management Measures) is contained in Petrorisk file

2.2. Control of exposure - Workers / Consumers

Product characteristics
Physical State
Liquid, vapour pressure < 0.5 kPa at STP
Concentration of substance in product
Covers percentage substance in the product up to 100 % (unless stated differently).
Frequency and duration of use
Covers daily exposures up to 8 hours (unless stated differently)
Other operational conditions affecting exposure
Assumes use at not more than 20°C above ambient temperature, unless stated differently. Assumes a good basic standard of occupational hygiene is implemented.

2.2a. Control of worker exposure	
Contributing Scenarios	**Operational conditions and risk management measures.**
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing 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.
Film formation - force drying, stoving and other technologies	Provide extract ventilation to points where emissions occur. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
General exposures (closed systems)	Handle substance within a closed system. Provide extract ventilation to points where emissions occur. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Material transfers	Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Ensure material transfers are under containment or extract ventilation.
Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Wear suitable gloves tested to EN374.
Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Storage	Store substance within a closed system. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

2.2b. Control of consumer exposure	
Product Category(ies)	**Operational conditions and risk management measures.**
Not applicable	

3. Exposure estimation and references

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

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

4. Guidance for Downstream User to check compliance with the Exposure scenario

Health
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Risk Management Measures are based on qualitative risk characterisation.

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

ES08007
Version 1.0
Trade name / designation Heavy Fuel Oil

1. Exposure scenario

Use as a fuel, Industrial.

Use Descriptor
Sector of use
SU3 - Industrial Manufacturing (all)

Process Category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC16 - Using material as fuel sources, limited exposure to unburned product to be expected

Environmental Release Category
ERC7 - Industrial use of substances in closed systems
Specific Environmental Release Category
ESVOC SpERC 7.12a.v1.

Processes, tasks, activities covered
Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Product characteristics
Substance is complex UVCB. Predominantly hydrophobic.

Fraction of EU tonnage used in region: 0.1
Regional use tonnage (tonnes/year): 1.1E+7
Fraction of Regional tonnage used locally: 1.4E-1
Annual site tonnage (tonnes/year): 1.5E+6
Maximum daily site tonnage (kg/day): 5.0E+6

Frequency and duration of use Continuous release
Emission Days (days/year): 300

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

Release fraction to air from process (initial release prior to RMM): 7.0E-4
Release fraction to wastewater from process (initial release prior to RMM): 4.4E-7
Release fraction to soil from process (initial release prior to RMM): 0

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

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Risk from environmental exposure is driven by freshwater sediment
Onsite wastewater treatment required
Prevent discharge of undissolved substance to or recover from onsite wastewater
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 of (%): >=87.7
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%): >= 0

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Estimated substance removal from wastewater via domestic sewage treatment (%): 88.8
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 88.8
Maximum allowable site tonnage (MSafe) (kg/d): 5.2E+6
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. Combustion emissions considered in regional exposure assessment.

Conditions and measures related to external recovery of waste
This substance is consumed during use and no waste of the substance is generated.

Remarks
Additional information on the basis for the allocation of the identified OCs (operating conditions) and RMMs (Risk Management Measures) is contained in Petrorisk file

2.2. Control of exposure - Workers / Consumers

Product characteristics
Physical State
Liquid, vapour pressure < 0.5 kPa at STP
Concentration of substance in product
Covers percentage substance in the product up to 100 % (unless stated differently).
Frequency and duration of use
Covers daily exposures up to 8 hours (unless stated differently)
Other operational conditions affecting exposure
Assumes use at not more than 20°C above ambient temperature, unless stated differently. Assumes a good basic standard of occupational hygiene is implemented.

2.2a. Control of worker exposure	
Contributing Scenarios	**Operational conditions and risk management measures.**
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing 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.
General exposures (closed systems)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Avoid carrying out operation for more than 4 hours. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
General exposures (closed systems) Product sampling	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Avoid carrying out operation for more than 1 hour. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Bulk closed unloading Outdoor	Transfer via enclosed lines. Avoid carrying out activities involving exposure for more than 4 hours. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Operation of solids filtering equipment	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 4 hours. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Drum/batch transfers	Ensure material transfers are under containment or extract ventilation. Or. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Use as a fuel (closed systems)	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Bulk product storage	Store substance within a closed system. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 4 hours. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

2.2b. Control of consumer exposure	
Product Category(ies)	**Operational conditions and risk management measures.**
Not applicable	

3. Exposure estimation and references

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

4. Guidance for Downstream User to check compliance with the Exposure scenario

Health
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Risk Management Measures are based on qualitative risk characterisation.

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

ES08008
Version 1.0
Trade name / designation Heavy Fuel Oil

1. Exposure scenario

Use as a fuel, Professional.

Use Descriptor
Sector of use
SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process Category
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC16 - Using material as fuel sources, limited exposure to unburned product to be expected

Environmental Release Category
ERC9a - Wide dispersive indoor use of substances in closed systems
ERC9b - Wide dispersive outdoor use of substances in closed systems
Specific Environmental Release Category
ESVOC SpERC 9.12b.v1.

Processes, tasks, activities covered
Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste.

2. Operational conditions and risk management measures

2.1. Control of environmental exposure

Product characteristics
Substance is complex UVCB. Predominantly hydrophobic.

Fraction of EU tonnage used in region: 0.1
Regional use tonnage (tonnes/year): 3.3E+5
Fraction of Regional tonnage used locally: 5.0E-4
Annual site tonnage (tonnes/year): 1.7E+2
Maximum daily site tonnage (kg/day): 4.6E+2

Frequency and duration of use Continuous release
Emission Days (days/year): 365

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

Release fraction to air from process (initial release prior to RMM): 1.0E-4
Release fraction to wastewater from process (initial release prior to RMM): 0.00001
Release fraction to soil from process (initial release prior to RMM): 0.00001

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

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Risk from environmental exposure is driven by humans via indirect exposure
No wastewater treatment required
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 of (%): >=0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%): >=0

Organizational measures to prevent/limit release from the site
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Estimated substance removal from wastewater via domestic sewage treatment (%): 88.8
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 88.8
Maximum allowable site tonnage (MSafe) (kg/d): 2.3E+3
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. Combustion emissions considered in regional exposure assessment.

Conditions and measures related to external recovery of waste
This substance is consumed during use and no waste of the substance is generated.

Remarks
Additional information on the basis for the allocation of the identified OCs (operating conditions) and RMMs (Risk Management Measures) is contained in Petrorisk file

2.2. Control of exposure - Workers / Consumers

Product characteristics
Physical State
Liquid, vapour pressure < 0.5 kPa at STP
Concentration of substance in product
Covers percentage substance in the product up to 100 % (unless stated differently).
Frequency and duration of use
Covers daily exposures up to 8 hours (unless stated differently)
Other operational conditions affecting exposure
Assumes use at not more than 20°C above ambient temperature, unless stated differently. Assumes a good basic standard of occupational hygiene is implemented.

2.2a. Control of worker exposure	
Contributing Scenarios	**Operational conditions and risk management measures.**
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing 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.
General exposures (closed systems)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Avoid carrying out activities involving exposure for more than 1 hour. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
General exposures (closed systems) Product sampling	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Avoid carrying out activities involving exposure for more than 1 hour. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Bulk closed unloading	Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Avoid carrying out activities involving exposure for more than 1 hour. Or. Ensure material transfers are under containment or extract ventilation.
Refuelling	Ensure material transfers are under containment or extract ventilation. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Avoid carrying out activities involving exposure for more than 1 hour.
Drum/batch transfers	Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Avoid carrying out activities involving exposure for more than 1 hour. Or. Ensure material transfers are under containment or extract ventilation.
Use as a fuel (closed systems)	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Equipment cleaning and maintenance	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Clear spills immediately.

2.2b. Control of consumer exposure	
Product Category(ies)	**Operational conditions and risk management measures.**
Not applicable	

3. Exposure estimation and references

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

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

4. Guidance for Downstream User to check compliance with the Exposure scenario

Health
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Risk Management Measures are based on qualitative risk characterisation.

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