Q8 QUASER S.R.L. GENERAL TERMS AND CONDITIONS FOR THE SALE AND SUPPLY OF MARINE FUELS

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Q8 QUASER S.R.L. GENERAL TERMS AND CONDITIONS FOR THE SALE AND SUPPLY OF MARINE FUELS

1ST SEPTEMBER 2015 EDITION

These General Terms of Sale are not subject to the United Nations Convention of Contracts for international sale of Goods of 1980, nor shall that Convention be applicable to these Terms of Sale. This exclusion is pursuant to article 6 of the said Convention.

These General Terms govern the Marine Bunker Sale contracts that are entered between Q8 Quaser S.r.l. – (hereinafter "The Seller") and the "The Buyer" with regard to everything related to nomination, delivery, price and payment of the Marine Fuel sold. Except as otherwise expressly agreed in writing, all sales and supply of Marine Fuels as defined in article 1 shall be subject to the following terms and conditions.

1. APPLICABILITY

1.1 The following General Terms and Conditions shall apply to any and all sales of Marine Fuels by Q8 Quaser S.r.l. either to shipowners and traders and other companies.

1.2 Unless specifically agreed in writing, Q8 Quaser S.r.l. General Terms and Conditions shall apply to any and all sales of Marine Fuels on the Italian territory and abroad.

2. DEFINITIONS

Agreement The Bunker confirmation, these General Terms and Conditions.

Bad weather High winds, currents and tides, and/or atmospherical conditions such as high temperatures, fog, rain, waves and/or any other event that prevents bunkering operations and/or makes the presence of the vessel at berth unsafe.

Berth A berth, dock, anchorage, submarine line, single berthing or mooring facility point, off shore location or any other loading or discharge place as may be indicated by Buyer.

Buyer The company ordering the bunker which is entitled for the payment of the product delivered.

Parties Collectively the Seller and the Buyer.

Bunker Confirmation A summary with all the main clauses of the agreement sent in writing by the Buyer to the Seller.

F.O.B. The acronym of the specific trade term "Free On Board" , as per Incoterms ICC publication issued in year 2010 and following amendments.

Marine Fuels Fuel oil, marine diesel and gasoil, also referred to as the Product and/or Bunker.

3. SCOPE

Seller shall sell and Buyer shall buy the Marine Fuels as defined in article 1 to be delivered at one or more ports at the conditions indicated herebelow and in the Bunker Confirmation .

4. ENTIRE AGREEMENT

4.1 These General Terms and Conditions contain or will contain all the terms which the Parties have agreed on in relation to the sale of Marine Fuels.

4.2 These General Terms and Conditions have been given to Buyers or made known to them. Should a single Buyer, for any reason, not have a copy of these Marine Sales terms and conditions, these are made available for downloading from the internet web site www.q8quaser.it which Buyers are assumed to have visited before entering single sale contracts.

5. DELIVERY, TITLE, RISK AND DAMAGE

5.1 For deliveries by barge where Seller is the charterer of the barge, the risk and title will pass onto Buyer at the vessel's permanent hose connection. Connection and disconnection of delivery hoses are at the risk of Buyer.

5.2 For deliveries by barge where Seller is not the charterer of the barge, the risk and title will pass onto Buyer FOB, to be intended at the barge's permanent hose connection at the loading of the barge.

5.3 For deliveries by truck, the risk and title will pass onto Buyer at the loading of the truck, unless it has been expressly agreed that they will pass at destination.

5.4 At the points over indicated, the Seller's (or its supplier's) responsibility shall terminate and the Buyer shall assume all risks of loss or damage caused by the product so delivered, such as deterioration, evaporation, spills or any other risk of the Product delivered.

5.5 Any loss or damage to the Product, or any property of the Seller (or its supplier), or to any property of any third party, or any injury or liability to any person, caused by Vessel or Barge (in case of delivery as per paragraph 5.2), or the vessel's or Barge's representative or crew, while at the loading port, shall be borne by Buyer.

5.6 Any deliveries are subject to weather conditions, vessels' priority, if any, and working hours. If vessel arrives out of working hours, all extra costs are for Buyer's account. Working hours are those indicated in the port regulations and, in the lack of such regulations, 8:00 am – 5:00 pm

5.7 Seller shall not be liable for any loss or demurrage due to congestion of the terminal or to lack of availability of barges for the product to be delivered.

5.8 Deliveries off shore are, in any case, also subject to the barge's captain confirmation that weather conditions permit delivery in conformity to port regulations on off shore bunker. In case Marine Fuel cannot be delivered because of the Captain determinations, Seller will not be responsible for non-delivery, delay in the delivery and connected costs.

6. OBLIGATIONS OF THE PARTIES

Buyer shall:

6.1 Provide a safe berth. All costs due to terminal or berth congestion shall be for Buyer's account.

6.2 Pay all costs and port expenses, including possible insurance costs.

6.3 Ascertain and guarantee that vessel tanks are clean and suitably ready to receive the product according to the rules and best practices of the specific sector including those related to product

quality guarantee. Seller will not be responsible for possible product discrepancies due to improper tanks cleaning and/or unsuitability to receive the product.

6.4 Verify that bunker which might already be on board is consistent with the one ordered to Seller. Seller shall anyhow not be liable or responsible for any problems due to the incompatibility between the two products.

6.5 Communicate to Seller the exact time of delivery of the bunker. The failure by Buyer to give such information shall release Seller from its obligation to deliver the Marine Fuel and the order of bunker shall be considered cancelled.

6.6 Take prompt delivery of the bunker. All costs and expenses due to its delay in taking delivery, included but not limited to barge demurrage or truck overtime, shall be on Buyer's account.

6.7 Pay the price of bunker and the costs indicated in article 10.

6.8 Should the vessel for any reason arrive later than 5 days after the ETA (Estimated Time of Arrival) reported in the Bunker Confirmation, reimburse to Seller all costs and expenses due to the late arrival of the vessel, being in any case understood that Seller will be released of its obligation to deliver bunker.

6.9 Pay all costs and reimburse to Seller all expenses and charges due to unfulfillment of any of the obligations stated in this paragraph 6.1.

The Seller shall:

6.10 Verify that the product to be delivered meets the requested specifications.

6.11 Deliver the bunker to Buyer timely.

6.12 Deliver to Buyer the quantity requested according to paragraph 7.1. Official measurements shall anyway be assessed as per paragraph 7.2 and 7.3.

6.13 Issue a formal invoice after bunker has been delivered.

7. QUANTITIES AND MEASUREMENTS

7.1 In its Bunker Confirmation, the Seller will confirm the quantity of Marine Fuel to be supplied and that amount must be stated in metric tonnes or cubic metres.

7.2 Should Buyer require a different quantity to be delivered after confirmation has been sent by Seller, Seller will make all reasonable efforts to meet Buyer's request. Seller shall anyway have no obligation to adjust the quantities indicated in the Confirmation of Bunker.

7.3 Quantity shall be the one determined ashore by terminal oil meter for barge deliveries or by weigh station for truck deliveries. Such determination shall be binding upon the parties unless a specific remark is written by Buyer's representative on the Bunker Delivery Note. Should a dispute arise on quantity determination, the following paragraph 7.6 will apply.

7.4 Should bunker quantity be subject to determination by local customs authorities, the assessed quantity shall be binding upon the parties. This quantity will also be reported on the pertinent documents released by the above mentioned authority.

7.5 Buyer has the right to be represented at the time of measurements.

7.6 Should a dispute arise on the quantity delivered, the Seller shall immediately appoint an Independent Inspector, qualified and of recognised standing, unless expressly provided otherwise by Buyer, which shall ascertain the quantity actually delivered. The Independent Inspector will verify actual figures delivered and such determination shall be final and binding upon the parties, unless Independent Inspector's wilful misconduct or fundamental error is proven. Costs for inspections will be charged on defaulter account.

8. QUALITY

Product quality supplied is fully compliant with ISO 8217 last release and subsequent modifications.

8.1 Quality shall be determined by the parties in the Bunker Confirmation and shall be the one generally offered and available to Seller at the place of delivery for similar use.

8.2 Should the above quality not be available, Seller will inform Buyer and offer the grades and quantities available at that time without any liability whatsoever to Seller.

8.3 The Buyer has the exclusive responsibility for the choice and description of the Marine Fuel to be supplied, which must be suitable for the ship concerned. The Buyer shall also be solely, absolutely and exclusively liable as to the compatibility between the Marine Fuel stated and the fuels that are on board the ship prior to the supply.

8.4 Should a dispute arise on the quality delivered, the Parties will proceed with the nomination of an independent laboratory, as described in paragraph 7.6, in order to re-test the sample. Costs for retesting analysis will be charged on defaulter account.

9. SAMPLING

9.1 The Seller shall take four (4) commercial samples of each degree of Marine Fuel supplied during the bunker operation, in the presence of the Buyer or the Ship's Master, or their representatives. Three of these samples are taken for quality purposes (commercial samples), the forth sample is known as the "Marpol Sample".
Such commercial samples shall be the only authentic, conclusive, binding proof for the parties, to determine the quality of the Marine Fuel supplied to the ship. The absence of the Buyer or the Ship's Master or their representatives during the sample taking process shall be considered irrelevant to such determination.

9.2 The commercial samples taken will be duly sealed and labelled with tag showing the name of the ship, identifying the means of supply of the Marine Fuel (barge or truck), name of the product, date and place of supply, and they will bear the seal of the Ship Owner Company and be signed by the Seller and the Ship's Master, or their representatives.

9.3 The Seller shall deliver one of the commercial samples for each product delivered to the Master of the ship bunkered or his representative, who shall acknowledge receipt of same at the moment of receipt. Two commercial samples shall remain in the possession of the Seller and of the carrier for thirty (30) days from the date of the supply.
When the aforementioned 30 days have elapsed and no written claim has been lodged (just as established in Clause 18 below) by the Buyer, the Seller is empowered to proceed to destroy the commercial sample or samples held by it.

9.4 Pursuant to the terms and conditions set forth in Annex VI of Marpol Convention 73/78, for all ships with a GT of more than 400 tons., the Seller shall take one "Marple Sample" of each grade of Marine Fuel supplied during each supply operation, in the presence of the Buyer or the Ship's Master, or their representatives.
The samples taken will be duly sealed and labelled with tag identifying it as "Marpol Sample", showing the name of the ship, identifying the means of supply of the Marine Fuels (barge or truck), name of the product, date and place of supply, and they will bear the seal of the Ship Owner Company and be signed by the Seller and the Ship's Master or their representatives.
The Seller shall give the Marple samples to the Ship's Master or his representative, who will acknowledge receipts of the aforementioned samples in the moment of reception.

10. PRICES

Prices shall be Seller's current prices at time and place of delivery as agreed in Seller's Confirmation of Bunker.

11. CHARGES

In addition to the prices of Marine Fuel, Buyer shall pay the following charges:
a) current barge charges, for any delivery by barge;
b) current truck charges, for any delivery by truck;
c) any mooring or unmooring charges, agency fees or port dues which Seller may incur in connection with the bunker operation;
d) any duties and/or taxes incurred by Seller or for which Seller is accountable in respect of deliveries of Marine Fuel;
e) any additional cost incurred by Seller in respect of payments for overtime.
f) any cost which Seller may incur in case of partial/total refusal of the bunker from Buyer.

12. INVOICING

12.1 Seller shall invoice on the basis of weight indicated in the customs/fiscal documentation.

12.2 The invoice shall indicate prices of the products and include all data, and particularly:
- Product and the quantity delivered;
- Customs tax treatment;
- Facility of delivery and terms of delivery.

13. PAYMENT

13.1 Payment to Seller for Marine Fuel delivered shall be made in US Dollars or in Euro within 30 days after bunker has been delivered, unless a different period of time is indicated in the confirmation of bunker.

13.2 Payment to Seller shall be made to Seller's bank by wire transfer. Any bank and/or interbank commission will be on Buyer account.

13.3 Should payment by Buyer not be made within the period of time referred to in paragraph 13.1, Seller will charge Buyer default interests in accordance with the provisions of EC Directive n. 2000/35 against payment delays on commercial transactions. Should buyer have an overdue payment position, Seller can turn down further deliveries.

13.4 Should the last date for the payment fall on a Saturday, payment shall be made on the nearest preceding banking day; should the last date for the payment fall on Sunday or other day that is not a banking day, payment shall be made on the next following banking day.

13.5 The sale price is payable in all cases, notwithstanding any claim that may be presented by the Buyer against the Seller.

14. INDEMNITY

According to the contract clauses stated in paragraph 5, Buyer shall indemnify and hold Seller harmless from any and all consequences and/or responsibilities arising out of any and all uses of the product by Buyer after the product has been delivered to Buyer.

15. BUNKER USAGE

Being in any case understood Seller's indemnity as referred to in paragraph 14, Buyer undertakes and guarantees that the Marine Fuel supplied by Seller to Buyer shall not be used by the latter in any way other than for the bunkering requirements of Buyer's vessel, as expressly specified in D.L. (Government Decree) n. 152 of April 3, 2006 and subsequent modifications.

16. HEALTH, SAFETY AND ENVIRONMENT

16.1 Buyer shall provide its employees, agents, contractors and any other persons who will handle or who may come into contact with the Product supplied under these Terms and Conditions with the SHE Information attached ("Product Safety Data Sheet") and Buyer shall ensure that any recommendation relating to handling and use of such Product set out in the SHE Information is followed by all such persons. In relation to Product supplied under these General Terms and Conditions and from the point at which risk and property pass to Buyer, Buyer shall ensure that any obligation, requirement or recommendation in respect of health, safety and the environment relating or applying to Product, is complied with under the laws, statutes, regulations or directives in force in or applying to any location in which operations involving Product are carried out by or on behalf of Buyer.

16.2 Buyer shall indemnify and hold harmless Seller from and against any liability, claim, loss or damage arising from any failure in complying with the obligations set out in this article. Compliance by Buyer with the recommendations contained in the SHE Information shall not prevent Buyer from complying with any other obligation or recommendation related to Product in connection with any law, statute, regulation or directive in any place, territory, state or jurisdiction. Buyer will remain fully responsible for any liability deriving from its failure in complying with any of such obligation or recommendations. Seller shall not be responsible or liable in any respect whatsoever for any loss, damage or injury resulting from any hazard related to the nature of Product.

16.3 Seller keeps the right, without any obligation, to cease or suspend the supply of Product if Buyer fails in complying with this Clause or if, on reasonable grounds, Seller considers that any action, activity, operation or operating system held by or on behalf of Buyer with regard to Product is or may be prejudicial to good health, safety and/or environmental protection practice as regulated and enforced in the territory.

17. CLAIMS

17.1 Any and all claims arising out or in connection with Marine Fuel supplied must be sent in writing from Buyer to Seller according to the terms set in the following paragraphs 17.2 and 17.3. Any claim shall be null and void if not supported by the documentation indicated.

17.2 QUANTITY CLAIMS

In case of a quantity dispute, the Ship's Master of the receiving vessel must record such presumed discrepancy on the Bunker Delivery Note and/or on a Letter of Protest, countersigned by Barge Ship's Master/ truck driver at the end of discharging. Barge Ship's Master/ truck driver signature on the Bunker Delivery Note/Letter of Protest does not represent acceptance of the claim, unless clearly specified in the document undersigned. The Seller shall promptly be informed by the Buyer of the dispute on the way in order to initiate the procedure laid down in paragraph 7.6.

Seller will not accept quantity discrepancy claims not ascertained before ship departure from the port of delivery of the bunker.

17.3 QUALITY CLAIMS

Any claim relating to quality of Marine Fuel supplied shall be null and void if not submitted by Buyer to Seller within 15 days after Marine Fuel has been delivered.

Quality claims must be sent in writing from Buyer to Seller and should be supported by clear information allowing Buyer to identify the correct operation and should contain the Buyer formal request to proceed with ascertainments set in paragraph 8.4.

The Parties expressly agree that the commercial sample kept in custody by the Seller (denominated "Supplier" on the Bunker Delivery Note) shall be analysed by a qualified independent laboratory of international prestige, specialized in performing analysis of marine fuels, appointed by mutual agreement between the Parties.

The result of such analysis shall be conclusive and binding for both parties. The expenses incurred in performing such analysis shall be borne by the losing party. The analysis shall be performed according to the criteria and instructions agreed by the parties, always with regard to the quality guaranteed by the Seller.

18. FORCE MAJEURE

18.1 Seller and Buyer shall not be liable for delay or failure to perform these General Terms and Conditions or the Agreement to which they refer to, when such performance is prevented either totally or partially by force majeure, meaning any cause beyond the reasonable control of the parties, such as act of terrorism, civil strife, earthquakes, breakdown or failure of producing, manufacturing, selling delivery facilities, strike, whether involving the employees of Seller and/or Buyer or otherwise, shortage in sources of supply and/or in means of transport, exceptional

weather conditions, closing or limitations of functioning of power plants and/or reception facilities.

18.2 Should such a contingency prevent or delay one of the party's performance, it shall be made known to the other timely.

18.3 The party whose performance is delayed shall make the other know the approximate duration of such a contingency, when known, and shall make any reasonable efforts to remove or to mitigate the effects of such event timely.

18.4 Should these General Terms and Conditions performance be prevented, or delayed as a result of such an accidental event, the agreement will be terminated and the Parties shall be relieved of their obligations hereunder.

19. FRIENDLY COMPOSITION

19.1 The parties undertake to come to a friendly composition for the settlement of any dispute related to the enforcement of these General Terms and Conditions, other than the ones arisen as to quantity and/or quality to be delivered which are already regulated by paragraph 17, based on or arising out of this agreement within 90 days after such dispute arises.

19.2 In order to come to the composition referred to in paragraph 19.1, the claimant shall communicate to the other party the object of its claim within 15 days after claim arises and shall ask for a meeting with the other party's representative.

19.3 Within 15 days the communication mentioned in paragraph 19.2 has been made, the party to which the claim has been communicated shall accept or reject such claim and, in the latter case, shall appoint his representative.

19.4 The representatives of the parties shall meet within 40 days after such dispute arises and make any reasonable effort to settle the dispute, letting in any case each other's party know in writing the outcome of the meeting within the next 20 days.

20. SUBSTITUTION

The Seller keeps the right to be substituted by a third party in fulfilment of all or part of the obligations established under these General Terms and Conditions for the Sale of Marine Fuel.
The Buyer shall not assign all or part of the supply ordered to a third party without the prior consent of the Seller in writing. Such consent shall not be withheld by the Seller in case the Buyer as assignee and the third party as assignor remain jointly liable for the due fulfilment of any and all contractual obligations.

21. APPLICABLE LAW AND JURISDICTION

Except as otherwise expressly agreed in writing, the Agreement, its performance and enforcement shall be governed by and construed in accordance with the Italian Laws.

22. CODE OF ETHICS AND ADMINISTRATIVE RESPONSIILITY CLAUSE

Buyer acknowledges that Seller adopted its own Code of Ethics pursuant to the provisions of Italian Legislative Decree dated 8th June, 2001, n. 231. The full edition of the document is published on the internet site www.q8.it. The Buyer agrees in complying with the principles included in the Code of Ethics.
Both Parties declare to be fully aware of the provisions and regulations currently in force relating the "administrative responsibility of legal parties" set in Legislative Decree 231/2001 and following modifications.
Both Parties also represent that they have adopted and actually implemented a system of governance and internal control (protocols, procedures and best practices) capable of preventing the offences, also attempted, covered by Legislative Decree 231/2001 and following modifications.
They also declare to plan their own business, relationships with employees and/or third parties (physical or juridical), they get in touch with for the execution of this Agreement, in full compliance with Legislative Decree 231/2001.
Each Party shall indemnify and hold the other harmless from any damage that may arise from infringement of the rules set in Legislative Decree 231/2001 and of Code of Ethics.
Both Parties acknowledge that the non-fulfilment of the obligations and commitments referred to above shall constitute serious breach of contract and shall entitle both Parties to terminate the Contract, with immediate effect, pursuant to and for the effects of Clause 1456 of the Italian Civil Code.

In such an event, the failing Party shall be charged for all the costs and expenses deriving or consequent thereto and without prejudice to the responsibilities borne by the other for all and any prejudicial event or damage which may occur as a consequence of the failure of the actions and facts referred to above.

Whether one of the Parties intends to make use of termination clause, it has to notify the other by registered letter with delivery information.

The exercise of such a right will take place against the counterpart that will be charged for all further expenses and any loss or damage suffered.

ATTACHMENTS:

- Material Safety Data Sheet Fuels_Diesel
- Material Safety Data Sheet Fuel Oil

Material Safety Data Sheet

according to EC Regulation No 1907/2006

FUELS, DIESEL

Q8 Quaser srl

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/ UNDERTAKING

1.1 Product identifier

Product name	FUELS, DIESEL
Synonym	FUELS, DIESEL (all types)
CAS Number	not applicable (mixture)
EC Number	not applicable (mixture)
Index number	not applicable (mixture)
Registration number	not applicable (mixture)

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

COMMON USE: Use as a fuel, heating fuel, and other industrial uses

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

- *Industrial: distribution of substance, formulation & (re)packing of substances and mixtures, use as a fuel*
- *Professional: use as a fuel*
- *Consumer: use as a fuel*

See section 16 for a complete list of uses, and use descriptors, for which an ES is provided as an annex

USES ADVISED: The uses of substances are the uses are indicated above. Other uses are not recommended unless an assessment is completed, prior to commencement of that use, which demonstrates that the use will be controlled.

1.3 Details of the safety data sheet supplier

Company name	Q8 Quaser srl
Address	Viale dell'Oceano Indiano, 13
City / State	00144 - Roma (Italy)
Telephone	+39 06-520881
Competent Technician E-mail	*schede@q8.it*

1.4 Emergency telephone number

Italy: Poisons Information Centre Niguarda (Cà Granda – Milano) Tel. +39 02 66101029 (24 h).

Foreign countries: Contact the closest Poisons Information Centre.

2. HAZARDS IDENTIFICATION

Physico-chemical hazards: Flammable Product

Human health hazard: The mixture causes skin irritation, harmful if inhaled. Because of the low viscosity of the product, it may be aspirated into the lungs or directly after ingestion or later in the case of spontaneous or induced vomiting, in such cases there may be aspiration pneumonia. May cause damage to organs throught prolonged or repeated exposure. Suspected of causing cancer.

Environmental hazard: The mixture is toxic to aquatic life with long lasting effects.

2.1 Classification of the substance or mixture

2.1.1 The classification of the substance according to Regulation (EC) No 1272/2008 (CLP/GHS)

Flam. Liq. 3	H226
Asp. Tox. 1	H304
Skin Irrit. 2	H315
Acute Tox 4	H332
Carc.2	H351
STOT RE 2	H373
Aquatic Chronic 2	H411

2.1.2 The classification of the substance according to Directive 67/548/EEC

Xn; R20-65

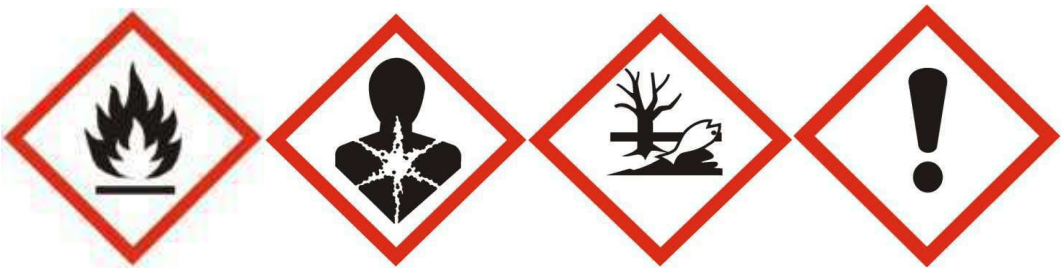
Xi; R38

Carc. Cat 3; R40

N; R51-53

Full text of R and H-phrases: see section 16

2.2 Label elements



Signal Word: **DANGER**

Hazard Statement

H226:	Flammable liquid and vapour.
H304:	May be fatal if swallowed and enters airways.
H315:	Causes skin irritation.
H332:	Harmful if inhaled.
H351:	Suspected of causing cancer.
H373:	May cause damage to organs throught prolonged or repeated exposure.
H411:	Toxic to aquatic life with long lasting effects.

Precautionary Statement

General statement

P261:	Avoid breathing dust/fume/gas/mist/vapors/spray.
P280:	Wear protective gloves/protective clothing/eye protection/face protection.

Response

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

Disposal

P501:	Dispose of contents/container in accordance with local/regional/national/international regulation.

Other information:

NOTE: H-N (full text given in section 16).

2.3 Other hazards

Hot product may form explosive and flammable vapour-air. The vapour product is heavier than air: may accumulate in confined spaces and low lying areas where it may easily be accidentally ignited.

The product does not meet the criteria for classification as PBT or vPvB required by Annex XIII of REACH.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Not applicable

3.2 Mixtures

The mixture contains:

1) UVCB substance: Fuels, diesel ("Complex combination of hydrocarbons produced by the distillation of crude oil. It consists of hydrocarbons having carbon numbers predominantly in the range of C9 through C20 and boiling in the range of approximately 163 °C to 357 °C")

CAS N. 68334-30-5 EC N. 269-822-7, INDEX N. 649-224-00-6, Registration N. 01-2119484664-27-XXXX

Concentration: 75 - 100% v/v

Classification and labelling according to (EC) 1272/2008 (CLP):

Flam. Gas 3: H226

Asp. Tox. 1: H304

Skin Irrit.2: H315

Acute Tox 4: H332

Carc.2: H351

STOT Rep.Exp.2: H373

Aquatic Chronic 2: H411

Classification and labelling according to DSD / DPD:

Xn; R20-R65

Xi; R38

Carc.Cat.3; R40

N; R51-53

2) Biodiesel

Biodiesel can contain the following substances:

CAS N. 68990-52-3; EINECS N. 273-606-8

CAS N. 67762-26-9; EINECS N. 267-007-0

CAS N. 6776-38-3; EINECS N. not applicable

Concentration: 0 - 25% v/v

Classification and labelling according to (EC) 1272/2008 (CLP):

Not dangerous.

Classification and labelling according to DSD / DPD:

Not dangerous.

4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. If irritation, blurred vision or swelling occurs and persists, obtain medical advice from a specialist.

Skin contact: Remove contaminated clothing, contaminated footwear and dispose of safely. Wash affected area with soap and water 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. 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 induce vomiting as there is high risk of 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: Inhalation is unlikely because of the low vapour pressure of the substance at ambient temperature. Exposure to vapours may however occur when the substance is handled at high temperatures with poor ventilation. In case of symptoms arising from inhalation of product fumes, mists or vapour: remove casualty to a quiet and well ventilated place if safe to do so. 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 breathing, place in the recovery position. Administer oxygen if necessary.

4.2 Most important symptoms and effects, both acute and delayed

The mixture may cause skin irritation, slight eye irritation. It can cause irritation of the respiratory tract due to excess fume, mists or vapour exposure. In case of ingestion: few or no symptoms expected. If any, nausea and diarrhea might occur.

4.3 Indication of any immediate medical attention and special treatment needed

In case of ingestion, always assume that aspiration has occurred. Send the casualty immediately to hospital. Do not wait for symptoms to develop.

5. FIREFIGHTING MEASURES

5.1 Suitable extinguishing media

Small fires: sand or earth, carbon dioxide, foam, 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), 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).

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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). If required, notify relevant authorities according to all applicable regulations.

Small spillages: normal antistatic working clothes are usually adequate.

Large spillages: full body suit of chemically resistant and antistatic material. 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. Wear work helmet, antistatic non-skid safety shoes or boots with adequate chemical resistance. 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 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. 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: 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. Large spillages: If possible, large spillages in open waters should be contained with floating barriers or other mechanical means. The use of dispersants should be advised by an expert, and, if required, approved by local authorities. If possible, collect the product and contaminated materials with mechanical means, and store/dispose of according to relevant regulations.

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.

6.4 Reference to other sections

For more information regarding protective equipment and operational conditions see Exposure scenarios

6.5 Other information

Not available

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

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. Keep away from heat/sparks/open flames/hot surfaces. Do not smoke. Avoid contact with skin and eyes. Do not ingest. Do not breathe vapours

Use and store only outdoors or in a well-ventilated area. Avoid contact with the product. Use adequate personal protective equipment as needed. Do not use compressed air for filling, discharging, or handling operations. Prevent the risk of slipping. Avoid release to the environment.

For more information regarding protective equipment and operational conditions see Exposure scenarios.

7.1.2 Advice on general occupational hygiene

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

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. After cleaning of tanks and before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, and flammability. Store separately from oxidising agents. Store in a well-ventilated place.

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.

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

Keep containers tightly closed and properly labelled. Protect from the sunlight.

Light hydrocarbon vapours can build up in the headspace of containers. These can cause flammability / explosion hazards. 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 uses

See attached Exposure scenarios.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Exposure limit values (mixture components):

Fuels, Diesel

ACGIH 2010:

- TLV®-TWA: 100 mg/m^3

Exposure limit values (atmospheric contaminants):

Minerals Oils: Oil mist

ACGIH 2010:

- TLV®-TWA
  - Oil mist concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum (both mildly and severely refined)
  - 5 mg/m^3 (mineral oil mists derived from highly refined oils)

Recommended Monitoring procedures: refer to Dir. 96/82/EC or Good industrial heath practices in the work place.

DNEL (Derived No effect Level)

Fuel, Diesel

	DNEL for workes				DNEL for the general population			
Route	**Long-Term Exposure: Local Effects**	**Long-Term Exposure: Systemic effects:**	**Acute Exposure: Local effects**	**Acute Exposure Systemic effects**	**Long-Term Exposure: Local effects**	**Long-Term Exposure: Systemic effects:**	**Acute Exposure: Local effects**	**Acute Exposure: Systemic effects**
Oral	a	a	a	a	a	a	a	a
Dermal	Note (b) for 13-wk exposures and Note (d) for chronic exposures	2.9 mg/kg/8h	b	b	Note (b) for 13-wk exposures and Note (d) for chronic exposures	1.3 mg/kg/24h	b	b
Inhalation	b	68 mg aerosol /m^3/8h [aerosol]	c	4300 mg/m^3/ 15 min (for lethality) [aerosol]	b	20 mg aerosol /m^3/24h [aerosol]	b	2600 mg/m^3/ 15 min (for lethality) [aerosol]

Note a: No data available

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

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

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

DMEL (Derived Minimal Effect Level)

Not identified because no dose descriptor are available.

PNEC(S) (Predicted No Effect Concentration)

Refer to "Exposure scenarios".

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Minimise exposure to mists/vapours/aerosols. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content and flammability.

8.2.2 Individual protection measures, such as personal protective equipment

(a) 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.

(b) 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

Wash contaminated clothing before wearing it again.

(c) Respiratory protection:

Confined spaces: Use approved devices for respiratory protection: masks with cartridge filter type A (brown for organic vapors). If can not be determined or estimated with good certainty the levels of exposure or if it is possible that there is a lack of oxygen, only use a SCBA (EN 529).

In the absence of containment systems: Use approved devices for respiratory protection: masks with cartridge filter type AX (brown for organic vapors with a low boiling point).

(d) Thermal hazards:

See previous letter b)

8.2.3 Environmental exposure controls

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. Sludge should be incinerated, contained or reclaimed.

8.3 Other

For more information on personal protective equipment and operating conditions, refer to "Exposure scenarios".

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Liquid yellow (automotive use), red (heating use Italy), green(agricultural use Italy)
b)	Odor	Petroleum odor
c)	Odor threshold	Not available
d)	pH	Not applicable
e)	Melting point/freezing point	≤ 5 °C
f)	Initial boiling point and boiling range	150 - 400 °C (range)
g)	Flash point	>55 °C @ 101325 Pa
h)	Evaporation rate	Not applicable
i)	Flammability (solid, gas)	Not applicable
j)	Upper/lower flammability or explosive limits	LEL 1%; UEL 6%
k)	Vapor pressure	0.4 kPa @ 40 °C
l)	Vapor density	Not applicable
m)	Density	815 - 875 kg/m^3 @ 15 °C
n)	Solubility(ies)	Not applicable: substance is a hydrocarbon UVCB.
o)	Partition coefficient: n-octanol/water	Not applicable: substance is a hydrocarbon UVCB.
p)	Auto-ignition temperature	>225 °C
q)	Decomposition temperature	Not applicable
r)	Viscosity	1,5 – 7,4 mm^2/s @ 40 °C (range)
s)	Explosive properties	In accordance with column 2 of REACH Annex VII, the explosive properties study does not need to be conducted as there are no chemical groups associated with

		explosive properties present in the structures of the streams
t)	Oxidising properties	In accordance with column 2 of REACH Annex VII, this study does not need to be conducted as the streams because is incapable of reacting exothermically with combustible materials based on their chemical structures

The information above described are of the UVCB substanze CAS number 68334-30-5.

9.2 Other information

Products that relate to this sheet have a sulfur content ranging from 10 mg/kg maximum (eg., use in traction) and 1000 mg/kg maximum (eg., use for heating).

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.

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 mixture 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/sparks/open flames/hot surfaces. Do not smoke.

Avoid Static Electricity.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

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

11. TOXICOLOGICAL INFORMATION

The informations in this section are of the UVCB substanze CAS number 68334-30-5.

11.1 Information on toxicokinetics, metabolism and distribution

No experimental data were located on the toxicokinetics of fuels, diesel in vivo.

Experimental studies in animals have shown an absorption through the lungs. Physico-chemical considerations also suggest that highly respirable aerosols of poorly water soluble substances with a log Pow greater than zero will be absorbed to some extent from the respiratory tract. In the absence of further guidance, it will assumed that 50% of an inhaled dose of aerosolized gas oil will be absorbed by the lung in animals and humans.

No measured data are available on the dermal absorption of fuels diesel, however, repeated dose toxicity studies indicates that some absorption across the skin is possible. Results from the SKINPERM model indicate that uptake of gas oil across the skin is likely to be low (with an estimated dermal flux of 0.0001058 mg cm^{-2} hour, for human skin). However, the reliability of this value is not known, and therefore complete absorption of gas oil by human skin has been assumed.

11.2 Information on toxicological effects

a) Acute toxicity:

Acute Oral Toxicity:

Toxicity was evaluated on samples of fuel diesel products of VGOs/HGOs/Distillate fuels, categories. These studies have shown an oral LD50 > 2000 mg/kg bw. Therefore VGOs/HGOs/Distillate Fuels are not classified for acute oral toxicity according to the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
RAT (Sprague-Dawley) male/female oral: gavage equivalent to OECD Guideline 420	LD50: 9 mL/kg bw (male/female) (approx 7600 mg/kg bw)	key study, reliable without restriction CAS 68334-30-5	American Petroleum Institute (API) 1980b

Acute Inhalation Toxicity:

Animal studies on rats are available for samples of products in this category (VGOs/HGOs/Distillate fuels). Based on results of these studies, VGOs/HGOs/Distillate fuel sare classified as Xn, R20 (Harmful by inhalation) and H332 (Harmful if inhaled) according to the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference

Method	Results	Remarks	Reference
RAT male/female inhalation: aerosol and vapour mixture OECD Guideline 403	LC50 (4 h): 3.6 mg/L air (female) LC50 (4 h): 5.4 mg/L air (male) LC50 (4 h): 4.1 mg/L air (male/female)	key study, reliable without restriction CAS 68334-30-5	ARCO (1988a)

Acute Dermal Toxicity:

Toxicity was evaluated on samples of products in this category (VGOs/HGOs/Distillate fuels). These studies have shown an dermal LD50 > 2000 mg/kg bw. Therefore VGOs/HGOs/Distillate Fuels are not classified for acute dermal toxicity according to the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
RABBIT OECD Guideline 434 (Acute Dermal Toxicity - Fixed Dose Procedure)	LD50: > 5 mL/kg bw (male/female) (approx > 4300 mg/kg bw/day)	key study, reliable without restriction, experimental result CAS68334-30-5	API (1980b)

b) Skin corrosion/irritation:

No specific studies have been reported on corrosivity of these substances in this category. Considering the available studies, no corrosive action of these substances is expected.

The potential for skin irritation of products in this category have been tested in a large number of studies on rabbits in general. Most of the studies and the overall weight of evidence indicates that VGOs/HGOs/Distillate fuels are irritating to skin and are classified as Xi, R38 (Irritating to skin) and H315 (Causes skin irritation) according to EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
RABBIT (New Zealand White) OECD Guideline 404	irritating Erythema score: 3.9 (intact skin) Edema score: 2.96 (intact skin)	key study, reliable with restrictions CAS 68334-30-5	API (1980b)

c) Serious eye damage/irritation:

Multiple studies were available to assess the skin irritation potential of VGOs/HGOs/Distillate fuels. Animal studies (rabbits) demonstrate that these products are not irritating to eyes. Therefore VGOs/HGOs/Distillate fuels are not classified for eye irritation according to the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
RABBIT Observations at 24/48/72 hours OECD 405	not irritating Cornea score: 0 Iris score: 0 Conjunctivae score: 0	key study, reliable without restriction CAS68334-30-5	American Petroleum Institute (API) (1980b)

d) Respiratory or skin sensitization:

Respiratory system:

This endpoint is not a REACH requirement. Furthermore no data were available for this endpoint.

Skin sensitisation:

Multiple studies were available to assess the skin sensitising potential of VGOs/HGOs/Distillate fuels. Based on test data, there was no evidence of skin sensitization, VGO/Hydrocracked/Distillate fuels are not classified as sensitising to the skin according to the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
GUINEA PIG (Hartley) male Buehler test OECD Guideline 406	Not sensitising	key study, reliable without restriction CAS 68334-30-5	ARCO (1990d)

e) Germ cell mutagenicity:

The weight of evidence from *in vitro* and *in vivo* mutagenic studies indicates that VGOs/HGOs/Distillate fuels are not mutagens, therefore, no classification is given according to the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
In vitro gene mutation (Ames test) S. typhimurium TA 98 Doses: 0, 1, 3, 5, 7, 10, 15, 20, 25, 40, 40, 50, 60 µL/plate OECD Guideline 471	positive	key study, reliable with restrictions CAS 68334-30-5	Deininger, G.; Jungen, H.; Wenzel-Hartung, R. (1991)

In vivo Chromosome aberration assay RAT (male/female) Intraperitoneal route 300, 1000, or 3000 mg/kg equivalent to OECD Guideline 475 (Mammalian Bone Marrow Chromosome Aberration Test)	Negative	1 (reliable without restriction) key study CAS 64741-44-2	API (1985a)

f) Carcinogenicity:

VGO/HGOs/Distillate fuels exhibited varying levels of activity in carcinogenicity testing with some materials demonstrating low carcinogenic potential and others a marked response both in the presence of severe irritation. Carcinogenic activity is reported in the presence of repeated dermal irritation. However, in view of the questionable adequacy of the PAH (polycyclic aromatic hydrocarbons) analysis and the high levels of phenanthrene and pyrene found in some samples tested in the key study, it is uncertain whether a genotoxic mechanism can be ruled out. Therefore VGO/HGOs/Distillate fuels are classified as Carc. Cat. 3, R40 (Limited evidence of a carcinogenic effect) and Carc. 2 H351 (Suspected of causing cancer) according to the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
MOUSE male Dosage: 25 µL Exposure: Lifetime (three times a week) Compound was applied dermally 3 times a week for the lifespan of the animal (only male mice used) and animals were examined for dermal tumours. Animals were examined grossly for internal tumours at the end of the study period.	Neoplastic effects (skin tumour development)	key study, reliable without restriction	Biles, R.W.; Mckee, R.H.; Lewis, S.C.; Scala, R.A.; DePass, L.R. (1988)

g) Reproductive toxicity:

Effects on fertility:

The information available currently on reproduction toxicity parameters is insufficient to determine the impact on human fertility. No classification is appropriate at this time. However, a testing proposal is included for a two generation fertility study to meet data requirements for this endpoint.

Effects on fertility/ Developmental toxicity:

Developmental studies were only observed developmental effects at doses that caused maternal toxicity and the developmental effects cannot be separated from the maternal effects; therefore, there is no appropriate developmental classification according to the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
RAT inhalation: vapour 0, 101.8, 401.5 ppm Exposure: 10 days (gestational days 6 through 15) (6 hours a day) OECD Guideline 414	**NOAEC** (maternal toxicity): 401.5 ppm (overall effects) **NOAEC** (developmental toxicity): 401.5 ppm (overall effects)	key study, reliable without restriction experimental result CAS 68334-30-5	American Petroleum Institute (API) (1979a)

h) STOT-single exposure:

Data not available.

i) STOT-repeated exposure:

Were conducted repeated dose toxicity studies in animals for classification of repeated dose toxicity for oral exposure of VGO/Hydrocracked/Distillate fuels. A NOAEC of > 1710 mg/m^3 will be carried forward for risk characterisation of systemic effects following sub-chronic exposure to aerosolised diesel fuel. A NOAEL of 30 mg/kg body weight/day, reflecting dose-related changes in liver and thymus, for systemic effects following sub-chronic dermal exposure was obtained.

The overall weight of evidence indicates that VGOs/HGOs/Distillate fuels are classified as stot Rep.Exp.2 H373(May cause damage to organs through prolonged or repeated exposure) according to CPL regulations.

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

Method	Results	Remarks	Reference
Inhalation			
RAT male/female subchronic (inhalation: aerosol) Exposure: 13 weeks OECD Guideline 413	**NOAEC** > 1.71 mg/L Systemic effects (male/female) **NOAEC** 0.88 mg/L Local effects (Lung weight) (male/female)	key study, reliable with restrictions	Lock, S.; Dalbey, W.; Schmoyer, R.; Griesemer, K. (1984)
Dermal			
RAT male/female subacute OECD Guideline 410	**NOEL** (systemic): 0.5 mL/kg (male/female) **NOEL**: 0.0001 mL/kg (male/female) (based on dermal irritation)	key study, reliable with restrictions CAS 68334-30-5	ARCO (1992e)
Rat male/female Subchronic exposure: continuous exposure for 13 weeks (Five days per week) OECD Guideline 411	**NOAEL** 30 mg/kg bw/day (male/female) (clinical signs; body weight; haematology; clinical chemistry; organ weights)	key study, reliable with restrictions; experimental result CAS 64741-49-7	Mobil (1989a)

j) Aspiration hazard:

The low viscosity of this product, <7 mm2 at 40 °C, may cause risk of aspiration into the lungs during swallowing or subsequent vomiting with lung inflammation (chemical pneumonitis) according to the criteria for classification of Annex VI to Directive 67/548/EEC as amended by Directive 2006/121/EC and in accordance with the criteria in Part 3 of Annex I of Regulation 1272/2008. Thus, VGOs/HGOs/Distillate fuels are classified as Xn, R65 (Harmful: may cause lung damage if swallowed) and Asp. Tox. 1, H304 (May be fatal if swallowed and enters airways) according to the EU Dangerous Substances Directive.

Other information:

No data available.

12. ECOLOGICAL INFORMATION

The informations in this section are of the UVCB substanze CAS number 68334-30-5.

According to the information below (toxicity short/long term to fish invertebrates algae and aquatic plants, biodegradation etc), this product is classified as N, R51-53 (Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment) and Aquatic Chronic 2 H411 (Toxic to aquatic life with long lasting effects).

12.1 Toxicity

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

Endpoint	Results	Remarks
Short-term Aquatic Toxicity		
Daphnia magna Aquatic invertebrates	EL50 (48 h): 68 mg/L NOEL (48 h): 46 mg/L	key study, reliable without restriction CAS 68334-30-5 Girling, A.; Cann, B. (1996b)
Algae Pseudokirchnerella subcapitata) Growth Inhibition Test	ErL50 (72 h): 22 mg/L NOEL (72 h): 1 mg/L	key study, reliable with restrictions CAS 68334-30-5 Girling, A.; Cann, B. (1996b)
Fish Oncorhynchus mykiss	LL50 (96 h): 21 mg/L NOEL (96 h): 10 mg/L	key study, reliable with restrictions CAS: 68334-30-5 Girling, A.; Cann, B. (1996b)
Long-term Aquatic Toxicity		
Daphnia magna Aquatic invertebrates	NOEL (21 d): 0.2 mg/L	key study, reliable with restrictions (Q)SAR Redman, et al. (2010b)

Endpoint	Results	Remarks
Fish Oncorhynchus mykiss	NOEL (14 d): 0.083 mg/L	key study, reliable with restrictions (Q)SAR Redman, et al. (2010b)

12.2 Persistence and degradability

Abiotic degradation:

Hydrolysis: the available data demonstrate that these products 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.

Phototransformation in air: this endpoint is not a REACH requirement.

Phototransformation in water/soil: this endpoint is not a REACH requirement.

Biotic degradation (water/sediments/soil):

Substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single 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

Absorption 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.

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 official regulations.

European Waste Catalogue code(s) (Decision 2001/118/CE): 13 07 03. 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 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: dispose of in accordance with local regulations. Do not cut, weld, bore, burn or incinerate emptied containers, unless they have been cleaned and declared safe.

14. TRANSPORT INFORMATION

14.1 UN number

UN 1202

14.2 UN proper shipping name

GAS OIL/DIESEL FUEL/HEATING OIL, LIGHT

14.3 Transport hazard class(es)

Road/railway transport (ADR/RID):	CLASS 3, DANGER CODE F1
Sea transport (IMDG):	CLASS 3
Air transport (ICAO):	CLASS 3
Secondary Risks:	-

14.4 Packing group

Group: III

14.5 Environmental hazards

According to the UN Model Regulations:	Substance Dangerous for the environment
According to the IMDG Code:	Marine Pollutant (P)
According to ADN, just in the tank:	-

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 individual protection measures required bysection 8.2.2 of this SDS.

Mark and labeling (except packaging exemption):	WARNING LABEL N. 3 + MARK OF ENVIRONMENTAL HAZARD
Hazard Identification Number (ADR tank):	30
Tunnel restriction code (ADR):	(D/E)

Emergency measures on board ship (IMDG):	EmS F-E, S-E
Emergency measures in case of aircraft accidents (ICAO):	ERG Code 3L
High-risk goods (security):	NO.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

If you are planning a bulk transfer comply with Annex II to MARPOL 73/78 and the IBC Code if applicable.

15. REGULATORY INFORMATION

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

Authorisations according to Regulation 1907/2006/EC (REACH):

- This product is not in the list of substances of very high concern (SVHC) candidate for authorization.

Restrictions according to REACH Regulation:

- This product is not subject to REACH restrictions.

Other UE:

- The substance is dangerous under the Seveso Regulation (Dir. 96/82/EC): annex I, part 1.
- Directive 98/24/EC (on the protection of the health and safety of workers from the risks related to chemical agents at work) : Hazardous chemical agent for Dir. 98/24/CE.

Dispose of waste in accordance with environmental legislation.

15.2 Chemical safety assessment

Chemical safety assessment has been carried out for the product.

16. OTHER INFORMATION

These phrases are exposed to information and are not necessarily relevant to the classification of the product.

R phrases

R20: Harmful by inhalation

R38: Irritating to skin

R65: Harmful: may cause lung damage if swallowed

R51-53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

H phrases

H226: Flammable liquid and vapour.

H304: May be fatal if swallowed and enters airways.

H315: Causes skin irritation.

H351: Suspected of causing cancer.

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

H411: Toxic to aquatic life with long lasting effects.

Advice on any training appropriate for workers:

Have been properly trained workers potentially exposed to this substance on the basis of the contents of this safety data sheet.

Key literature references and sources for data:

REACH dossier

Legend to abbreviations and acronyms:

ACGIH:	American Conference of Governmental Industrial Hygienists
CSR:	Chemical Safety Report
DNEL:	Derived No effect Level
DMEL:	Derived Minimal Effect Level
EC50:	Half maximal effective concentration
IC50:	Half maximal inhibitory concentration
LC50:	Lethal concentration, 50%
LD50:	Median lethal dose
PNEC:	Predicted No Effect Concentration
PBT:	Persistent, Bioaccumulative and Toxic substance
STOT:	Specific Target Organ Toxicity
(STOT) RE:	Repeated Exposure
(STOT) SE:	Single Exposure
TDL0:	Lowest published toxic dose
TLV:	Threshold Limit Values
vPvB:	Very Persistent and Very Bioaccumulative

Note H = The classification and labelling shown for this substance applies to the dangerousproperty(ies) indicated by the risk phrase(s) in combination with the category(ies) of danger shown. The requirements of Article 6 of this Directive on manufacturers, distributors and importers of this substance apply to all other aspects of classification and labelling. The final label shall follow the requirements of section 7 of Annex VI of this Directive.This note applies to certain coal- and oil-derived substances and to certain entries for groups of substances in Annex I.

Note N = The classification as a carcinogen need not apply if the full refining history is known and it can be shown that the substance from which it is produced is not a carcinogen. This note applies only to certain complex oilderived substances in Part 3.

Compilation date	01/12/2010
Updating date	01/12/2010
Grounds for review	Update under Annex I of Regulation UE 453/2010, which replaced Annex II of Regulation EC No. 1907/2006

ANNEX

Exposure Scenarios
For the component CAS 68334-30-5

Identified Use Name	Sector	Sector of Use (SU)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
01a – Distribution of Substance	Industrial	3	1, 2, 3, 4, 8a, 8b, 9, 15	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7	ESVOC SpERC 1.1b.v1
02 – Formulation & (Re)packing of Substances and Mixtures	Industrial	3, 10	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15	2	ESVOC SpERC 2.2.v1
12a – Use as a Fuel: Industrial	Industrial	3	1, 2, 3, 8a, 8b, 16	7	ESVOC SpERC 7.12a.v1
12b – Use as a Fuel: Professional	Professional	22	1, 2, 3, 8a, 8b, 16	9a, 9b	ESVOC SpERC 9.12b.v1
12c – Use as a Fuel: Consumer	Consumer	21	NA	9a, 9b	ESVOC SpERC 9.12c.v1

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1. Distribution of Gas Oils (vacuum, hydrocracked & distillate fuels) – Industrial

Section 1 Exposure Scenario Title Gas Oils (vacuum, hydrocracked & distillate fuels) R20, R38, R40, R65, R51/53	
Title	
Distribution of Substance	
Use Descriptor	
Sector(s) of Use	3
Process Categories	1, 2, 3, 4, 8a, 8b, 9, 15 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	1, 2, 3, 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, maintenance 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 temperature, 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 applicable to all activities CS135	Control any potential exposure using measures such as contained systems, properly designed and maintained facilities and a good standard of general ventilation. Drain down systems and transfer lines prior to breaking containment. Drain down and flush equipment where possible prior to maintenance. Where there is potential for exposure: Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions. G25
General measures (skin irritants) G19	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin effects that may develop. E3
General exposures (Closed systems) CS15	Handle substance within a closed system E47
General exposures (Open systems) CS16	Wear suitable gloves tested to EN374 PPE15
Process sampling CS2	No other specific measures identified EI20
Laboratory activities CS36	No other specific measures identified EI20
Bulk closed loading and unloading CS501	Handle substance within a closed system E47 Wear suitable gloves tested to EN374 PPE15
Bulk open loading and unloading CS503	Wear suitable gloves tested to EN374 PPE15
Drum and small pack filling CS6	Wear suitable gloves tested to EN374 PPE15
Equipment cleaning and maintenance CS39	Drain down system prior to equipment break-in or maintenance. E65. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. PPE16
Storage CS67	Handle substance within a closed system. E84
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3	
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 (tones/year)	2.8e7
Fraction of Regional tonnage used locally	0.002
Annual site tonnage (tonnes/year)	5.6e4
Maximum daily site tonnage (kg/day)	1.9e5
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 human via indirect exposure (primarily ingestion) [TCR1j] Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].No wastewater treatment required [TCR6].	
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	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1]. 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	

Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	2.9e6
Assumed domestic sewage treatment plant flow (m^3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable regulations [ETW3].	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file.	
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 dermal irritant effects. G32. 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].	

2. Formulation & (Re)packing of Gas Oils (vacuum, hydrocracked & distillate fuels) – Industrial

Section 1 Exposure Scenario Title Gas Oils (vacuum, hydrocracked & distillate fuels) R20, R38, R40, R65, R51/53	
Title	
Formulation & (Re)packing of Substances and Mixtures	
Use Descriptor	
Sector(s) of Use	3, 10
Process Categories	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
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, tabletting, 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 temperature, 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 applicable to all activities CS135	Control any potential exposure using measures such as contained systems, properly designed and maintained facilities and a good standard of general ventilation. Drain down systems and transfer lines prior to breaking containment. Drain down and flush equipment where possible prior to maintenance. Where there is potential for exposure: Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions. G25
General measures (skin irritants) G19	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin effects that may develop. E3
General exposures (closed systems) CS15	Handle substance within a closed system E47
General exposures (open systems) CS16	Wear suitable gloves tested to EN374 PPE15
Process sampling CS2	No other specific measures identified EI20
Drum and batch transfers CS8	Use drum pumps or carefully pour from container E64 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16
Bulk transfers CS14	Handle substance within a closed system E47 Wear suitable gloves tested to EN374 PPE15
Mixing operations (open systems) CS30	Provide extract ventilation to points where emissions occur E54 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16
Production or preparation or articles by tabletting, compression, extrusion or pelletisation CS100	Wear suitable gloves tested to EN374 PPE15

Drum and small package filling CS8	Wear suitable gloves tested to EN374 PPE15
Laboratory activities CS36	No other specific measures identified EI20
Equipment clean down and maintenance CS39	Drain down system prior to equipment break-in or maintenance. E65. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. PPE16
Storage CS67	Store substance within a closed system. E84
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3	
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)	2.8e7
Fraction of Regional tonnage used locally	0.0011
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 (after typical onsite RMMs, consistent with EU Solvent Emissions Directive requirements)	1.0e-2
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)	0.0001
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 freshwater sediment [TCR1b]. 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
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	59.9
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1]. 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	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	6.8e5
Assumed domestic sewage treatment plant flow (m^3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable regulations [ETW3].	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file.	
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 dermal irritant effects. G32. 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].

3. Use of Gas Oils (vacuum, hydrocracked & distillate fuels) as a Fuel – Industrial

Section 1 Exposure Scenario Title Gas Oils (vacuum, hydrocracked & distillate fuels) R20, R38, R40, R65, R51/53	
Title	
Use as a Fuel	
Use Descriptor	
Sector(s) of Use	3
Process Categories	1, 2, 3, 8a, 8b, 16 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	7
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) 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 temperature, 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 applicable to all activities CS135	Control any potential exposure using measures such as contained systems, properly designed and maintained facilities and a good standard of general ventilation. Drain down systems and transfer lines prior to breaking containment. Drain down and flush equipment where possible prior to maintenance. Where there is potential for exposure: Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions. G25
General measures (skin irritants) G19	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin effects that may develop. E3
Bulk transfers CS14	Wear suitable gloves tested to EN374. PPE15
Drum/batch transfers CS8	Wear suitable gloves tested to EN374.PPE15
Use as a fuel (closed systems) GEST_12I, CS107	No other specific measures identified EI20
Equipment cleaning and maintenance CS39	Drain down system prior to equipment break-in or maintenance E65 Wear chemically resistant gloves (tested to type EN374) in combination with 'basic' employee training PPE16
Storage CS67	Handle substance within a closed system. E84

Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3

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)	4.5e6
Fraction of Regional tonnage used locally	0.34
Annual site tonnage (tonnes/year)	1.5e6

Maximum daily site tonnage (kg/day)	5.0e6
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)	5.0e-3
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
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 freshwater sediment [TCR1b]. 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 ≥ (%)	97.7
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	60.4
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1]. 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	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.7
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	5.0e6
Assumed domestic sewage treatment plant flow (m^3/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].
Conditions and measures related to external recovery of waste
External recovery and recycling of waste should comply with applicable regulations [ERW1].
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file.
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 dermal irritant effects. G32. 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].

4. Use of Gas Oils (vacuum, hydrocracked & distillate fuels) as a Fuel – Professional

Section 1 Exposure Scenario Title Gas Oils (vacuum, hydrocracked & distillate fuels) R20, R38, R40, R65, R51/53	
Title	
Use as a Fuel	
Use Descriptor	
Sector(s) of Use	22
Process Categories	1, 2, 3, 8a, 8b, 16 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
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 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 temperature, 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 applicable to all activities CS135	Control any potential exposure using measures such as contained systems, properly designed and maintained facilities and a good standard of general ventilation. Drain down systems and transfer lines prior to breaking containment. Drain down and flush equipment where possible prior to maintenance. Where there is potential for exposure: Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions. G25
General measures (skin irritants) G19	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin effects that may develop. E3
Bulk transfers CS14	Wear suitable gloves tested to EN374. PPE15
Drum/batch transfers CS8	Use drum pumps or carefully pour from container E64 Wear suitable gloves tested to EN374.PPE15
Refuelling activities CS507	Wear suitable gloves tested to EN374 PPE15
Use as a fuel (closed systems) GEST_12I, CS107	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) E11 **or** Ensure operation is undertaken outdoors E69
Equipment cleaning and maintenance CS39	Drain down system prior to equipment break-in or maintenance E65 Wear chemically resistant gloves (tested to EN374) in combination with basic employee training PPE16
Storage CS67	Store substance within a closed system E84
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3	
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)	6.7e6
Fraction of Regional tonnage used locally	0.0005

Annual site tonnage (tonnes/year)	3.3e3
Maximum daily site tonnage (kg/day)	9.2e3
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 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 (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]. 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
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1]. 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	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	1.4e5

Assumed domestic sewage treatment plant flow (m^3/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].	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file.	
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 dermal irritant effects. G32. 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].	

5. Use of Gas Oils (vacuum, hydrocracked & distillate fuels) as a Fuel – Consumer

Section 1 Exposure Scenario Title Gas Oils (vacuum, hydrocracked & distillate fuels) R20, R38, R40, R65, R51/53		
Title		
Use as a Fuel		
Use Descriptor		
Sector(s) of Use		21
Product Categories		13 *Further information on the mapping and allocation of PC codes is contained in Table 9.1*
Environmental Release Categories		9a, 9b
Specific Environmental Release Category		ESVOC SpERC 9.12c.v1
Processes, tasks, activities covered		
Covers consumer uses in fuels.		
Assessment Method		
See Section 3		
Section 2 Operational conditions and risk management measures		
Section 2.1 Control of consumer exposure		
Product characteristics		
Physical form of product		liquid
Vapour pressure (kPa)		Liquid, vapour pressure > 10 Pa OC15
Concentration of substance in product		Unless otherwise stated, cover concentrations up to 100% [ConsOC1]
Frequency and duration of use/exposure		Unless otherwise stated, covers use amounts up to 37500g [ConsOC2]; covers skin contact area up to 420cm^2 [ConsOC5]
Other Operational Conditions affecting exposure		Unless otherwise stated, covers use frequency up to 0.143 times per day [ConsOC4]; covers exposure up to 2 hours per event [ConsOC14]
Product Category		**Specific Risk Management Measures and Operating Conditions**
PC13:Fuels--Liquid - subcategories	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 52 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 210.00 cm^2 [ConsOC5]; for each

added: Automotive Refuelling		use event, covers use amounts up to 37500g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m^3[ConsOC11]; for each use event, covers exposure up to 0.05hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated [ConsRMM15]
PC13:Fuels--Liquid - subcategorie s added: Garden Equipment - Use	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 26 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 750g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m^3[ConsOC11]; for each use event, covers exposure up to 2.00hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated [ConsRMM15]
PC13:Fuels--Liquid (subcategorie s added): Garden	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 26 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 420.00 cm2 [ConsOC5]; for each use event, covers use amounts up to 750g [ConsOC2]; Covers use in a one car garage (34m^3) under typical ventilation [ConsOC10];
Equipment - Refuelling		covers use in room size of 34m3[ConsOC11]; for each use event, covers exposure up to 0.03hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated [ConsRMM15]

Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3

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)	1.6e7
Fraction of Regional tonnage used locally	0.0005
Annual site tonnage (tonnes/year)	8.2e3
Maximum daily site tonnage (kg/day)	2.3e4

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	
Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion) [TCR1j].	
Release fraction to air from wide dispersive use (regional only)	1.0e-4
Release fraction to wastewater from wide dispersive use	0.00001
Release fraction to soil from wide dispersive use (regional only)	0.00001
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	3.5e5
Assumed domestic sewage treatment plant flow (m^3/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].	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file.	
Section 3 Exposure Estimation	
3.1. Health	
The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD. Where exposure determinants differ to these sources, then they are indicated.	
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.
4.2. Environment
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Material Safety Data Sheet

according to EC Regulation No 1907/2006

FUEL OIL

Q8 Quaser srl

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
CE Number	270-675-6
Index number	649-024-00-9
Registration number	01-2119474894-22-XXXX
Molecular formula	Not applicable, the substance is a petroleum UVCB substance which cannot be represented by a simple or unique chemical structure.
Molecular weight	Not applicable, the substance is a petroleum UVCB substance.

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:

- *Industrial: distribution of substance, formulation & (re)packing of substances and mixtures, uses in coatings, use as a fuel.*
- *Professional: use as a fuel, uses in coatings, road and construction applications.*

See section 16 for a complete list of uses, and use descriptors, for which an ES is provided as an annex.

USES ADVISED: The uses of substances are indicated above. Other uses are not recommended unless an assessment is completed, prior to commencement of that use, which demonstrates that the use will be controlled.

1.3 Details of the safety data sheet supplier

Company name	Q8 Quaser srl
Address	Viale dell'Oceano Indiano, 13
City / State	00144 - Roma (Italy)
Telephone	+39 06-520881
Competent Technician E-mail	*schede@q8.it*

1.4 Emergency telephone number

Italy: Poisons Information Centre Niguarda (Cà Granda – Milano) Tel. +39 02 66101029 (24 h).

Foreign countries: Contact the closest Poisons Information Centre.

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, and set out in Annex VI of Directive 67/548/EEC as amended by Directive 2006/121/EC.

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

2.1.1 The classification of the substance according to Regulation (EC) No 1272/2008 (CLP/GHS)

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

2.1.2 The classification of the substance according to Directive 67/548/EEC

Xn; R20- 48/21

Carc. Cat. 2; R45

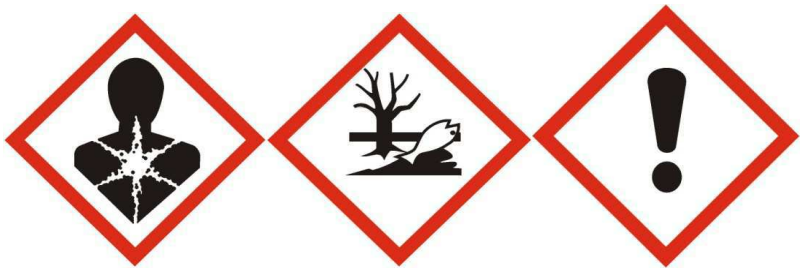
Repr. Cat. 3.; R63

R66;

N; R50-53

Full text of R and H-phrases: see section 16

2.2 Label elements



Signal Word: **DANGER**

Hazard Statement

H332: Harmful if inhaled

H350: May cause cancer

H361d: Suspected of damaging the unborn child

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

H410: Very toxic to aquatic life with long lasting effects

EU H066: Repeated exposure may cause skin dryness or cracking

Precautionary Statement

Prevention

P201: Obtain special instructions before use

P260: Do not breathe dust/fume/gas/mist/vapours/spray

P273: Avoid release to the environment

P281: Use personal protective equipment as required

Response

P301+310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician

Disposal

P501: Dispose of contents/container in accordance with local/regional/national/international regulation

Other information:

NOTE: H (full text given in section 16).

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.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

UVCB substance (PrC3), CAS N. 68476-33-5, EINECS N. 270-675-6 INDEX N. 649-024-00-9, ("The liquid product from various refinery streams, usually residues. The composition is complex and varies with the source of the crude oil."): 100% w/w.

This product contains sulfur compounds that, in certain circumstances, may give rise to small amounts of hydrogen sulfide (see also sec. 2).

3.2 Mixtures

Not applicable.

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.

5. FIREFIGHTING MEASURES

5.1 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.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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 H_2S 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.

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 regarding protective equipment and operational conditions see Exposure scenarios.

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 H_2S 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.

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/sparks/open flames/hot surfaces. Do not smoke.

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 uses

See attached Exposure scenarios.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Exposure limit values (substance):

Mineral oil:

ACGIH 2010:

- TLV®-TWA:
  - Exposure should be kept as low as possible (low and mildly refined mineral oil)
  - 5 mg/m^3 (pure mineral oil and other highly refined)

Exposure limit values (atmospheric contaminants):

Hydrogen sulphide:

Dir. 2009/161/UE:

- Limit Values (8 h): 5 ppm; 7 mg/m^3
- Limit Values (short-term): 10 ppm; 14 mg/m^3

ACGIH 2010:

- TLV®-TWA: 1 ppm
- TLV®-STEL: 5 ppm

Recommended Monitoring procedures: refer to Dir. 96/82/EC or Good industrial heath practices in the work place.

DNEL (Derived No Effect Level)

	DNEL for workes				DNEL for the general population			
Route	**Long-Term Exposure: Local Effects**	**Long-Term Exposure: Systemic effects**	**Acute Exposure: Local effects**	**Acute Exposure: Systemic effects**	**Long-Term Exposure: Local effects**	**Long-Term Exposure: Systemic effects**	**Acute Exposure: Local effects**	**Acute Exposure: Systemic effects**
Oral	n.a.	n.a.	n.a.	n.a.	n.a.	0.015 mg/kg/24h	n.a.	n.a.
Dermal	n.d.	0.065 mg/kg/8h	a	a	a	a	a	a
Inhalation	a	0.12 mg/m^3/8h (aerosol)	a	4700 mg/m^3/15 min (aerosol)	a	a	a	a

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

DMEL (Derived Minimal Effect Level)

Not identified because no dose descriptor are available.

PNEC(S) (Predicted No Effect Concentration)

Refer to "Exposure scenarios".

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, such as personal protective equipment

(a) 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.

(b) 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). 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.

(c) 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 H_2S) 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.

(d) Thermal hazards:

See previous letter b)

8.2.3 Environmental exposure controls

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

For more information regarding protective equipment and operational conditions see “Exposure Scenarios”.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Blackish viscous liquid
b)	Odor	Petroleum odor
c)	Odor 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)	Vapor pressure	0,02-0,79 kPa @ 120 °C Mw 330-500
l)	Vapor density	Not applicable
m)	Density	840-1100 kg/m^3 (Absolute density for UVBC-EN ISO 12185, ASTM D 4052 and/or EN ISO 3675, ASTM 1298)
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	No chemical group in the molecule has explosive properties
t)	Oxidising properties	The substance does not react exothermically with combustible materials

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.

10. STABILITY AND REACTIVITY

10.1 Reactivity

The substance 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/sparks/open flames/hot surfaces. Do not smoke.

Avoid formation of electrostatic charges.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

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

11. TOXICOLOGICAL INFORMATION

11.1 Information on 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.

11.2 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. These results do not lead to any classification in accordance with regulations on hazardous substances.

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

Method	Results	Remarks	Reference
RAT 4320 (female) 5270 (male) ORAL (gavage) OECD Guideline 401 (Acute Oral Toxicity)	DL50: 5270 (male) DL50: 4320 mg/kg (female)	key study, reliable with restriction CAS 64741-62-4	American Petroleum Institute (API) 1982

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 Xn R20 (Harmful by inhalation) and Acute Tox. 4 H332 (Harmful if inhaled).

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

Method	Results	Remarks	Reference
RAT EPA OTS 798.1150 (Acute inhalation toxicity)	CL50 mg/L/4 h: 4.5 (female) CL50 mg/L/4 h: 4.1 (male)	key study (study of more relevance) CAS 64741-62-4	ARCO 1987 (Atlantic Richfield Company)

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 under the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
RABBIT EU Method B.3 (Acute Toxicity Dermal)	DL50 >2000 mg/kg (male/female)	Key study, reliable with restriction CAS 68476-33-5	ARCO 1987 (Atlantic Richfield Company)

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).

No classification is required under theEU Dangerous Substances Directive.

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

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

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. No classification is required under the EU Dangerous Substances Directive.

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

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

d) Respiratory or skin sensitisation

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 under the EU Dangerous Substances Directive.

Skin sensitisation:

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. Thus, no classification is required under the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference

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

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, with no classification required under the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
In vitro Ames Test S. typhimurium TA98	Positive (with or without activation) >10000 ug/plate	Key study, reliable with restrictions CAS 64741-62-4	American Petroleum Institute 1986
Micronucleus assay (chromosome aberration) MOUSE (CD-1) male/female Oral: garage 0, 188, 375, 750 or 1500 mg/kg/ bw/d (nominal concentration) Equivalent or similar to EU B.12	Negative Test results: Genotoxicity: negative (male/female); Toxicity: no effect	Key study, reliable without restrictions CAS 64741-62-4	Przygoda, R.T.; McKee, R.H.; Amoroso, M.A.; Freeman, J.J. (1999)

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. Cat. 2; R45 (May cause cancer) and Carc. 1B H350 (May cause cancer) is appropriate.

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

Method	Results	Remarks	Reference
MOUSE 50 µL (amount applied). Compound was applied dermally 2 times a week for the lifespan of the animal. No guidance available.	Strongly carcinogenic for the skin (**LOAEC** 1% increase of malignant tumors of the skin **NOAEL** 0,1%: modest increase in the incidence of benign skin tumors)	Key study, reliable with restriction CAS 64741-62-4	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. No classification is required under the EU Dangerous Substances Directive.

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

Method	Results	Remarks	Reference
RAT 0,1, 1, 10, 50, 250 mg/kg/bw/d Dermal application 6 h/d EPA OTS 798.4700 (Priproduction and fertility effects Study	**NOAEL** 50 mg/kg systemic effects: decrease in body weight (male) **NOAEL** 250 mg/kg Reproductive toxicity (male): No adverse effects on reproductive organ weights, sperm parameters and fertility functional	Supporting study, reliable without restriction CAS 64741-62-4	ARCO (1992 af)

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. Cat. 3; R63 (Possible risk of harm to the unborn child) and Repr. 2 H361d (Suspected of damaging the unborn child) is considered appropriate.

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

Method	Results	Remarks	Reference
RAT 0,05, 1, 10, 50, 2550 mg/kg mg/kg/bw/d Dermal application 6 h/gd	**NOAEL** 0.05 mg/kg Maternal toxicity, effects: Decrease in weight, effects on food consumption vaginal discharge **NOAEL** 0.05 mg/kg Developmental toxicity effects: Decreased gravid uterine weight, resorptions, reduced fetal weight.	Key study, reliable without restriction CAS 64741-62-4	Hoberman, A.M.; Christian, M.S.; Lovre, S.; Roth, R. and Koschier, F. 1995 EPA OTS 798.4900 (Prenatal Developmental Toxicity Study)
RAT 0, 50, 333, 1000 mg/kg mg/kg/bw/d Dermal application 6 h/d	**NOAEL** 333 mg/kg Maternal toxicity, effects: weight loss, increased length of gestation **NOAEL** 333 mg/kg Developmental toxicity effects: decrease of infant weight	Key study, reliable with restriction CAS 64741-45-3	ARCO (Atlantic Richfield Company) 1994

h) STOT-single exposure:

Data not available

i) STOT-repeated exposure:

Oral:

Justification: 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 R48/21 (Harmful: danger of serious damage to health by prolonged exposure in contact with skin) and STOT RE 2 H373 (May cause damage to organs through prolonged or repeated exposure) is appropriate.

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

Method	Results	Remarks	Reference
RAT Pure product: 0, 1, 10, 50 mg/kg/bw/d Diluted in acetone: 0,01 1, 10, 50 mg/kg/bw/d Occlusive bandage 6 h/day for 5 days a week for 4 weeks.	**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)): 1 mg/kg bw/day (male/female) (Sporadic very slight erythema, eschar and dry skin) **NOAEL** (systemic toxicity (applied in acetone)): 1 mg/kg bw/day (male) (Decreased haematological parameters, increate relative liver weight) **NOAEL** (systemic toxicity (applied in acetone)): 1 mg/kg bw/day (female) (Increased relative liver weight) **LOAEL** (local effects (applied in acetone)): 0.01 mg/kg bw/day (male/female) (Sporadic very slight erythema, eschar and dry skin)	Key study, reliable with restriction CAS 64741-62-4	ARCO 1993a (Atlantic Richfield Company)

Inhalation:

Justification: 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.

j) Aspiration hazard:

There is no further information.

Other information:

The substance has moderate potential to cause photoirritation.

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 N; R50-53 (Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment) and Aquatic Chronic 1 H410 (Very toxic to aquatic life with long lasting effects).

12.1 Toxicity

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

Endpoint	Results	Remarks
Aquatic Toxicity		
Invertebrates Daphnia magna Short-term	EL50 48h: 2 mg/L	Key study
Invertebrates Daphnia magna Long-term	NOAEL: 0.27 mg/L	Key study
Algae Selenastrum capricornutum Growth Inhibition Test	ErL50 72h: 0.75 mg/L NOEL: < 1 mg/L	Key study
Fish Pimephales promelas Short-term	LL50 96h: 79 mg/L	Key study
Pesce Long-term	NOEL: 0.1 mg/L	Key study
Activated sludge: (respiration inhibition test)	LL50: >1,000 mg/L	Key study
Effects on terrestrial organisms		
Birds Anas platyrhynchos Long-term /oral/22 weeks	NOAEL: 20,000 mg/kg	Key study

12.2 Persistence and degradability

Abiotic degradation:

Hydrolysis: 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.

Phototransformation 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.

Phototransformation in water/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:

Biodegradation (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

Absorption 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.

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 of waste product or used containers 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 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 containers in the environment. Dispose used containers according to local regulations.

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

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

ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S. (heating oil)

14.3 Transport hazard class(es)

Road/railway transport (ADR/RID):	CLASS 3, DANGER CODE F2
Sea transport (IMDG):	CLASS 3
Air transport (ICAO):	CLASS 3
Secondary Risks:	-

14.4 Packing group

Group: III

14.5 Environmental hazards

According to the UN Model Regulations:	Substance Dangerous for the environment.
According to the IMDG Code:	Marine Pollutant (P)
According to ADN, just in the tank:	-

14.6 Special precautions for users

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 individual protection measures required bysection 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.

Air transport prohibited.

Mark and labeling (except packaging exemption):	WARNING LABEL N. 3
	+ MARK OF ENVIRONMENTAL HAZARD
Hazard Identification Number (ADR tank):	30
Tunnel restriction code (ADR):	(D/E)
Emergency measures on board ship (IMDG):	EmS F-E, S-D
Emergency measures in case of aircraft accidents (ICAO):	ERG Code 3L
High-risk goods (security):	NO

14.7 Transport bulk according to Annex II of MARPOL 73/78 and the IBC Code

If you are planning a bulk transfer comply with Annex II to MARPOL 73/78 and the IBC Code if applicable.

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

14.1 UN number

UN 3257

14.2 UN proper shipping name

ELEVATED TEMPERATURE LIQUID, N.O.S. (heating oil)

14.3 Transport hazard class(es)

Road/railway transport (ADR/RID):	CLASS 9, DANGER CODE M9
Sea transport (IMDG):	CLASS 9
Air transport (ICAO):	CLASS 9
Secondary Risks:	-

14.4 Packing group

Group: III

14.5 Environmental hazards

According to the UN Model Regulations:	Substance Dangerous for the environment.
According to the IMDG Code:	Marine Pollutant (P)
According to ADN, just in the tank:	-

14.6 Special precautions for users

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 individual protection measures required bysection 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.

Air transport prohibited.

Mark and labeling (except packaging exemption):	WARNING LABEL N. 9 + MARK OF ENVIRONMENTAL HAZARD
Hazard Identification Number (ADR tank):	99
Tunnel restriction code (ADR):	(D)
Emergency measures on board ship (IMDG):	EmS F-A, S-P
Emergency measures in case of aircraft accidents (ICAO):	ERG Code 9L
High-risk goods (security):	NO

14.7 Transport bulk according to Annex II of MARPOL 73/78 and the IBC Code

If you are planning a bulk transfer comply with Annex II to MARPOL 73/78 and the IBC Code if applicable.

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

14.1 UN number

UN 3082

14.2 UN proper shipping name

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (heating oil)

14.3 Transport hazard class(es)

Road/railway transport (ADR/RID):	CLASS 9, DANGER CODE M6
Sea transport (IMDG):	CLASS 9
Air transport (ICAO):	CLASS 9
Secondary Risks:	-

14.4 Packing group

Group: III

14.5 Environmental hazards

According to the UN Model Regulations:	Substance Dangerous for the environment.
According to the IMDG Code:	Marine Pollutant (P)
According to ADN, just in the tank:	-

14.6 Special precautions for users

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 individual protection measures required bysection 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.

Mark and labeling (except packaging exemption):	WARNING LABEL N. 9 + MARK OF ENVIRONMENTAL HAZARD
Hazard Identification Number (ADR tank):	90
Tunnel restriction code (ADR):	(E)
Emergency measures on board ship (IMDG):	EmS F-A, S-F
Emergency measures in case of aircraft accidents (ICAO):	ERG Code 9L
High-risk goods (security):	NO

14.7 Transport bulk according to Annex II of MARPOL 73/78 and the IBC Code

If you are planning a bulk transfer comply with Annex II to MARPOL 73/78 and the IBC Code if applicable.

15. REGULATORY INFORMATION

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

Authorisations according to Regulation 1907/2006/EC (REACH):

- This product is not in the list of substances of very high concern (SVHC) candidate for authorization.

Restrictions according to REACH Regulation:

- Restricted substance under Title VIII (Annex XVII, Appendix 2, paragraph 28).

Other UE:

- The substance is dangerous under the Seveso Regulation (Dir. 96/82/EC): annex I part 2 group 9i.
- Directive 98/24/EC (on the protection of the health and safety of workers from the risks related to chemical agents at work) : Hazardous chemical agent for Dir. 98/24/CE.

Dispose of waste in accordance with environmental legislation.

15.2 Chemical safety assessment

Chemical safety assessment has been carried out for the product.

16. OTHER INFORMATION

List of relevant hazard statements:

These phrases are exposed to information and are not necessarily relevant to the classification of the product.

R phrases

R20: Harmful by inhalation

R45: May cause cancer

R48/21: Harmful: danger of serious damage to health by prolonged exposure in contact with skin

R63: Possible risk of harm to the unborn child

R66: Repeated exposure may cause skin dryness or cracking

R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

H phrases

H332: Harmful if inhaled

H350: May cause cancer

H361d: Suspected of damaging the unborn child

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

H410: Very toxic to aquatic life with long lasting effects

EU H066: Repeated exposure may cause skin dryness or cracking

Advice on any training appropriate for workers:

Have been properly trained workers potentially exposed to this substance on the basis of the contents of this safety data sheet.

Key literature references and sources for data:

REACH dossier

Legend to abbreviations and acronyms:

ACGIH: American Conference of Governmental Industrial Hygienists

CSR: Chemical Safety Report

DNEL: Derived No effect Level

DMEL: Derived Minimal Effect Level

EC50: Half maximal effective concentration

IC50: Half maximal inhibitory concentration

LC50: Lethal concentration, 50%

LD50: Median lethal dose

PNEC: Predicted No Effect Concentration

PBT: Persistent, Bioaccumulative and Toxic substance

CNS: Central nervous system

STOT: Specific Target Organ Toxicity

(STOT) RE Repeated Exposure

(STOT) SE: Single Exposure

TLV®TWA: Threshold Limit Values – Time-Weighed Average

TLV®STEL: Threshold Limit Values – Short Term Exposure Limit

UVCB: Unknown or Variable Composition, Complex reaction products or Biological materials

vPvB: Very Persistent and Very Bioaccumulative

Note H = The classification and labelling shown for this substance applies to the hazardous property(ies) indicated by the hazard statement(s) in combination with the hazard class(es) and category(ies) shown. The requirements of Article 4 for manufacturers, importers or downstream users of this substance apply to all other hazard classes and categories. For hazard classes where the route of exposure or the nature of the effects leads to a differentiation of the classification of the hazard class, the manufacturer, importer or downstream user is required to consider the routes of exposure or the nature of the effects not already considered.

Date of compilation	01/12/2010
Data of revision	01/12/2010
Version	N. 0
Reason for revision	Update under Annex I of Regulation UE 453/2010, which replaced Annex II of Regulation EC No. 1907/2006

ANNEX

Exposure Scenario

Identified Use Name	Sector	Sector(s) of Use	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
01a- Distribution of Substance (GEST1A_I)	Industrial (G26)	3	1, 2, 3, 8a, 8b, 15	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7	ESVOC SpERC 1.1b.v1
02- Formulation & (Re)packing of Substances and Mixtures (GEST2_I)	Industrial (G26)	3, 10	1, 2, 3, 8a, 8b, 15	2	ESVOC SpERC 2.2.v1
03a- Uses in Coatings: Industrial (GEST3_I)	Industrial (G26)	3	1, 2, 3, 8a, 8b, 15	4	ESVOC SpERC 4.3a.v1
03b- Uses in Coatings: Professional (GEST3_I)	Professional (G27)	22	1, 2, 3, 8a, 8b, 15	8a, 8d	ESVOC SpERC 8.3b.v1
12a- Use as a Fuel: Industrial (GEST12_I)	Industrial (G26)	3	1, 2, 3, 8a, 8b, 16	7	ESVOC SpERC 7.12a.v1
12b- Use as a Fuel: Professional (GEST12_I)	Professional (G27)	22	1, 2, 3, 8a, 8b, 16	9a, 9b	ESVOC SpERC 9.12b.v1
15- Use in Road and Construction Applications (GEST15-P)	Professional (G27)	22	8a, 8b	8d, 8f	ESVOC SpERC 8.15.v1

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1. Distribution of Heavy Fuel Oil – Industrial

Section 1	
Title	
Distribution of Substance	
Use Descriptor	
Sector(s) of Use	3
Process Categories	1, 2, 3, 8a, 8b, 15 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	1, 2, 3, 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) of substance within closed or contained systems, including incidental exposures during its sampling, storage, unloading, maintenance 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
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.
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3	
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)	1.1e7
Fraction of Regional tonnage used locally	2.0e-3
Annual site tonnage (tonnes/year)	2.3e4
Maximum daily site tonnage (kg/day)	7.7e4
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-4
Release fraction to wastewater from process (initial release prior to RMM)	1.0e-7
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]. No wastewater treatment required [TCR6].	
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	
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) based on release following total wastewater treatment removal (kg/d)	3.8e5
Assumed domestic sewage treatment plant flow (m^3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable regulations [ETW3].	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file in IUCLID Section 13	
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].	

2. Formulation & (Re)packing of Heavy Fuel Oil – Industrial

Section 1 Exposure Scenario Title Heavy Fuel Oil	
Title	
Formulation & (Re)packing of Substances and Mixtures	
Use Descriptor	
Sector(s) of Use	3, 10
Process Categories	1, 2, 3, 8a, 8b, 15 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	2
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.	
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	Handle substance within a closed system E47. Sample via a closed loop
(closed systems).	or other system to avoid exposure E8. 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. 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	Transfer via enclosed lines E52 Avoid carrying out activities involving exposure for more than 4 hours OC28..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.

Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3

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)	1.1e7
Fraction of Regional tonnage used locally	2.6e-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 (after typical onsite RMMs, consistent with EU Solvent Emissions Directive requirements)	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 (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]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TRC14].	
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 ≥ (%)	54.0
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	
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) based on release following total wastewater treatment removal (kg/d)	1.1e5
Assumed domestic sewage treatment plant flow (m^3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable regulations [ETW3].	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file in IUCLID Section 13	
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].	

3. Uses of Heavy Fuel Oil in Coatings – Industrial

Section 1 Exposure Scenario Title Heavy Fuel Oil	
Title	
Uses in Coatings	
Use Descriptor	
Sector(s) of Use	3
Process Categories	1, 2, 3, 8a, 8b, 15 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	4
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.	
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
CS99 Film formation - force drying, stoving and other technologies.	Provide extract ventilation to points where emissions occur E54. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
CS15 General exposures (closed	Handle substance within a closed system E47. Provide extract ventilation to

systems).	points where emissions occur E54. 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.
CS3 Material 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. Ensure material transfers are under containment or extract ventilation E66.
CS36 Laboratory activities.	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure E12. Wear suitable gloves tested to EN374 PPE15.
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.
CS67 Storage.	Store substance within a closed system E84. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16.
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3	
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)	1.0e2
Fraction of Regional tonnage used locally	1
Annual site tonnage (tonnes/year)	1.0e2
Maximum daily site tonnage (kg/day)	5.0e3
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	20
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)	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 (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]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TRC14].	
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	
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) based on release following total wastewater treatment removal (kg/d)	1.1e5
Assumed domestic sewage treatment plant flow (m^3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable regulations [ETW3].	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file in IUCLID Section 13	
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].	

4. Uses of Heavy Fuel Oil in Coatings – Professional

Section 1 Exposure Scenario Title Heavy Fuel Oil	
Title	
Uses in Coatings	
Use Descriptor	
Sector(s) of Use	22
Process Categories	1, 2, 3, 8a, 8b, 15 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	8a, 8d
Specific Environmental Release Category	ESVOC SpERC 8.3b.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.	
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
Film formation - force drying, stoving and other technologies CS99.	Handle substance within closed systems E47 Limit the substance content in the product to 5 % OC17. Provide extract ventilation to points where emissions occur. E54

CS15 General exposures (closed systems).	Handle substance within closed systems E47 Limit the substance content in the product to 5 % OC17. Provide extract ventilation to points where emissions occur. E54
CS3 Material transfers	Ensure material transfers are under containment or extract ventilation E66 Avoid carrying out activities involving exposure for more than 15 minutes OC26. Limit the substance content in the product to 1 % OC16. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls PPE18.
CS36 Laboratory activities.	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. E12.
CS39 Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance E55 Retain drain down in sealed storage pending disposal or for subsequent recycle ENVT4. Deal with spills immediately. C&H13. Avoid carrying out activities involving exposure for more than 15 minutes OC26. Limit the substance content in the product to 1 % OC16. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls PPE18. Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4.
CS67 Storage.	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training PPE16. Store substance within a closed system. E84

Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3

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)	1.0e2
Fraction of Regional tonnage used locally	5.0e-4
Annual site tonnage (tonnes/year)	5.0e-2
Maximum daily site tonnage (kg/day)	1.4e-1

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 only)	0.98
Release fraction to wastewater from wide dispersive use	0.01
Release fraction to soil from wide dispersive use (regional only)	0.01

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

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	
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) based on release following total wastewater treatment removal (kg/d)	7.0e-1
Assumed domestic sewage treatment plant flow (m^3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable regulations [ETW3].	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file in IUCLID Section 13	
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].	

5. Use of Heavy Fuel Oil as a Fuel – Industrial

Section 1 Exposure Scenario Title Heavy Fuel Oil	
Title	
Use as a Fuel	
Use Descriptor	
Sector(s) of Use	3
Process Categories	1, 2, 3, 8a, 8b, 16 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	7
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.	
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. Sample via a closed loop or other system to avoid exposure E8. 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.
CS15 General exposures	Handle substance within a closed system E47. Sample via a closed loop

(closed systems). + CS137 Product sampling.	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 equipment	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.
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.

Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3

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)	1.1e7
Fraction of Regional tonnage used locally	1.4e-1
Annual site tonnage (tonnes/year)	1.5e6
Maximum daily site tonnage (kg/day)	5.0e6

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)	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 (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 freshwater sediment [TCR1b]. Additional onsite wastewater treatment required [TCR13]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TRC14].	
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 ≥ (%)	87.7
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	
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) based on release following total wastewater treatment removal (kg/d)	5.2e6
Assumed domestic sewage treatment plant flow (m^3/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].	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated to recover [ERW3].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file in IUCLID Section 13	
Section 3 Exposure Estimation	
3.1. Health	
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].	

6. Use of Heavy Fuel Oil as a Fuel – Professional

Section 1 Exposure Scenario Title Heavy Fuel Oil	
Title	
Use as a Fuel	
Use Descriptor	
Sector(s) of Use	22
Process Categories	1, 2, 3, 8a, 8b, 16 *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	9a, 9b
Specific Environmental Release Category	ESVOC SpERC 7.12b.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.	
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 specific activity training PPE17.

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.

Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3

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)	3.3e5
Fraction of Regional tonnage used locally	5.0e-4
Annual site tonnage (tonnes/year)	1.7e2
Maximum daily site tonnage (kg/day)	4.6e2

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 only)	1.0e-4
Release fraction to wastewater from wide dispersive use	0.00001
Release fraction to soil from wide dispersive use (regional only)	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
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	
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) based on release following total wastewater treatment removal (kg/d)	2.3e3
Assumed domestic sewage treatment plant flow (m^3/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].	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated to recover [ERW3].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file in IUCLID Section 13.	
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].	

7. Use of Heavy Fuel Oil in Road and Construction Applications - Professional

Section 1 Exposure Scenario Title Heavy Fuel Oils	
Title	
Use in Road and Construction Applications	
Use Descriptor	
Sector(s) of Use	22
Process Categories	8a, 8b *Further information on the mapping and allocation of PROC codes is contained in Table 9.1*
Environmental Release Categories	8d, 8f
Specific Environmental Release Category	ESVOC SpERC 8.15.v1
Processes, tasks, activities covered	
Covers the use of surface coatings and binders within closed or contained systems, including incidental exposures during material transfers and filling operations.	
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	Operation is carried out at elevated temperature (> 20°C above ambient temperature). OC7. 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
CS3 Material transfers	Ensure material transfers are under containment or extract ventilation E66 Avoid carrying out activities involving exposure for more than 15 minutes OC26. Limit the substance content in the product to 1 % OC16. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls PPE18.
CS39 Equipment cleaning	Drain down and flush system prior to equipment break-in or maintenance

and maintenance	E55 Retain drain down in sealed storage pending disposal or for subsequent recycle ENVT4. Deal with spills immediately. C&H13. Avoid carrying out activities involving exposure for more than 15 minutes OC26. Limit the substance content in the product to 1 % OC16. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls PPE18. Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4.
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 2 to 3	
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)	2.2e4
Fraction of Regional tonnage used locally	5.0e-4
Annual site tonnage (tonnes/year)	1.1e1
Maximum daily site tonnage (kg/day)	3.0e1
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 only)	0.95
Release fraction to wastewater from wide dispersive use	0.01
Release fraction to soil from wide dispersive use (regional only)	0.04
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 (%)	N/A
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	30.2
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	
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) based on release following total wastewater treatment removal (kg/d)	1.1e2

Assumed domestic sewage treatment plant flow (m^3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable regulations [ETW3].	
Conditions and measures related to external recover of waste	
External recovery and recycling of waste should comply with applicable regulations [ERW1].	
Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in PETRORISK file in IUCLID Section 13	
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].	